UNIVERSITÉ DE BOURGOGNE

Demande de Subvention 2016 auprès du Grand Dijon

Soutien aux colloques

Unité de Recherche :	**Centre de Recherche en Droit et Science Politique (CREDESPO)**
Porteurs :	**Dominique Andolfatto (CREDESPO), Marc Filser (CREGO), Thomas Thévenin (THEMA)**
Titre du Projet :	**Colloque 8-9 septembre 2016** **"Compétitivité des chemins de fer et des cheminots"**

2. DEMANDE DE FINANCEMENT

DEPENSES			RECETTES		
Type et Détail des Dépenses éligibles	***Fournisseur, Prestataire ou salarié***	***Montant TTC***	**Nom du Financeur**	**Montant TTC**	**Acquis ou prévu**
. Fonctionnement					
			Auto-Financement du CREDESPO	2175,00 €	Acquis
Participation Missions/Hébergements		1200 €	Université de Bourgogne (BQR)	500,00 €	Acquis
			Laboratoire CREGO	500	Acquis
Collations matinée 3,75€x60	CROUS	225			
Collation après midi 2,5€x60 x2	CROUS	300	Ville de Dijon	1500 €	Prévu
			Conseil Général	1000	Prévu
Déjeuner (30x25), dont 10 payants	Germain trait.	750			
Dîner (40x25)		1000	Inscriptions au déjeuner : 30x10	300,00 €	Prévu
			SNCF	1000€	Acquis
Documentation		600,00 €			
Aide à la publication des actes		4000,00 €			
Plaquettes affiches supports		400,00 €			
			Montant de la Subvention demandée au Grand Dijon :	**1 500,00 €**	
MONTANT TOTAL DES DEPENSES		**8475 €**	**MONTANT TOTAL DES FINANCEMENTS :**	**8475,00 €**	

Patrick Charlot

Marc Filser, directeur du CREGO

Directeur du CREDESPO

Budget prévisionnel (Manifestations et Colloque ESIREM 2016)

Charges	**67 900,00 €**

Site	Estimation
Frais de salle	5 000,00 €
Personnel du site	2 000,00 €
Total	7 000,00 €

Spectacle	Estimation
Installation scène	1 800,00 €
Lumière	1 800,00 €
Sonorisation	2 500,00 €
Images	2 200,00 €
Divers (costumes…)	600,00 €
Total	8 900,00 €

Communication	Estimation
Photocopies/Impressions	2 500,00 €
Affranchissement	300,00 €
Divers (promotion soirée...)	2 600,00 €
Total	5 400,00 €

Divers	Estimation
Transport	500,00 €
Services de télécopie	570,00 €
Fourniture de bureau	530,00 €
SACEM/SPREE/Assurances	3 400,00 €
Total	5 000,00 €

Traiteur	Estimation
Restauration	27 410,00 €
Boissons	5 790,00 €
Cocktail	2 500,00 €
Total	35 700,00 €

Frais propres au Colloque	Estimation
Restauration	3 900,00 €
Frais Intervenants	1 650,00 €
Pause café	350,00 €
Total	5 900,00 €

Produits	**67 900,00 €**

Recettes propres	Estimation
Dîner spectacle	26 500,00 €
Colloque ESIREM-Entreprises	4 600,00 €
Esiros	3 000,00 €
Total	34 100,00 €

Annonces publicitaires	Estimation
Ecrans	3 000,00 €
Plaquettes	3 200,00 €
Banderoles	4 600,00 €
ESIREM	11 500,00 €
Total	22 300,00 €

Subventions	Estimation
Grand Dijon	4 000,00 €
CRB – FSDIE	7 500,00 €
Total	11 500,00 €

MSH de Dijon

Journées terminologies professionnelles de la gastronomie et de l'œnologie

20-21 septembre 2016

BUDGET PREVISIONNEL

DEPENSES			**RECETTES**	
Frais de déplacements des intervenants	1500,00€		Inscriptions payantes (120€/pers)	12 000,00€
Frais d'hébergement des intervenants	1750,00€			
Frais de restauration	3500,00€		Autofinancement des laboratoires	2000,00€
Diner de gala	3000,00€		Financement UB	5000,00€
Autres frais de réception	8000,00€			
Frais de communication	2750,00€		Ville de Dijon	1000,00€
Publication ouvrage	4000,00€		**Grand Dijon**	**1000,00€**
			Ville de Beaune	2000,00€
			BIVB	500,00€
			Association des Climats	500,00€
			Union des Métiers de l'Hôtellerie	500,00€
TOTAL	**24500,00€**		**TOTAL**	**24500,00€**

UNIVERSITÉ DE BOURGOGNE	**Demande de Subvention 2016 auprès du Grand Dijon** **Soutien aux colloques**
Unité de Recherche :	**Centre de Recherche en Droit et Science Politique (CREDESPO)**
Porteurs :	**Nathalie Droin, maître de conférences en droit public et** **Walter Jean-Baptiste, maître de conférences en droit privé**
Titre du Projet :	**Colloque, 3 et 4 novembre 2016** ***La réécriture de la loi sur la presse du 29 juillet 1881 : une nécessité ?***

2. PLAN DE FINANCEMENT DU PROJET

DEPENSES			RECETTES		
Type et Détail des Dépenses éligibles	***Fournisseur, Prestataire ou salarié***	***Montant TTC***	**Nom du Financeur**	**Montant TTC**	**Acquis ou prévu**
. Fonctionnement					
Missions			Auto-Financement du CREDESPO	2 885,00 €	Acquis
4 AR Paris Dijon		520,00 €	Université de Bourgogne (BQR)	2 000,00 €	Acquis
1 AR Montpellier Dijon		120,00 €			
1 AR Caen Dijon		140,00 €			
1 AR Reims Dijon		90,00 €	Ville de Dijon	2000 €	Prévu
4 AR Limoges Dijon		200,00 €	GIP Mission Droit et Justice	1 500,00 €	Prévu
1 AR Toulouse Dijon		150,00 €			
1 AR Clermont-Ferrand Dijon		60,00 €	Inscriptions au déjeuner : 30x20	600,00 €	Prévu
1 AR Nancy Dijon		50,00 €			
1 AR Havre Dijon		150,00 €			
Hôtel : 9 x 80€ x2 nuits + 6 x 80€ x1 nuit		1 920,00 €			
Diner1 intervenants (40€ x 12)		480,00 €			
Diner2 intervenants (40€ x 22)		880,00 €			
Déjeuners (30€ x 25 ; 30€ x 20 inscrits payants) x 2		2 700,00 €			
Collations matinée 3,75€x60		225,00 €			
Collation après midi 2,5€x60 x2		300,00 €			
Frais publication des actes		2 500,00 €			
Plaquettes affiches pochettes		500,00 €			
			Montant de la Subvention demandée au Grand Dijon :	**2 000,00 €**	
MONTANT TOTAL DES DEPENSES		**10 985,00 €**	**MONTANT TOTAL DES FINANCEMENTS :**	**10 985,00 €**	

Patrick Charlot

Directeur du CREDESPO

UNIVERSITÉ DE BOURGOGNE

Demande de Subvention 2016 auprès du Grand Dijon

Soutien aux colloques

Unité de Recherche :	**Centre de Recherche en Droit et Science Politique (CREDESPO)**
Porteurs :	**Elsa Forey, Professeur de droit public et Alix Meyer, Maître de conférences en civilisation américaine**
Titre du Projet :	**Colloque, du 27 au 28 octobre 2016 Transparence et moralisation de la vie politique en perspective comparée**

2. DEMANDE DE FINANCEMENT

DEPENSES			RECETTES		
Type et Détail des Dépenses éligibles	***Fournisseur, Prestataire ou salarié***	***Montant TTC***	**Nom du Financeur**	**Montant TTC**	**Acquis ou prévu**
. Fonctionnement					
Missions			Auto-Financement du CREDESPO	3120,00 €	Acquis
5 AR Paris Dijon		650,00 €	Universite de Bourgogne (BQR)	3 000,00 €	Acquis
1 AR Bologne Dijon		300,00 €	Laboratoire TIL de l'université de Bourgogne	500	Acquis
1 AR Bruxelles Dijon		260,00 €			
1 AR Strasbourg Dijon		100,00 €	Ville de Dijon	2500 €	Prévu
1 AR Grenoble Dijon		120,00 €	GIP Mission Droit et Justice	3000,00 €	Prévu
1 AR Toulon Dijon		200,00 €			
4 AR Besancon Dijon		200,00 €	Inscriptions au déjeuner : 30x20	600,00 €	Prévu
1 AR Lyon Dijon		60,00 €	Prise en charge de la mission américaine par le laboratoire du missionnaire	1100€	Acquis
1 AR Oviedo Espagne (vol + train)		400,00 €			
1 AR Boston Dijon (vol+ train)		1 100,00 €			
1 AR Londres Dijon (vol + train)		370,00 €			
1 AR Strockholm Dijon (vol+ train)		300,00 €			
1 AR Amsterdam Dijon (vol +train)		300,00 €			
1 AR Craciva Dijon (vol + train)		500,00€			
Hotel 16 x 80E x2 nuits + 7 x 80E x1 nuit		3 120,00 €			
Diner1 intervenants (40€ x 16)		640,00 €			
Diner2 intervenants (40€ x 30)		1200,00 €			
Déjeuners (30€ x 25 ; 30€ x 20 inscrits payants) x 2		2 700,00 €			
Collations matinée 3,75€x60x2		500,00 €			
Collation après midi 2,5€x60 x2		300,00 €			
Frais publication des actes		2500,00 €			
Plaquettes affiches pochettes		500,00 €			
			Montant de la Subvention demandée au Grand Dijon :	**2 500,00 €**	
MONTANT TOTAL DES DEPENSES		**16 320,00 €**	**MONTANT TOTAL DES FINANCEMENTS :**	**16320,00 €**	

Patrick Charlot

Directeur du CREDESPO

UNIVERSITÉ DE BOURGOGNE	**Demande de Subvention 2016 auprès du Grand Dijon** **Soutien aux colloques**
Unité de Recherche :	**Centre de Recherche en Droit et Science Politique (CREDESPO)**
Porteurs :	**Amélie MAYOUSSIER, doctorante du CREDESPO** **Aurèlie TOMADINI, maître de conférences, CREDESPO**
Titre du Projet :	**Colloque 20 octobre 2016** **Viticulture et droit public : les enjeux d'une rencontre**

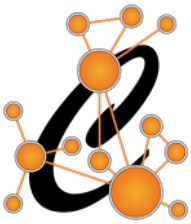
2. DEMANDE DE FINANCEMENT

DEPENSES			RECETTES		
Type et Détail des Dépenses éligibles	***Fournisseur, Prestataire ou salarié***	***Montant TTC***	**Nom du Financeur**	**Montant TTC**	**Acquis ou prévu**
. Fonctionnement					
Missions			Auto-Financement du CREDESPO	**1380,00 €**	Acquis
1 AR Lyon Dijon		**60,00 €**			
			Laboratoire TIL de l'université de Bourgogne	**500**	Acquis
Hotel 1 x 80E x 1 nuit		**80€**			
			Ville de Dijon	**1000 €**	Prévu
Diner1 intervenants (40€ x 12)		**480**			
Déjeuners (30€ x 15 ; 30€ x 10 inscrits payants)		**750**	Inscriptions au déjeuner : 30x10	**300,00 €**	Prévu
Collations matinée 3,75€x50		**185,00 €**			
Collation après midi 2,5€x50		**125,00 €**			
Frais publication des actes		**2000,00 €**			
Plaquettes affiches pochettes		**500,00 €**			
			Montant de la Subvention demandée au Grand Dijon :	**1000,00 €**	
MONTANT TOTAL DES DEPENSES		**4180,00 €**	**MONTANT TOTAL DES FINANCEMENTS :**	**4180,00 €**	

Patrick Charlot

Directeur du CREDESPO

Laboratoire Électronique Informatique et Image



The 7th International Workshop on Complex Networks

23-25 Mars 2016 Dijon

"CompleNet 2016"

http://complenet.org/CompleNet_2016/

Président du Comité de Programme : Pr. Hocine CHERIFI
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Université de Bourgogne – LE2I- UFR des Sciences et Techniques - Aile de l'Ingénieur

Sommaire

Presentation succinte de la Conférence

Préambule

Après Catane (Italie), Rio de Janeiro (Brésil), Melbourne (Floride), Berlin (Allemagne), Bologne (Italie), New York (USA), Dijon accueillera la septième édition de la conférence internationale « International Workshop on Complex Networks » du 23 au 25 Mars 2016. Après NetSci, CompleNet est la manifestation mondiale la plus prestigieuse entièrement dédiée à la science des réseaux. D'année en année, elle accroit son rayonnement international et devient un point d'échange incontournable de la communauté scientifique francophone, européenne et internationale dans le domaine des grandes masses de Données.

CompleNet 2016 sera un temps fort d'échanges entre les principaux acteurs de la recherche industrielle et universitaire. Environ 120 chercheurs du monde entier (**85% d'étrangers représentant plus de 30 nationalités**) sont attendus pour confronter leurs recherches sur la Science des réseaux.

Nous vivons désormais à l'ère des données. En effet, toutes les disciplines (physique, biologie, sciences sociales ,économie, informatique, météorologie, etc..) sont confrontées à un afflux massif de données et à une explosion d'informations à gérer. A travers les données et leurs interactions, la science des réseaux vise à comprendre ces structures de plus en plus grandes et, à travers elles, les systèmes complexes qu'elles modélisent.

L'originalité de la conférence réside dans le caractère résolument interdisciplinaire des thématiques abordées. En effet, la complexité et la science des réseaux sont des entreprises pluridisciplinaires qui mobilisent des ressources intellectuelles dans pratiquement toutes les communautés scientifiques. Dans les deux dernières décennies, nous avons assisté à une augmentation exponentielle du nombre de publications dans ce domaine. Des systèmes biologiques à l'informatique, de l'économie aux réseaux sociaux, les réseaux complexes sont de plus omniprésents dans de nombreux domaines de la science. C'est à cette nature interdisciplinaire des réseaux complexes que CompleNet vise à répondre.

Pour sa septième édition sous la présidence du professeur Hocine CHERIFI CompleNet a su réunir dans son comité scientifique d'éminents experts internationaux qui couvrent les cinq continents ceci afin de garantir l'excellence et la notoriété de cette manifestation.

CompleNet veut ainsi contribuer à la résolution des grands défis du secteur des « BIG DATA » en faisant collaborer efficacement les principaux acteurs industriels et universitaires du secteur, au meilleur niveau mondial.

Processus de Sélection

Le processus de sélection mis en place est extrêmement rigoureux. Chaque soumission sera évaluée par un minimum de 3 experts et 5 experts au maximum. On attend de 500 à

600 soumissions. Le nombre de papiers acceptés devant évoluer entre 100 à 120. Le comité d'orientation de CompleNet tiens à maitriser la croissance de la manifestation et limite volontairement le nombre de participants. Cette démarche est un gage d'excellence scientifique des contributions retenues. Elle vise a maintenir CompleNet dans les toutes premières rencontres scientifiques du domaine.

Comité de programme

Le comité de programme est résolument international avec plus de 30 nationalités représentées couvrant les 5 continents. Afin de gérer plus efficacement le caractère pluridisciplinaire de la conférence le président de la conférence s'est entouré d'une direction du comité de programme assuré par 2 coprésidents et d'un comité local d'organisation. Ce comité de programme est amené a évoluer afin d'intégrer de nouvelles personnalités.

Actes de la conférence

Les actes de la conférence seront publiés dans la série «Studies in Computational Intelligence" (SCI) **des Lecture Note on Computer Sciences de Springer.** Cette série publie les progrès et de nouveaux développements dans les différents domaines de l'Intelligence Artificielle. Son but est de diffuser efficacement les résultats de recherche originaux sous forme imprimée et électronique. Seuls sont considérés pour publication dans cette série les actes de conférences répondant aux normes internationales des comités de programme garantissant un strict processus d'évaluation et de sélection de soumission par les pairs. Le champ d'application de la série SCI couvre tout le spectre de l'Intelligence Artificielle à partir de thèmes fondamentaux de la théorie de l'informatique à l'information et de communication scientifique et de la technologie et un large éventail de domaines d'application interdisciplinaire.

La série SCi est indexées dans ISI Proceedings, DBLP, Ulrichs, SCOPUS, MathSciNet, Current Mathematical Publications, Mathematical Reviews, Zentralblatt Math: MetaPress et Springerlink.

Issues spéciales de revues scientifiques

CompleNet se veut une conférence résolument transdisciplinaire car c'est souvent aux interfaces que se situent les avancés les plus fécondes. Néanmoins cette volonté est couplée avec une volonté d'exigence quant à la qualité des contributions qui doivent être les plus représentatives des meilleurs travaux dans chacune des spécialités abordés. C'est la raison pour laquelle un certain nombre de revues on acceptées de nous accompagner afin de diffuser plus amplement les travaux présentés. A l'issue de la conférence les auteurs des meilleures contributions seront invités à proposer des versions étendues de leurs travaux pour apparaitre dans des issues spéciales des revues suivantes :

Applied Network Science	Springer
Computational Social Networks	Springer
Journal of Complex Networks	Oxford Journal

La conférence

La Conférence portera sur les recherches et les études en cours dans les domaines des réseaux complexes et plus particulièrement sur les sujets de recherche portant sur les points suivants (mais sans s'y limiter) :

- Applications of Network Science
- Behavioral & Social Influence
- Community Structure in Networks
- Complex Networks in Technology
- Complex Networks and Epidemics
- Complex Networks and Mobility
- Complex Networks in Biological Systems
- Complex networks in Statistical Mechanics
- Emergence in Complex Networks
- Geometry in Complex Networks
- Interacting Social Networks
- Information Spreading in Social Media,
- Link Analysis and Ranking
- Modeling Human Behavior in Complex Networks
- Network Evolution
- Networks as Frameworks
- Rumor Spreading
- Search in Complex Networks
- Social Networks
- Structural Network Properties and Analysis
- Synchronization in Networks

Composition de l'équipe organisatrice de la manifestation

Président Général

Hocine Cherifi, Université de Bourgogne, France.

Présidents du comité de programme

Bruno Gonçalves Université Aix-Marseille, France.

Roberta Sinatra Northeastern University, Cambridge, USA.

Présidents des sessions posters

Chantal Cherifi, Université de Lyon, France.

Olivier Togni, Université de Bourgogne, France.

Comité d'orientation

Giuseppe Mangioni, University of Catania, Italie.

José Mendes, University of Aveiro, Portugal.

Ronaldo Menezes, Florida Institute of Technology, USA.

Comité d'organisation local

Hocine Cherifi, Université de Bourgogne, France.

Eric Leclercq, Université de Bourgogne, France.

Sylvain Rampacek, Université de Bourgogne, France.

Marinnette Savonnet, Université de Bourgogne, France.

Olivier Togni, Université de Bourgogne, France.

Comité scientifique international

Yong-Yeol Ahn, Indiana University Bloomington, USA

Sebastian Ahnert, University of Cambridge, UK

Marco Aiello, University of Groningen, HOLLAND

Lucas Antiqueira, Universidade de São Paulo, BRAZIL

Marcio Argollo De Menezes, Universidade Federal Fluminense, BRAZIL

Tomaso Aste, University College London (UCL), UK

Rodolfo Baggio, Bocconi University, ITALY

Carmelo J. A. Bastos Filho, University of Pernambuco, BRAZIL

Rosa M. Benito, Universidad Politecnica de Madrid (UPM), SPAIN

Sanjukta Bhowmick, University of Nebraska, Omaha, USA

Marian Boguna, University of Barcelona, SPAIN

Dan Braha, NECSI, USA

Jesper Bruun, University of Copenhagen, Department of Science Education, DENMARK

Matteo Casadei, Alma Mater Studiorum - Università di Bologna, ITALY

Claudio Castellano, SMC, INFM-CNR, ITALY

Jaime Cohen, Federal University of Paraná (UFPR), BRAZIL

Regino Criado, Universidad Rey Juan Carlos, SPAIN

Luigi Cuccia, University of Palermo, ITALY

Dominik Dahlem, IBM Research, USA

Albert Diaz-Guilera, Universitat de Barcelona, SPAIN

Jordi Duch, Universitat Rovira i Virgili, SPAIN

Tim Evans, Imperial College London, UK

Alexandre Evsukoff, UFRJ, BRAZIL

Giorgio Fagiolo, Sant'Anna School of Advanced Studies, ITALY

Daniel Figueiredo, COPPE/UFRJ, BRAZIL

Pablo Fleurquin, IFISC - Universitat de les Illes Balears, SPAIN

Alexandre P. Francisco, INESC-ID / CSE Dept, IST, Tech Univ of Lisbon, PORTUGAL

Vasco Furtado, UNIFOR, BRAZIL

José Manuel Galán, University of Burgos, SPAIN

Philippe Giabbanelli, Simon Fraser University, CANADA

Fosca Giannotti, ISTI/CNR, ITALY

Santiago Gil, Northeastern University, USA

James Gleeson, University of Limerick, IRELAND

Kwang-Il Goh, Korea University, KOREA

Jesus Gomez-Gardenes, Universidad Rey Juan Carlos, SPAIN

Steve Gregory, University of Bristol, UK

Jean-Loup Guillaume, LIP6 - UPMC, FRANCE

Mehmet Gunes, University of Nevada, Reno, USA

Alexander Gutfraind, University of Illinois at Chicago, USA

Aric Hagberg, Los Alamos National Laboratory, USA

Mohammad Hasan, Indiana University Purdue University, Indianapolis, USA

Philipp Hoevel, TU Berlin, GERMANY

Petter Holme, Sungkyunkwan University, SWEDEN

Kevin Huggins, US Military Academy, USA

Marco Alberto Javarone, University of Sassari, ITALY

Renaud Lambiotte, University of Namur, BELGIUM

Paul Laurienti, Wake Forest Baptist Medical Center, USA

Sune Lehmann, Technical University of Denmark, DENMARK

Amanda Leonel, Technological Institute of Aeronautics, BRAZIL

Clemence Magnien, LIP6 (CNRS - UPMC), FRANCE

Giuseppe Mangioni, University of Catania, ITALY

Isabel Meirelles, Northeastern University, USA

Sandro Meloni, University of Zaragoza, SPAIN

Jose Mendes, University of Aveiro, PORTUGAL

Ronaldo Menezes, Florida Institute of Technology, USA

Vincenzo Nicosia, School of Mathematical Sciences, Queen Mary University of London, UK

Andrea Omicini, Alma Mater Studiorum–Università di Bologna, ITALY

Juyong Park, Graduate School of Culture Technology, KAIST, KOREA

Ana Pastore Y Piontti, Universidad Nacional de Mar del Plata, ARGENTINA

Georgios Piliouras, Georgia Institute of Technolog, USA

Luce Prignano, Institut Català de Paleocologia Humana i Evolució Social (IPHES), SPAIN

Matthias R. Brust, Louisiana Tech university, USA

Filippo Radicchi, Northwestern University, USA

Yiye Ruan, The Ohio State University, USA

Francisco C. Santos, INESC-ID, Lisboa, PORTUGAL

Joaquin Sanz, University of Zaragoza, SPAIN

Maximilian Schich, CCNR - Barbásilab, Northeastern University, USA

Frank Schweitzer, ETH Zurich, SWITZERLAND

M. Ángeles Serrano, Departament de Física Química, Universitat de Barcelona, SPAIN

Filippo Simini, University of Bristol, UK

Roberta Sinatra, CCNR and Physics Department, Northeastern University, USA

Thorsten Strufe, TU Dresden, GERMANY

Michael Szell, Northeastern University, USA

Attila Szolnoki, Res. Inst. Tech. Phys. & Mat. Sci., HUNGARY

Bosiljka Tadic, Jozef Stefan Institute, SLOVENIA

Robert Tolksdorf, Freie Universität Berlin, Networked Information Systems, GERMANY

Stephen Uzzo, New York Hall of Science, USA

Paulino R. Villas Boas, Universidade de São Paulo, BRAZIL

Mirko Viroli, Alma Mater Studiorum - Università di Bologna, ITALY

Dashun Wang, IBM T.J. Watson Research Center, USA

Haoxiang Xia, Dalian University of Technology, CHINA

Soon-Hyung Yook, Kyung Hee University, SOUTH KOREA

Anna Zygmunt, AGH, POLAND

Conférenciers invités

Complenet fait une large place aux conférenciers invités afin de stimuler les interactions entres les chercheurs de divers horizons (sciences sociales, physique, informatique, économie, etc..). Trois conférences invitées par jour alternent avec des sections techniques regroupées par thématiques. Le choix des conférenciers invités repose sur un certain nombre de principes :

- faire appel à des chercheurs de grande notoriété (keynote speakers) mais aussi à de jeunes chercheurs aux travaux prometteurs (invited speakers), susceptibles de devenir des leaders dans l'avenir.
- avoir des chercheurs de diverses nationalités, tout en donnant une légère préférence aux invités du continent sur lequel se déroule l'édition pour des commodités pratiques.
- avoir un certain équilibre entre les sexes.
- Avoir une répartition thématique équilibrée (théorie des réseaux, réseaux de villes, réseaux de mobilité, réseaux sociaux, épidémies, dynamique des réseaux, réseaux biologique, chaine alimentaire, science de la réussite, etc.)
- Avoir des chercheurs exerçant tout ou partie de leurs activités dans des laboratoires de grands groupes industriels

Invités des précédentes éditions :

2010 , Federal University of Rio de Janeiro, Rio de Janeiro , Brazil

M. Madan Babu, Cambridge,UK. Eugene Stanley, Boston University, USA
Jure Leskovec, Stanford, USA Rita Zozernon, University of Pernambuco,Brazil
Cesar Hidalgo, Harvard, USA Maximilian Schich, Northeastern Univ. USA
Marcio Argolo de Menezes, Universidade Federal Fluminense , Brazil

2012 , Florida Institute of Technology, Melbourne , Florida, USA

Sinan Aral, New York University , USA- Robert Bonneau, Rensselaer Pol. Institute, USA,
László Barabási, Northeastern Univ., USA Gourab Ghoshal, Northeastern Univ., USA
My Thai, University of Florida, USA Neil Johnson, University of Miami, USA
Julia Casasnovas, Univ. Rov. i Virgili, Spain - Sune Lehmann, Technical Univ. of Denmark, Denmark Nathalie Riche, Microsoft, USA

2013 , Freie Universitat Berlin, Germany

Thilo Gross, univ. of Bristol.UK Martin Warnke, Leuphana Univ, Germany,
Alex Arenas, Univ. Rov. i Virgili,Spain José Mendes, University of Aveiro, Portugal
Boleslaw Szymanski, NEST , USA Luis Izquierdo, University of Burgos Spain
Jesús Gómez-Gardeñes, Univ. de Zaragoza, Spain Maxi San Miguel, Univ. Illes Balears,Spain
Albert Diaz- Guilera, Univ.de Barcelona, Spain

2014 , University of Bologna, Bologna, Italy

Raffaella Burioni, Univ di Parma Italy - Tamás Vicsek, Eötvös Univ. Budapest, Hungary Alessandro Vespignani, ISI Foundation, Italy- Juyong Park, KAIST, South Korea Mirko Esposti, Univ. of Bologna, Italy Stephen Uzzo, New York Hall of Science, USA Giorgio Fagiolo, Sant'Anna School of Advanced Studies, Italy, Adriano Barra, Sapienza University of Rome Bruno Golçalves, Université Aix- Marseille

2015 , New York Hall of Science New York City, USA

Chaoming Song, University of Miami. USA, Reka Albert, Penn State University , USA, Cesar Hidalgo , Cambridge, USA- Hernan Makse, City College of New York, USA, Kate Coronges, Army Research Office Mark Newman, University of Michigan,USA Arun Sundararajan, Leonard N. Stern School of Business, USA -Ching-Yung Lin J. Watson Research Center, USA

Invités de l'Édition 2016, Université de Bourgogne, Dijon

- Renaud Lambiotte, Département de Mathématiques , Université de Namur, Belgique
- Alain Barrat, Centre de Physique Théorique, UMR 7332, Marseille, France
- Vittoria Colizza, INSERM, France.
- Nicola Perra, Business School of Greenwich University, UK.
- Giovanna Miritello, Telefonica, Spain
- Ernesto Estrada, Institute of Complex Systems, University of Strathclyde, Glasgow, U.K.
- Petra Vertes, Brain Mapping Unit (BMU), University of Cambridge, UK.
- Balazs Vedres, Center for Network Science, Central European University, Budapest, Hungary
- Jose Ramasco. IFISC, University of the Balearic Islands, Spain.

Intérêt de l'opération, retombées régionales attendues

Parce qu'elle touche à des enjeux stratégiques pour les sociétés développées (communication, protection de l'information, commerce, compétitivité industrielle), l'activité de recherche autour de la science des données joue un rôle essentiel dans l'essor et dans l'émergence des acteurs socio- économiques de l'industrie de l'information.

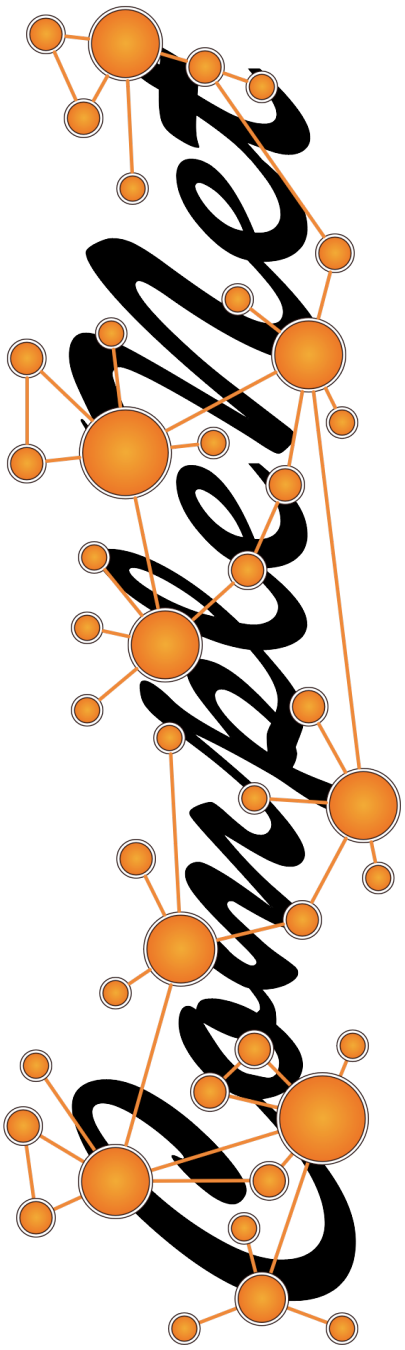
Dans une compétition internationale particulièrement intense l'organisation de CompleNet en Bourgogne témoigne de la très grande vitalité et du dynamisme exceptionnel des acteurs régionaux dans ce secteur. Elle constitue une occasion unique pour la ville de Dijon et pour toute la région afin de se positionner sur la scène nationale et internationale comme l'un des acteurs majeurs dans le développement des industries du futur.

Cette manifestation scientifique constitue un espace de promotion de choix pour les entreprises bourguignonnes évoluant dans des domaine d'activité aussi divers que les sciences du vivant, les sciences exactes (Multimédia, Imagerie, réalité Virtuelle, Réseaux, Web sémantique,etc.) , l'économie,etc.. Nous souhaitons que les entreprises innovantes du secteur prennent une part active à cette manifestation afin de valoriser les atouts technologiques des industriels de la région. Cette interaction entre la recherche et l'innovation technologique est un enjeu essentiel de CompleNet pour accompagner et renforcer ce processus de forte innovation des principaux acteurs du domaine.

Plan de Financement

DEPENSES PAR POSTE (TTC EN EUROS)			RECETTES (TTC EN EUROS)	
Intitulé	***Formule de calcul utilisée***	***Montant en Euros***	***intitulé***	***Montant En Euros***
Frais de préparations	2000	2000	**Inscriptions Payantes**	38100
Frais de Communications	1000	1000	**Subventions :**	
Bourses étudiants	3x500	1500	Conseil régional	5000
Location matériel info/vidéo	900	900	CNRS	5000
Location panneaux posters	600	600	Université de Bourgogne	5000
Conférenciers invités	9x1500	13500	Grand Dijon	5000
Organisateurs	4x1500	6000		
Editions des actes papier	60€X120	7200		
pauses (6)	6X120X5	3600		
Déjeuner-	17€X120X3	6120		
Repas de gala	45€x120	5400		
Visite guidée « dijon et le vin »	120x 15€	1800		
Cadeau souvenir	120x6	720		
Fourniture papeterie	500	500		
Cartables	120x12€	2400		
Impression Programmes	120x5€	360		
Badges	120X2,5€	300		
Création et gestion site Web		1500		
Frais postaux		1600		
Photocopies		600		
Téléphone/ fax		500		
Total général des dépenses		**58100**		**58100**

Annexe : Programme de l'édition 2015



THE 2015 INTERNATIONAL WORKSHOP ON COMPLEX NETWORKS

New York City, USA
March 25-27, 2015

FINAL PROGRAM

GENERAL CHAIR
Stephen Miles Uzzo

PROGRAM CHAIRS
Giuseppe Mangioni
Filippo Simini
Dashun Wang

STEERING COMMITEE
Giuseppe Mangioni
José Mendes
Ronaldo Menezes

LOCAL ORGANIZATION
Stephen Miles Uzzo
Catherine Cramer
Marcia Rudy

THE ART OF NETWORKS II CHAIR
Isabel Meirelles

WEBMASTER
Ronaldo Menezes

HOSTED BY

nysci
New York Hall of Science

SPONSOR

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ACADEMIC SUPPORT BY

West Point

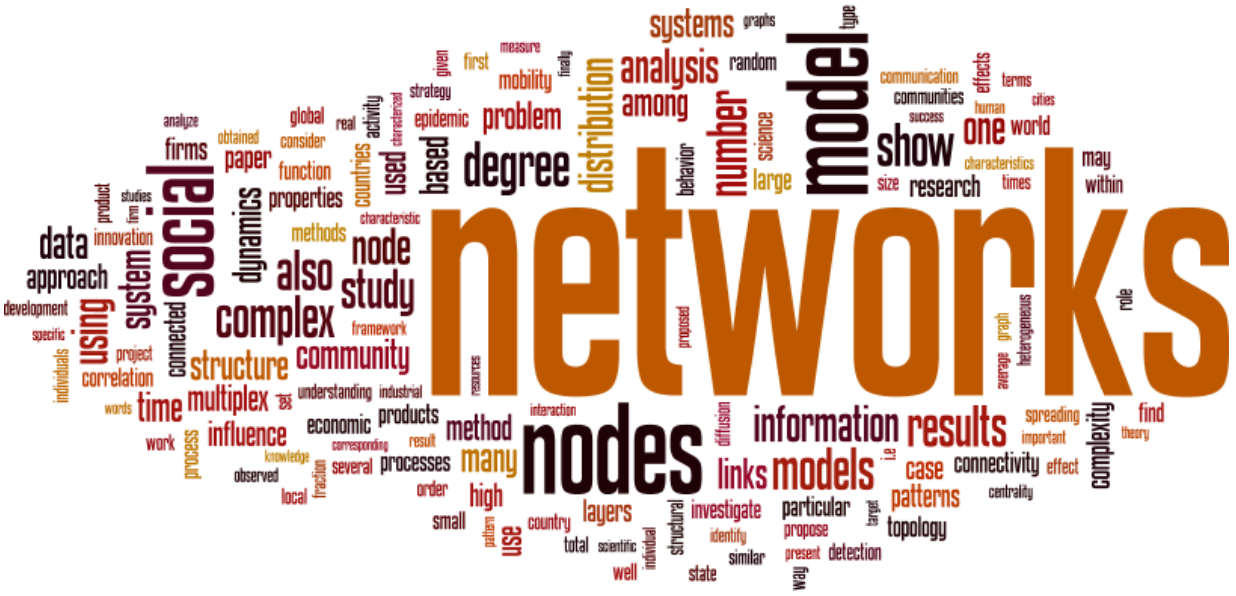
Florida Institute of Technology

University of Catania

University of Aveiro

COMPLENET 2015 WORD CLOUDS

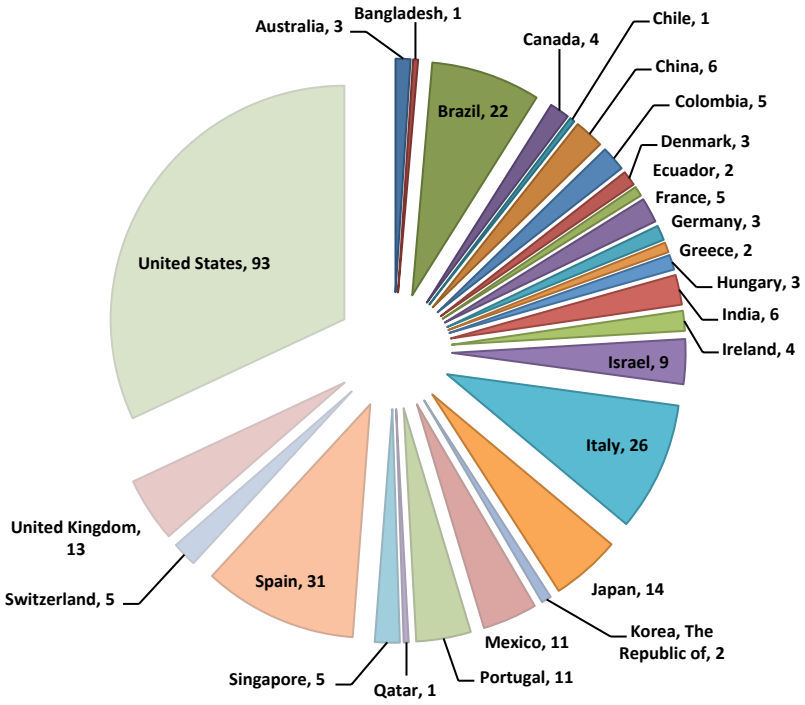
Abstracts of All Contributions



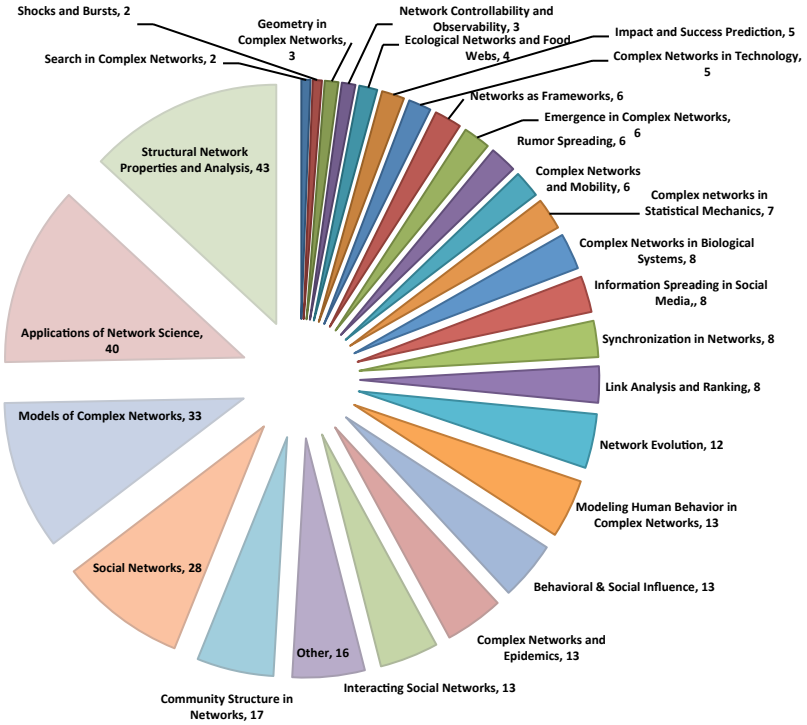
Citations of All Works

NUMBERS

Authors per Country



Contributions per Topic



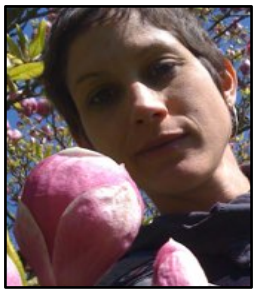
INVITED SPEAKERS' BIOS

REKA ALBERT
Pennsylvania State University

Prof. Reka Albert received her Ph.D. in Physics from the University of Notre Dame (2001), working with Prof. Albert-Laszlo Barabasi. She did postdoctoral research in mathematical biology at the University of Minnesota, then joined the Pennsylvania State University, where she currently is a Professor of Physics with adjunct appointments in the Department of Biology and the College of Information Science and Technology. Dr. Albert is a theorist who works on predictive modeling of biological regulatory networks at multiple levels of organization. Dr. Albert's pioneering publications on the structural heterogeneities of complex networks had a large impact on the field, reflected in their identification as "Fast breaking paper" and "High impact paper" by Thomson Reuters. Dr. Albert is a fellow of the American Physical Society, where she served as a member-at-large in the Division of Biological Physics. She was a recipient of a Sloan Research Fellowship (2004), an NSF Career Award (2007), and the Maria Goeppert-Mayer award (2011). Her service to the profession includes serving on the editorial board of the journals Physical Review E, The New Journal of Physics, IET Systems Biology, Biophysical Journal, SIAM Journal of Applied Dynamical Systems and Bulletin of Mathematical Biology, on the advisory board of the Mathematical Biosciences Istitute, and as a peer reviewer for more than 35 journals.

ALEX ARENAS
Universitat Rovira i Virgili, Tarragona

Alex Arenas (Barcelona) is Full Professor at the Departament d'Enginyeria Informàtica i Matemàtiques (DEIM) of theUniversitat Rovira i Virgili. He obtained his PhD in Physics in 1996. In 1995, he got a tenure position at DEIM, and in 1997 he became associate professor at the same department. In 2000, he was visiting scholar at the Lawrence Berkeley Lab. (LBL) in the Applied Mathematics group of Prof. Alexandre Chorin (University of California, Berkeley). After this visit, he started a collaboration with Berkeley, and in 2007 he became visiting researcher of LBL. Arenas has written more than 145 interdisciplinary publications in major peer reviewed including Nature, PNAS, Physics Reports and Physical Review Letters, which have received more than 5500 citations. He is one of the few Europeans serving as Associate Editors of the most important publication in physics worldwide, the American Physical Society journal Physical Review. He is in charge of the Interdisciplinary Physics section of Physical Review E. In 2011, he got the prestigious JSMF grant award for the study of complex systems.



KATHRYN CORONGES
Army Research Office

Dr. Kathryn Coronges is an Assistant Professor in the Department of Behavioral Sciences and Leadership at West Point. Dr. Coronges received a Masters degree in Public Health with an emphasis in Epidemiology in 2005 and a PhD in Health Behavior in 2009 from the University of Southern California in Los Angeles. Her dissertation used dynamic social network modeling techniques to investigate the role of friendship dynamics in the spread of alcohol and marijuana cognitions and behaviors. She has been an Assistant Professor in the Department of Behavioral Sciences & Leadership since July 2009. Within the Sociology program, she teaches an interdisciplinary course in Social Network Analysis for Public Policy which focuses on using network methodology and concepts to evaluate and design public and global policy (topics include energy, education, social media, information security, and health care systems). She has been the advisor for numerous cadets (including majors in Sociology, Engineering Psychology, and Math) on honors theses and summer internship projects. Dr Coronges is also a Research Fellow in West Point's Network Science Center, where she is active building research initiatives that apply social network analysis to important military issues. Her research explores the effects of social and organizational network structures of groups (from teams to societies) on communication patterns and performance outcomes.

CESAR HIDALGO

Macro Connections - MIT Media Lab

César A. Hidalgo is an assistant professor at the MIT Media Lab, and faculty associate at Harvard University's Center for International Development. Before joining MIT, Hidalgo was an adjunct lecturer in public policy at Harvard's John F. Kennedy School of Government, and a research fellow at Harvard's Center for International Development. Hidalgo's work focuses on improving the understanding of systems by using and developing concepts of complexity, evolution, and network science; his goal is to help improve understanding of the evolution of prosperity in order to help develop industrial policies that can help countries raise the living standards of their citizens. His areas of application include economic development, systems biology, and social systems. Hidalgo is also a graphic-art enthusiast and has published and exhibited artwork that uses data collected originally for scientific purposes. A native of Santiago de Chile, Hidalgo holds a PhD in physics from the University of Notre Dame and a bachelor's degree in physics from the Pontificia Universidad Catolica de Chile. With Ricardo Hausmann et al., he is co-author of The Atlas of Economic Complexity (2011).

CHING-YUNG LIN

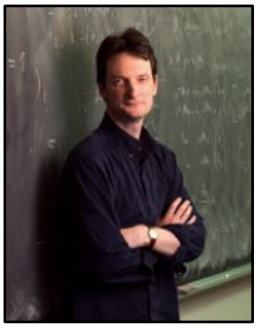
Thomas J. Watson Research Center, Yorktown Heights

Dr. Ching-Yung Lin is the Manager of the Network Science and Big Data Analytics Department in IBM T. J. Watson Research Center. He is also an Adjunct Faculty in Columbia University since 2005, in NYU since 2014, and in University of Washington 2003-2009. His research interest is mainly on fundamental research of multimodality signal understanding, network science, and computational social & cognitive science. Since 2011, Lin has been leading a team of more than 40 Ph.D. researchers in worldwide IBM Research Labs and more than 20 professors and researchers in 10 universities, including Columbia, Northeastern, Northwestern, CMU, U Minnesota, Rutgers, U New Mexico, UC-Berkeley, Stanford Research Institute, and USC. He is an author of 160+ publications and 20+ issued patents. His team recently won the Best Paper Award in BigData 2013, Best Paper Award in CIKM 2012, and Best Theme Paper Award in ICIS 2011. In 2011, he was the first IEEE Fellow elevated for contributions to Network Science.

HERNAN MAKSE

Levich Institute and Physics Department

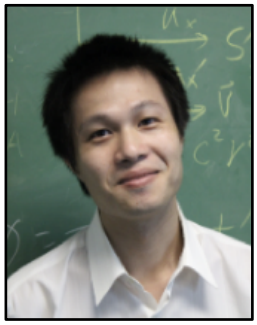
Hernán Makse currently serves as Professor of Physics at City University of New York, wherein he is responsible for the Complex Networks and Soft Matter lab at the Levich Institute. He holds a PhD degree in Physics from Boston University. He has been author of numerous publications on the theory of complex systems and the physics of granular materials. He has visited over 50 countries in the world and whenever he travels, he usually attends a concert at the main Arts Center of the city and enjoys the local culture. He loves jazz, classic literature and opera. He is also an avid footballer and likes to spend his free time kite-surfing in the northeastern Brazilian beaches.



MARK NEWMAN

Department of Physics, University of Michigan

Mark Newman received a PhD in physics from the University of Oxford in 1991 and conducted postdoctoral research at Cornell University before joining the staff of the Santa Fe Institute, a think-tank in New Mexico devoted to the study of complex systems. In 2002 he left Santa Fe for the University of Michigan, where he is currently the Dirac Professor of Physics and a professor in the university's Center for the Study of Complex Systems. Professor Newman's research focuses on networks, including social and biological networks. He is the author of over a 150 scientific publications, including seven books. Among other honors, he is a Fellow of the American Association for the Advancement of Science, a Fellow of the American Physical Society, and the winner of the 2014 Lagrange Prize.



CHAOMING SONG

University of Miami

Chaoming Song is an Assistant Professor in physics at University of Miami. He received the B.S. degree from the Fudan University in China in 2001 and the Ph.D. degree in physics from the City University of New York (CUNY) in 2008. Between 2008 and 2013, he worked with Laszlo Barabasi at the Northeastern University and Harvard Medical School as a postdoctoral fellow. Since August 2008 he joined in the Physics Department of University of Miami. Song's research interests lie in the intersection of statistical physics, network science, biological science and computational social science, broadly exploring patterns behind petabytes of data. One of his recent activities in this area is aiming to understand the fundamental properties of human mobility and interactions at various scales. He is also actively contributing to the network science area − an interdisciplinary field studying complex interactions that aims to connect phenomena emerged in different fields into a universal description. Currently Song is serving as an editorial board member of Nature: Scientific Reports.

ARUN SUNDARARAJAN

Leonard N. Stern School of Business

Arun Sundararajan is Professor and NEC Faculty Fellow at New York University's Leonard N. Stern School of Business. He also heads the Social Cities Initiative at NYU's Center for Urban Science+Progress, and is an affiliated faculty member at NYU's Center for Data Science. Professor Sundararajan's research program studies how digital technologies transform business and society. Some of his current and recent research focuses on the governance of digital spaces, collaborative consumption and the sharing economy, social media and cities, digital institutions, contagion in networks, privacy strategy, pricing in digital markets and managing online piracy. He has published in numerous scientific journals and has given more than 200 conference and invited presentations internationally. His research has been recognized by six Best Paper awards, been supported by organizations that include Yahoo!, Microsoft, Google and IBM, and recently profiled by trade publications that include The Atlantic, Bloomberg BusinessWeek, Fast Company, the Financial Times, Forbes, the San Francisco Chronicle and the Wall Street Journal. His op-eds and expert commentary have appeared in TIME Magazine, the New Yorker, the New York Times, the Washington Post, Le Monde, El Pais, Wired, TechCrunch, the Wall Street Journal, the Financial Times and Harvard Business Review, and on Al Jazeera, BBC News, Bloomberg, CNN, CNBC, Fox, NPR, PBS and a variety of non-English language TV networks. He has served as Director of NYU Stern's IS Doctoral Program since 2007, is one of the founders of the Workshop on Information in Networks, and is an advisor to OuiShare, the Center for Global Enterprise, the Project for the Advancement of our Common Humanity, and the National League of Cities. He holds degrees from the Indian Institute of Technology, Madras and the University of Rochester. Follow him on Twitter @digitalarun

CompleNet 2015 Program at a Glance

Wednesday, March 25, 2015

08:00	Registration and light breakfast
08:50	Opening remarks
09:00	Invited Speaker: Mark Newman
09:50	Invited Speaker: Ching-Yung Lin
10:40	Coffee Break
11:00	Technical session 1: Multiplex, Synchronization and Cascades
12:45	Lunch Break
13:45	Technical Session 2: Community Detection and Co-Evolving Networks
16:00	Coffee Break
16:20	Invited Speaker: Arun Sundararajan
17:30	Poster Session (refreshments included)
19:30	Dinner on your own

Thursday, March 26, 2015

08:00	Registration and light breakfast
09:00	Invited Speaker: Hernan Makse
09:50	Invited Speaker: Alex Arenas
10:40	Coffee Break
11:00	Technical session 3: Network Theory, Modeling and Metrics #1
12:45	Lunch Break
13:45	Technical Session 4: Networks in Finance and Economics
16:00	Invited Speaker: Kate Coronges
16:50	Coffee Break
17:10	Technical Session 5: Social Networks, Social Media and the Arts
18:55	Art of Networks opening (refreshments included)
20:30	Dinner on your own

Friday, March 27, 2015

08:00	Registration and light breakfast
09:00	Invited Speaker: Reka Albert
09:50	Invited Speaker: Chaoming Song
10:40	Coffee Break
11:00	Technical session 6: Network Theory, Modeling and Metrics #2
12:45	Lunch Break
13:45	Technical Session 7: Diffusion, Spreading and Searching on Networks
15:45	Invited Speaker: Cesar Hidalgo
16:35	Coffee Break
16:55	Technical Session 8: Language Networks and Science of Science
18:10	Closing remarks and Announcement of CompleNet 2016 Venue

CompleNet 2012 Detailed Program

Wednesday, March 25, 2015

08:00	Registration and light breakfast
08:50	Opening remarks Stephen Miles Uzzo (Conference Chair) Ronaldo Menezes (Steering Committee Member)
09:00	Learning from large-scale network data by Mark Newman
09:50	Network Science Solutions for Linked Big Data by Ching-Yung Lin
10:40	Coffee Break
11:00	Technical session 1: Multiplex, Synchronization and Cascades • Cascades on heterogeneous networks of networks • Several multiplexes in the same city: The role of socioeconomic differences in urban mobility • Cascading failures due to network overload • Pattern formation in multiplex networks • Dynamics on multiplex networks • Phase transition and hysteresis in the viability of multiplex networks • Synchronization levels in signaling networks with 1/f dynamics
12:45	Lunch Break
13:45	Technical Session 2: Community Detection and Co-Evolving Networks • Individual node's contribution to the mesoscale of complex networks • A flexible fitness function for community detection in complex networks • Interplay between burstiness and social activity in temporal networks • Optimal network modularity for information diffusion • Fast optimization of Hamiltonian for constrained community detection • Interdependent resistor networks with process-driven dependency • Expected Nodes: a quality function for the detection of link communities
16:00	Coffee Break
16:20	Deconstructing Influence and Trust in Complex Networks by Arun Sundararajan
17:30	Poster Session (refreshments included)
19:30	Dinner on your own

Thursday, March 26, 2015

08:00	Registration and light breakfast
09:00	Searching for Superspreaders in Networks: from Twitter to the Brain by Hernan Makse
09:50	Multilayer interconnected complex networks by Alex Arenas
10:40	Coffee Break
11:00	Technical session 3: Network Theory, Modeling and Metrics #1 • L-cloning for the analysis of network clustering • Collaborative problem solving in complex settings: Coupling NK model with the Ising/Glauber dynamics • Core-Periphery Models for Graphs based on their Delta-Hyperbolicity: An Example Using Biological Networks • Two kinds of cumulative advantage observed in networks • Shadow networks: Discovering hidden nodes with models of information flow • Resilience of interdependent modular networks
12:45	Lunch Break
13:45	Technical Session 4: Networks in Finance and Economics • Understanding user behaviour in massive decentralized sharing network • Tell me what you make and I will tell you how unequal you are: Uncovering the relationship between productive structure and income inequality • Efficient structure for networks with heterogeneous Connection Model • Global inter-firm networks and stock price correlations • Randomizing bipartite networks: the case of the World Trade Web • Detecting hidden correlation patterns in the historical behavior of country merchandise trade • From innovation to diversification: a simple competitive model • Building mini-categories in product networks
16:00	Structures of influence: Formal and informal leadership dynamics by Kate Coronges
16:50	Coffee Break

17:10	Technical Session 5: Social Networks, Social Media and the Arts • The universality of peer-influence in social networks • Structural patterns in backbone networks of multiple-choice test responses • From criminal spheres of familiarity to crime networks • Measuring the Generalized Friendship Paradox in networks with quality-dependent connectivity • Neighbourhood Distinctiveness: an initial study • Sentiment Classification Analysis of Chinese microblog network
18:55	Art of Networks opening (refreshments included)
20:30	Dinner on your own

Friday, March 27, 2015

08:00	Registration and light breakfast
09:00	Network analysis and discrete dynamic modeling elucidates the outcomes of within-cell networks by Reka Albert
09:50	Quantifying social dynamics: from scientific impact to social escalation by Chaoming Song
10:40	Coffee Break
11:00	Technical session 6: Network Theory, Modeling and Metrics #2 • An efficient estimation of a node's betweenness • How PageRank attachment process is affected by network topology. • Network models with realistic control profiles • Finding network motifs using MCMC sampling • Analysis of the robustness of degree centrality against random errors in graphs • Non-trivial inter-layer degree correlations in heterogeneously growing multiplex networks
12:45	Lunch Break
13:45	Technical Session 7: Diffusion, Spreading and Searching on Networks • Epidemic spreading in non-Markovian time-varying networks • Statistically exact simulation of Eepidemiological dynamics on networks • Competing spreading processes on multiplex networks: awareness and epidemics • Explosive transitions to large social contagions • The role of migration patterns in the spread of epidemics in complex networks • A two-parameter method to characterize the network reliability for diffusive processes • Rich club neurons dominate Information transfer in local cortical networks
15:45	Why Information Grows by Cesar Hidalgo
16:35	Coffee Break
16:55	Technical Session 8: Language Networks and Science of Science • NetSci High: Bringing network science research to high schools • Understanding team success • Scientific success and its contextual factors • Characterizing the Heterogeneity of Human Mobility ranges
18:10	Closing remarks and Announcement of CompleNet 2016 Venue

INVITED TALKS

LEARNING FROM LARGE-SCALE NETWORK DATA

Mark Newman

Wednesday, March 25, 9:00

Many systems of scientific interest take the form of networks, which are often large, complex, and multifaceted, making them interesting certainly, but also hard to understand. Much of the effort devoted to studying networks is, in effect, an attempt to find simple yet meaningful descriptions of these complex data. Can I give you small set of statements, facts, or numbers that will tell you most of what you need to know about a network, while missing out the millions of details that you don't need? Starting with simple examples, this talk will illustrate some new and powerful methods for doing this based on ideas from machine learning, and show how they can reveal many kinds of structure buried within networks and perform useful tasks such as prediction of missing links, generation of new networks that are similar to old ones, or identification of erroneous data in a network.

NETWORK SCIENCE SOLUTIONS FOR LINKED BIG DATA

Ching-Yung Lin

Wednesday, March 25, 9:50

In the Big Data era, data are linked and form large graphs. But, most traditional IT systems were designed for processing independent data, while analyses are mostly done in independent scenarios. Processing connected data has been a big challenge for Big Data Analytics, which requires both the traditional big data platforms for data processes that are easily to be parallelized and the novel graph computing platforms for data that are linked. There are three major aspects of graphs -- graph storage & retrieval, graph topological analysis, and graphical models. Graph database is a tool for efficiently managing large-scale graph data, especially important for contextual and relationship analysis. Graph analytics is important for finding the important vertices or edges that are more central, that are clustered, or that form abnormal patterns. Graphical models are essential to artificial intelligence, information reasoning and predictive analysis, which requires combining many factors to create actionable insights. We have been creating a comprehensive software system for probably all aspects of Graph Computing -- IBM System G. It includes 8 toolkits: Graph Database, Graph Middleware, Graph Analytics, Graph Visualization, Cognitive Networks, Cognitive Analytics, Spatiotemporal Analytics, and Behavioral Analytics. In this talk, I will use our Social Media Solution and Insider Threat Solution as examples to show how these Network Science toolkits work in real-world applications. For instance, the Social Media Solution includes: Live Monitoring, Trend Monitoring, Multimedia Monitoring, Scope Identification, Segment Analytics, Impact Prediction, Person Analytics, Flow Analytics, Target Discovery, and Anomaly Detection.

Deconstructing Influence and Trust in Complex Networks

Arun Sundararajan

Wednesday, March 25, 16:20

What causes us to trust our peers? How does this trust alter the extent to which our behaviors are influenced by our 'network neighbors'? Do digital social networks enhance or diminish trust? And as increasingly complex peer-to-peer marketplaces emerge, are there ways in which networks can be used to propagate trusted interaction? In my talk, I discuss what constitutes genuine influence in networks, what leads to trust between peers, how trust and influence interact, how they can be measure effectively, and how they can be seeded and propagated in networks, using simple examples as well as ongoing experiments for illustration.

SEARCHING FOR SUPERSPREADERS IN NETWORKS: FROM TWITTER TO THE BRAIN

Hernán Makse

Thursday, March 26, 9:00

The whole frame of interconnections in complex networks is hinged on a specific set of structural nodes, much smaller than the total size, which if activated would cause the spread of information to the whole network; or, if immunized, would prevent the diffusion of a large scale epidemic. Localizing this optimal, i.e. minimal, set of superspreaders is one of the most important problems in network science. Despite the vast use of heuristic strategies using high degree, betweenness and eigenvalue centralities, k-cores, PageRank, etc, the problem remains unsolved, and, surprisingly, a proper formulation in the language of optimization theory is still lacking. Here we provide the theoretical framework to identify superspreaders, which arise by minimizing the energy of a many-body system given by the non-backtracking matrix of the network. We carefully compare with all previous strategies, showing a systematic improvement in all cases, both in the quality of the solution and in the algorithmic running time. Big data analyses from Twitter to Brain Networks reveal that the set of superspreaders is much smaller than the one predicted by previous heuristic centralities. Remarkably, a large number of previously neglected weakly-connected nodes emerge among the optimal influencers. These are topologically tagged as low-degree nodes surrounded by hierarchical coronas of hubs, and are uncovered only through the optimal collective interplay of all the influencers in the network.

MULTILAYER INTERCONNECTED COMPLEX NETWORKS

Alex Arenas

Thursday, March 26, 9:50

The constituents of a wide variety of real-world complex systems interact with each other in complicated patterns that can encompass multiple types of relationships, change in time, and include other types of complications. Recently, the interest of the research community increased towards such systems because accounting for the "multilayer" features of those systems is a challenge. In this talk, we will discuss several real-world examples, put in evidence their multilayer information and review the most recent advance in this new field.

STRUCTURES OF INFLUENCE: FORMAL AND INFORMAL LEADERSHIP DYNAMICS

Kathryn Coronges

Thursday, March 26, 16:00

Understanding how groups make decisions and perform complex tasks is critical for predicting, evaluating and building successful teams. Recent research in Network Science has focused on finding unifying principles underlying network topology, dynamics and behaviors across physical, biological, spatial and social domains. Yet, social networks are driven by unique factors as they are dependent on cognitions, emotions, and beliefs, and thus require analysis and modeling rooted in social theories and behavioral processes. Teams are organized, either by design or by natural evolution, into structured relationships that are governed by rules of interactions that involve power, influence, and varying degrees of control, flexibility and adaptability. In organizations, formal imposed power structures have very different capabilities and utility than naturally occurring relationships among these same members. Work is presented that compares formal (command structure) and informal (perceptions of leadership) relationships in military units, as well as affective relationships (friendship, trust). In addition, we explore influence and spread of beliefs and behaviors dependent on those various structures and dynamics. Results show for example that informal leaders influence others' leadership attitudes and performance. This work offers empirical and conceptual insights into how the network science of teams can be better developed through network based metrics of cooperation processes and collaborative performance outcomes (e.g. adaptability and decision making) and with formalization of processes like group intelligence, shared mental models, and group think.

NETWORK ANALYSIS AND DISCRETE DYNAMIC MODELING ELUCIDATES THE OUTCOMES OF WITHIN-CELL

Reka Albert

Friday, March 27, 9:00

Interaction networks formed by gene products form the basis of cell behavior (growth, survival, apoptosis, movement). Experimental advances in the last decade helped uncover the structure of many molecular-to-cellular level networks, such as protein interaction or metabolic networks. These advances mark the first steps toward a major goal of contemporary biology: to map out, understand and model in quantifiable terms the various networks that control the behavior
of the cell. Such an understanding would also allow the development of comprehensive and effective therapeutic strategies.

This talk will focus on my group's recent work on discrete dynamic modeling of signal transduction networks in various organisms. These models can be developed from qualitative information yet show a dynamic repertoire that can be directly related to the real system's outcomes. For example, our model of the signaling network inside T cells predicted therapeutic targets for the blood cancer T-LGL leukemia, several of which were validated experimentally. I will then present an enriched network representation that includes the regulatory logic. Extension of existing network measures and analyses, performed on this expanded network, allows an efficient way to determine the dynamic repertoire of the network and to predict manipulations that can stabilize or, conversely, block, certain outcomes.

QUANTIFYING SOCIAL DYNAMICS: FROM SCIENTIFIC IMPACT TO SOCIAL ESCALATION

Chaoming Song

Friday, March 27, 9:50

The emergent processes driving social dynamics are a product of complex interactions among large numbers of individuals. In this talk, I will show several examples of complex human dynamics across various social systems, from scientific impact to social escalations. In the first part, I demonstrate a mechanistic model for the citation dynamics of individual papers, allowing us to collapse the citation histories of papers from different journals and disciplines into a single curve, indicating that all papers tend to follow the same universal temporal pattern. Next we focus on sudden uprisings occurred in social unrests, providing evidence instead of a remarkable gestational phase marked by self-organized aggregation through Social Networking Sites. Development hyper-escalates ahead of an uprising, enabling prediction of the real-world onset with substantial lead-times. Following a close parallel with the correlation clustering in quasi-particles and cyber-enabled contentious politics, we develop a theory of multi-agent adaptation agnostic of country and language.

WHY INFORMATION GROWS

Cesar Hidalgo

Friday, March 27, 15:45

The universe is made of energy, matter and information; but information is what makes the universe interesting. Without information, the universe would be an amorphous soup. It would lack the shapes, structures, aperiodic orders and fractal arrangements that give the universe both its beauty and complexity. Yet information is rare. It hides in pockets as it battles the universe’s hostility towards order: the growth of entropy. This talk will discuss the growth of physical order -- or information -- in the universe by describing the physical, social, and economic mechanisms that allow order to grow; from atoms to economies.

TECHNICAL SESSION 1: MULTIPLEX, SYNCHRONIZATION AND CASCADES

Wednesday, March 25, 11:00

Chair: TBD

CASCADES ON HETEROGENEOUS NETWORKS OF NETWORKS

Sergey Melnik, Mason Porter, Peter Mucha and James Gleeson

We develop a new ensemble of modular random graphs in which degree-degree correlations can be different in each module and the inter-module connections are defined by the joint degree-degree distribution of nodes for each pair of modules. We present an analytical approach that allows one to analyze several types of binary dynamics operating on such networks, and we illustrate our approach using bond percolation, site percolation, and the Watts threshold model. The new network ensemble generalizes existing models (e.g., the well-known configuration model and LFR networks) by allowing a heterogeneous distribution of degree-degree correlations across modules, which is important for the consideration of nonidentical interacting networks.

SEVERAL MULTIPLEXES IN THE SAME CITY: THE ROLE OF SOCIOECONOMIC DIFFERENCES IN URBAN

Laura Lotero, Alessio Cardillo, Rafael Hurtado and Jesus Gomez-Gardenes

Mobility plays a crucial role not only in transportation science but also in other fields like (to cite one) epidemiology. In recent times, the appearance of \emph{multiplex networks} has allowed to look at many complex systems under a new perspective, and transportation systems represent a well suited case to be analyzed under such paradigm. Even though a lot of data on mobility are available, the surveys campaigns made so far have always assumed no differences among travellers. However, it is known that the composition of the society, in terms of economic wealth, is highly hierarchical. Recently, two mobility surveys realized in the cities of Bogot\'a and Medell\'{\i}n in Colombia have been able to include also information about the socioeconomic status of the travellers. Thanks to these surveys, it has been possible to study the urban mobility by means of multiplex networks. In particular, each city is represented by six multiplex networks, each one representing the origin-destination trips performed by a subset of the population corresponding to a particular socioeconomic status (SES).

CASCADING FAILURES DUE TO NETWORK OVERLOAD

Yosef Kornbluth, Gabriel Cwilich and Sergey Buldyrev

We study the failure of networks due to overload, using the centrality betweenness of a node as the measure of its load. We discover a critical dependence between a node's degree and its load, and explain this dependence analytically. This dependence results in the counterintuitive result that nodes far away from previously destroyed nodes are the most vulnerable; we confirm this result computationally. We explore the role of the network's parameters and its degree distribution on its resilience for both random regular and Erdos-Renyi networks. We also explore a shift between first-order and second-order transitions as the parameters change.

PATTERN FORMATION IN MULTIPLEX NETWORKS

Nikos Kouvaris, Shigefumi Hata and Albert Diaz-Guilera

The advances in understanding complex networks have generated increasing interest in dynamical processes occurring on them.
Pattern formation in activator-inhibitor systems has been studied in networks, revealing differences from the classical continuous media. Here we study pattern formation in a new framework, namely multiplex networks.
These are systems where activator and inhibitor species occupy separate nodes in different layers. Species react across layers but diffuse only within their own layer of distinct network topology. This multiplicity generates heterogeneous patterns with significant differences from those observed in single-layer networks. Remarkably, diffusion-induced instability can occur even if the two species have the same mobility rates; condition which can never destabilize single-layer networks.The instability condition is revealed using perturbation theory and expressed by a combination of degrees in the different layers.
Our theory demonstrates that the existence of such topology-driven instabilities is generic in multiplex networks, providing a new mechanism of pattern formation.

DYNAMICS ON MULTIPLEX NETWORKS

Albert Diaz-Guilera

We will show some of the recent result in our group concerning dynamics in multiplex networks. On the one hand we consider multiplex networks as set of nodes in different layers. At each layer the set of nodes is the same but the connections among the nodes can be different in the layers. Furthermore the connections among the layers is described by a “network of layers”. We have studied different processes across the layers (diffusion) and between the layers (reaction). In this case Turing patterns appear as an effect of different average connectivities in different layers. As a particular case of multiplex network, one can also analyze networks that change in time, since in this case each layer of the multiplex corresponds to a snapshot of the interaction pattern. For this situation, we have shown that there are different mechanisms that dominate the diffusion of information in the system depending on the relative effect of mobility and diffusion among the nodes.

PHASE TRANSITION AND HYSTERESIS IN THE VIABILITY OF MULTIPLEX NETWORKS

Kwang-Il Goh

Many complex systems demand manifold resources to be supplied from distinct channels to function properly, e.g., water, gas, and electricity for a city. For such kind of systems, supports of more than one type of vital resources produced from a fixed set of source nodes such as power plants in power grid and water sources in water supply networks through a series of functioning nodes are essential for the proper functioning, or to be viable as we shall call. Here, we present results for a model for viability of such systems demanding simultaneous connectivities with vital resources produced and distributed by source nodes in multiplex networks proposed in [1].

The multiplex viability model is defined as follows. Given a network with n-multiple layers, in which each layer of the network corresponds to a certain infrastructural network, a given fraction ρ of resource nodes generates and distributes resources essential to be viable. A key assumption of the model is that only viable nodes can function properly and transmit resources further to their connected neighbors. Then, a node is viable only if it can reach, via the viable nodes, a source node in each and every layer. By presenting algorithms (Fig. 1a,b) to identify the set of viable nodes and the analytic solutions to the problem, we illustrate novel features of system behaviors characterized by the multiple resource demands.

A rich variety of behaviors were observed, such as discontinuity, bistability, and hysteresis in the fraction of viable nodes, called the viability V , with respect to the mean degree z of networks and the fraction of resource nodes ρ. The presence of discontinuous jumps in the viability indicates a potential danger of abrupt collapse of the system similar to the existing model of cascading failures in interdependent networks [2]. Furthermore, the strong hysteresis with respect to the link density suggests that after collapse, more addition of links compared with the link density before collapse is required to restore viability of networks as the previous level (Fig. 1c). Therefore, our results reveal the additional hidden cost of multiplex systems’ vulnerability in that viability of multiplex networks is not only exposed to the risk of abrupt collapse but also suffers excessive complication in recovery.

SYNCHRONIZATION LEVELS IN SIGNALING NETWORKS WITH 1/F DYNAMICS

Daniel Aguilar-Velázquez and Lev Guzman-Vargas

We study the levels of synchronization in a simple signaling network model (Amaral et al.), which under particular conditions is able to generate complex fluctuations with long-range correlations (1/f noise).

The system comprises Boolean units located in a network with small-world topology, and certain level of noise is considered between the communication of connected units. We use the Hilbert's transform to construct the phase difference between all pairs of units in the network, and then the synchronization parameter is calculated.

We find that the presence of 1/f-noise in the fluctuations, representing the state of the system, is associated with intermediated levels of synchronization between the units, i. e., when long-range correlations are present, the system exhibits

moderated synchronization, whereas for Brownian motion the units exhibit a low synchronization level. Moreover, we evaluate the sensitivity of the system to initial perturbations in terms of the Hamming distance, our results

indicate that for 1/f dynamics, the system displays moderated sensitivity when is compared to the white noise and Brownian motion cases.

TECHNICAL SESSION 2: COMMUNITY DETECTION AND CO-EVOLVING NETWORKS

Wednesday, March 25, 13:45

Chair: TBD

INDIVIDUAL NODE'S CONTRIBUTION TO THE MESOSCALE OF COMPLEX NETWORKS

Florian Klimm, Javier Borge-Holtoefer, Niels Wessel, Jürgen Kurths and Gorka Zamora-López

We have introduced measures to uncover the contribution that individual nodes make in modular and hierarchical networks. Our framework builds upon previous efforts to characterise the roles that nodes take [1, 2] overcoming their limitations, providing both comprehensive and universal results across networks of different characteristics. These tools will provide very useful insights into the architecture of the mesoscale of real networks, as we have illustrated for some biological networks, by filling the existing gap in the toolbox of network analysis that is already rich in local and in global measures.

A FLEXIBLE FITNESS FUNCTION FOR COMMUNITY DETECTION IN COMPLEX NETWORKS

Fabricio Olivetti de Franca and Guilherme Palermo Coelho

Most community detection algorithms from the literature work as optimization tools that minimize a given quality (or fitness) function, while assuming that each node belongs to a single community. Although several studies propose fitness functions for the detection of communities, the definition of what a community is is still vague. Therefore, each proposal of fitness function leads to communities that reflect the particular definition of community adopted by the authors. Besides, such communities not always correspond to the real partition observed in practice. This paper proposes a new flexible fitness function for community detection that allows the user to obtain communities that reflect distinct characteristics according to what is needed. This new fitness function was combined with an adapted version of the immune-inspired optimization algorithm named cob-aiNet[C] and applied to identify (both disjoint and overlapping) communities in a set of artificial and real-world complex networks. The results have shown that the partitions obtained with the optimization of this new metric are more coherent (when compared to the real, known, partitions) than those obtained with one of the most adopted function from the literature: modularity.

INTERPLAY BETWEEN BURSTINESS AND SOCIAL ACTIVITY IN TEMPORAL NETWORKS

Michele Starnini, Antoine Moinete and Romualdo Pastor-Satorras

Here we present an analytic study concerning the activity driven networks model [Perra at al. Sci. Rep. 2, 469 (2012)]. Firstly, we show how to obtain analytical expressions for the topological properties of the time-integrated networks, by means of a mapping to a hidden variables network model. Then we study the percolation properties of time-varying activity driven networks, providing exact expressions for the percolation threshold in both cases of uncorrelated networks, and general case of correlated networks. The temporal percolation concept can be fruitfully applied to study epidemic spreading on temporal networks. Finally we propose a new model, the Non-Poissoinan activity driven model (NoPAD), aimed to incorporate the empirically observed bursty nature of social interactions within the activity driven framework. We show that the NoPAD model is still analytically tractable, and we compute the degree distribution of the time-integrated networks.
Additionally, the NoPAD model predicts the presence of aging effects in the topology of the integrated networks. We validate the theoretical framework proposed by contrasting the results obtained with numerical simulations of the model, and we address the aging effects on a large empirical data set of scientific collaboration networks.

OPTIMAL NETWORK MODULARITY FOR INFORMATION DIFFUSION

Azadeh Nematzadeh, Emilio Ferrara, Alessandro Flammini and Yong-Yeol Ahn

We investigate the impact of community structure on information diffusion with the linear threshold model. Our results demonstrate that modular structure may have counterintuitive effects on information diffusion when social reinforcement is present. We show that strong communities can facilitate global diffusion by enhancing local, intracommunity spreading. Using both analytic approaches and numerical simulations, we demonstrate the existence of an optimal network modularity, where global diffusion requires the minimal number of early adopters.

FAST OPTIMIZATION OF HAMILTONIAN FOR CONSTRAINED COMMUNITY DETECTION

Keisuke Nakata and Tsuyoshi Murata

Many methods for analyzing networks have been proposed. Among them, methods for community detection based on network structures are important for making networks simple and easy to understand. As an attempt for incorporating background knowledge of given networks, methods called constrained community detection have been proposed recently.
Constrained community detection methods show robust performance on noisy data since they use background knowledge in the process of community detection. In particular, methods for community detection based on constrained Hamiltonian have advantages of flexibility in output results. The Hamiltonian, energy in statistical mechanics, can theoretically be considered as a generalization of Newman's modularity.
In this paper, we propose a method for accelerating the speed of constrained community detection based on Hamiltonian. Our optimization method is a variant of Blondel's Louvain method which is well-known for its computational efficiency. We experimentally show that our proposed method is superior in terms of computational time, and its accuracy is equal or greater than the existing method based on simulated annealing under the same conditions. Our proposed method enables us to perform constrained community detection in larger networks compared with existing methods. Moreover, we compare the strategies of adding constraints incrementally in the process of constrained community detection. Our experimental results show that a strategy of adding constraints to boundary nodes is good in terms of accuracy of constrained community detection.

INTERDEPENDENT RESISTOR NETWORKS WITH PROCESS-DRIVEN DEPENDENCY

Michael Danziger, Amir Bashan and Shlomo Havlin

One of the original and enduring focuses of percolation theory is the study of resistor networks. Recently, percolation theory has been used to construct a rich new the theory of interdependent networks. Here, we return to the problem of resistor networks, utilizing the framework of interdependent networks. In the process, we describe a new class of dependency in which a node's functionality, including its ability to provide support to nodes in another network, is determined by whether or not it is actually carrying current and not just by its connectivity. Beyond merely revisiting an established problem, we present here a shift in the basic assumptions of the theory of interdependent networks from a static, purely structural concept of functionality to a dynamic, process-based functionality. As such, the approach that we develop here may be useful in other interdependent systems where it is important to differentiate between connectivity and actual utilization of links.

EXPECTED NODES: A QUALITY FUNCTION FOR THE DETECTION OF LINK COMMUNITIES

Noé Gaumont, François Queyroi, Clémence Magnien and Matthieu Latapy

Many studies use community detection algorithms in order to understand complex networks. Most papers study node communities, i.e. groups of nodes, which may or may not overlap. A widely used measure to evaluate the quality of a community structure is the modularity. However, sometimes it is also relevant to study link partitions rather than node partitions. In order to evaluate a link partition, we propose a new quality function: Expected Nodes. Our function is based on the same inspiration as the modularity and compares, for a given link group, the number of incident nodes to the expected one. In this short note, we discuss the advantages and drawbacks of our quality function compared to other ones on synthetics graphs. We show that Expected Nodes is able to pass some fundamental sanity criteria and is the one that best identifies the most relevant partition in a more realistic context.

TECHNICAL SESSION 3: Network Theory, Modeling and Metrics #1
Thursday, March 26, 11:00
Chair: TBD

L-CLONING FOR THE ANALYSIS OF NETWORK CLUSTERING
Ali Faqeeh, Sergey Melnik and James Gleeson

We introduce network L-cloning, a novel technique for creating ensembles of random networks from any given real-world or artificial network. Each member of the ensemble is an “L-cloned network” constructed from L copies of the original network. The degree distribution of an L-cloned network and, more importantly, the degree-degree correlation between and beyond nearest neighbors are identical to those of the original network. The density of triangles in an L-cloned network, and hence its clustering coefficient, are reduced by a factor of L comparing to those of the original network. Furthermore, the density of loops of any fixed length approaches zero for sufficiently large values of L. As an application, we employ L-cloning to investigate the effect of short loops on dynamical processes running on networks and to inspect the accuracy of corresponding tree-based theories. We demonstrate that dynamics on L-cloned networks (with sufficiently large L) are accurately described by the so-called “adjacency tree-based theories”, which is a class of theoretical approaches for modeling various networked behaviors including percolation, SI epidemic spreading, and the Ising model.

COLLABORATIVE PROBLEM SOLVING IN COMPLEX SETTINGS: COUPLING NK MODEL WITH THE ISING/GLAUBER DYNAMICS
Ilaria Giannoccaro and Giuseppe Carbone

Managerial problems in different contexts such as product innovation, organizational design, and business strategy may be conceived as search problems where effective combinations of multiple and interdependent decision variables should be identified (Levinthal 1997; Katila and Ahuia, 2002; Mihm, Loch and Huchzermeier, 2003; Billinger et al., 2014).
To solve them, enhancing the search capability of the project members is a critical task, and collaborative problem solving (CPS) is a good strategy to adopt (Li, Bingham, and Umphress, 2007). Members combine their problem solving activities, share their knowledge to propose a solution for a common problem, and resolve conflicts through honest and open discussion. Interactions are based on collaboration, which involves high levels of transparency, mindfulness, and synergies (Jassawalla and Sashittal 1998). CPS has been shown to reduce environmental uncertainty (Jassawalla and Sashittal 1998) and to be positively associated with project performance (Edmondson 1999).
The aim of this paper is to study CPS in complex settings by applying NK model coupled with the Ising/Glauber dynamics. The NK model is used to code the complex problem in terms of interacting binary decisions and to associate a payoff with each configuration of decisions (fitness landscape); the Ising/Glauber perspective is applied to model the collaborative interactions occurring among project members involved in problem solving. Solving the problem consists in finding the global peak of the landscape (i.e., the configuration with the highest payoff) by applying a given search algorithm.
First, we recognize that the mechanism underlining CPS is based on social interactions among project members. In fact, this type of problem solving relies on the effect of open social relationships among project members, where knowledge is shared and information are disclosed (Jassawalla and Sashittal 1998). Then, we conceptualize CPS as a search strategy on the landscape. Project members, engaged in honest and open discussions, tend to convergence towards a vector of decisions (configuration), which minimize the level of conflict. This configuration is associated with a payoff, that should be optimized by means of collaborative social interactions.We consider a complex problem made up of N decisions to be solved by a group of project members adopting CPS. Each member makes a single binary decision (-1,1). The project member decisions thus correspond to a vector of choices on the decision space (configuration). In making the decision each member is influenced by his/her self-support, the knowledge of the neighbors, and the feedback he/she receives in terms of payoff improvement. A positive (negative) feedback is associated with a reduction (an increase) of the probability to change decision.
In order to describe the time evolution of decisions of the member of our Ising system, the Markov process defined by Glauber (1963) is employed, where the parameter governing the rate of change of member decisions is linked to the payoff feedback through an ad hoc relation, which represents the behavior of each single project member in making decisions.
A numerical analysis is provided to study the effect of complex parameters (N and K) on the efficacy of CPS to reach the highest payoff on the landscape.

CORE-PERIPHERY MODELS FOR GRAPHS BASED ON THEIR DELTA-HYPERBOLICITY: AN EXAMPLE USING BIOLOGICAL NETWORKS

Hend Alrasheed and Feodor Dragan

Hyperbolicity is a global property of graphs that measures how close their structures are to trees in terms of their distances. Itembeds multiple properties that facilitate solving several problems that found to be hard in the general graph form. In this paper, we investigate the hyperbolicity (or tree likeness) of graphs not only by considering Gromov's notion of delta-hyperbolicity but also by analyzing its relationship to other graph's parameters. This new perspective allows us to classify graphs with respect to their hyperbolicity, and to show that many biological networks are hyperbolic. Then we introduce the eccentricity-based bending property which we exploit to identify the core vertices of a graph by proposing two models: the Maximum-Peak model and the Minimum Cover Set model.

TWO KINDS OF CUMULATIVE ADVANTAGE OBSERVED IN NETWORKS

Ewan Colman

Our intuition tells us that links in a network are more likely to be created between nodes which are already well connected rather than those which have few connections. This maxim has famously been used to explain the large scale structure of many networks found in society. In this talk we examine this phenomenon on a deeper level and give likely explanations as to why well connected nodes have a higher likelihood of attracting new links. We introduce two models based around the concepts of triad formation and triadic closure which are applicable to citation networks, recommender systems and online social networks. Both models produce cumulative advantage effects which effect the large scale structure of the network in two different ways: in growing networks the degree distribution is scale-free with an exponent dependent on the rate at which triads are created. In dynamic networks, where edges can also be removed and rewired, we observe the spontaneous formation of rich-clubs; small groups of tightly connected nodes which dominate the network and appear as outliers to the degree distribution.

SHADOW NETWORKS: DISCOVERING HIDDEN NODES WITH MODELS OF INFORMATION flOW

James Bagrow

Complex, dynamic networks underlie many systems, and understanding these networks is the concern of a great span of important scientific and engineering problems. Quantitative description is crucial for this understanding yet, due to a range of measurement problems, many real network datasets are incomplete. Here we explore how accidentally missing or deliberately hidden nodes may be detected in networks by the effect of their absence on predictions of the speed with which information flows through the network. We use Symbolic Regression (SR) to learn models relating information flow to network topology. These models show localized, systematic, and non- random discrepancies when applied to test networks with intentionally masked nodes, demonstrating the ability to detect the presence of missing nodes and where in the network those nodes are likely to reside.

RESILIENCE OF INTERDEPENDENT MODULAR NETWORKS

Louis Shekhtman, Saray Shai and Shlomo Havlin

Many recent studies have explored the properties of interdependent networks, however the realistic effect of communities has not been explored. Here we explore networks of interdependent modular networks. Our model provides a realistic representation of infrastructure in cities where each city has various networks, e.x. power grid, water, communications, etc., which are highly connected within the city but have only limited connections to other cities. Our model is for treelike networks of networks where each node depends on a single node from the same community in another network via bidirectional dependencies. We present both analytic and numerical results for both random failures of a fraction of 1-p nodes and attacks on interconnected nodes. We find that in the case of random failure communities have little effect on the robustness of interdependent networks. For an attack on interconnected nodes, if within the communities the nodes are sufficiently tightly connected with limited connections between the communities, we observe that as p decreases there are two first-order abrupt drops in the size of the network giant component. The first jump is the result of the communities becoming disjointed. At this stage each community is still able to function and get support from the network on which it depends. As p further decreases we observe a second drop as a result of the interdependence between the networks.

TECHNICAL SESSION 4: NETWORKS IN FINANCE AND ECONOMICS

Thursday, March 26, 13:45

Chair: TBD

UNDERSTANDING USER BEHAVIOUR IN MASSIVE DECENTRALIZED SHARING NETWORK

Arnau Gavaldà-Miralles, David R. Choffnes, John S. Otto, Mario A. Sánchez, Fabián E. Bustamante, Luís A. N. Amaral, Roger Guimerà and Jordi Duch

Tens of millions of individuals around the world use decentralized content distribution systems, a fact of growing social, economic, and technological importance. These sharing systems are poorly understood because, unlike in other technosocial systems, it is difficult to gather large-scale data about user behavior. Here, we investigate user activity patterns and the socioeconomic factors that could explain the behavior. Our analysis reveals that (i) the ecosystem is heterogeneous at several levels: content types are heterogeneous, users specialize in a few content types, and countries are heterogeneous in user profiles; and (ii) there is a strong correlation between socioeconomic indicators of a country and users behavior. Our findings open a research area on the dynamics of decentralized sharing ecosystems and the socioeconomic factors affecting them, and may have implications for the design of algorithms and for policymaking.

TELL ME WHAT YOU MAKE AND I WILL TELL YOU HOW UNEQUAL YOU ARE: UNCOVERING THE RELATIONSHIP BETWEEN PRODUCTIVE STRUCTURE AND INCOME INEQUALITY

Dominik Hartmann, Miguel Guevara and Cesar Hidalgo

Economies differ in the mix of products that they make, but also, on how unequal these are. Here, we use the tools of networks science to show that an economy's level of inequality is constrained by the mix of products it produces, and hence, that a country's industrial structure sets the baseline level of inequality of an economy. We track the connection between productive structures and inequality using both international and domestic datasets. Our international data set analyzes the industrial structure and income inequality of 113 countries for 47 years. The domestic dataset connects industries, occupations and the income inequality of each of the more than 5000 Brazilian municipalities. Our results show that complex industries, such as vehicle parts and boat engines, are associated with lower levels of inequality, whereas less complex industries—based on agriculture and natural resources—are associated with higher levels of income inequality. Having information about income inequality related to 773 different sectors also allows us to reveal the association between the complexity of economies and their level of income inequality. The results show that differences in the product portfolio and the network structure of their economies - even after controlling for multiple further factors such as institutions and geography - still explain a significant share of differences in income inequality. In short, the productive structures of economies constitute strong constraints for the evolution of income inequality.

EFFICIENT STRUCTURE FOR NETWORKS WITH HETEROGENEOUS CONNECTION MODEL

Mohsen Mosleh, Kia Dalili and Babak Heydari

We extend the connection model to capture the effect of cost heterogeneity on the structure of efficient networks and demonstrate two contributions: (1) We introduce the Decomposable Heterogeneous Cost Model, where each agent pays a constant connection cost which is independent and different from the agent's potential partner. For these sets of networks, we provide the analytical solution for the efficient network. (2) We extend the island connection model by rising inter-island links so that not all agents in an island are connected. As a result, we obtained a wider range of structures for the efficient network.

GLOBAL INTER-FIRM NETWORKS AND STOCK PRICE CORRELATIONS

Takayuki Mizuno, Takaaki Ohnishi and Tsutomu Watanabe

The structural weakness of supply chains in the world was exposed by the 2011 Thailand floods. Many of the factories that make hard disk drives were flooded. As a result, most hard disk drive prices nearly doubled worldwide. The stock prices for the manufacturers who incorporate hard disk drives into one's products fell in the world. The floods emphasized the importance of understanding the relationship between the structure of supply chain networks and the cross-correlation of stock returns.
In this paper, we use a unique dataset that is compiled by Standard & Poor's Financial Services LLC (S&P). The dataset covers 412,814 major incorporated non-financial businesses, including all the listed companies in the world. First, we show the key structures of three different networks of major international firms: customer-supplier network, licensee-licensor network, and strategic alliance network. Second, we empirically evaluate to what extent stock price returns of listed firms are affected by the propagation of idiosyncratic shocks of listed firms through inter-firm relationships.
We investigate the global network of customer-supplier relationships. In order to investigate the network structure, we focus on the cumulative distribution functions (CDFs) of links across firms for the supplier links and customer links. The CDFs follow a power law distribution as,
Supplier: P_> (N_s)∝N_s^(-1.5), (1)
Customer: P_> (N_c)∝N_c^(-1.5), (2)
where N_s is the number of supplier links and N_c is the number of customer links. For the number of licensee links, licensor links and strategic alliance links, we again find a power law relationship between the number of links and the corresponding cumulative density. Moreover, these power law indexes are close to -1.5. Thus the CDFs for the number of links, which are denoted by N_le, N_lo and N_sa can be characterized by
Licensee: P_> (N_le)∝N_le^(-1.5), (3)
Licensor: P_> (N_ls)∝N_lo^(-1.5), (4)
Strategic alliance: P_> (N_sa)∝N_sa^(-1.5). (5)
Equations (1)-(5) show that the global inter-firm networks have a scale-free topology.
The number of firms that did business continuously on the customer-supplier network was 345,909, so there are about 119 billion pairs of firms. We calculated the shortest path lengths for each pair of firm i and firm j (i.e. the shortest cut among alternative paths connecting firm i to firm j) on the non-directed customer-supplier network. The number of firms in the maximum connected component of this network is 318,080, that is 92% of all firms. It is observed that 65.5% of all pairs are connected, but 34.5% cannot be connected regardless of how many path lengths there are. The mode of distribution of the shortest path lengths for those connected pairs is five path lengths. About 78.8% of the pairs are connected by six path lengths or fewer. We also investigate the mode for non-directed licensee-licensor network, the non-directed strategic alliance network, the directed customer-supplier network. Their modes are also short, only six or seven path lengths.
Close interconnectedness among firms implies that an idiosyncratic shock to a firm could diffuse widely to other downstream firms through business relationships on the networks. To investigate such diffusion on the networks, we compute the correlation in daily stock price returns between two firms, firms i and j, which is represented by ρ_ij. We use logarithm price returns in the all listed firms in NYSE from 01/04/2010 to 05/27/2014. We then examine how ρ_ij is related to the shortest path length between firms i and j. The results show the logarithm price return correlation between firm i and j is related to the shortest path length l_ij between them. The correlation decreases with the shortest path length. This result indicates that there is a positive correlation between the stock price return s for firms i and j if they are close to each other in the networks.

RANDOMIZING BIPARTITE NETWORKS: THE CASE OF THE WORLD TRADE WEB

Fabio Saracco, Riccardo Di Clemente, Andrea Gabrielli and Tiziano Squartini

Within the last fifteen years, networks have been found to be ubiquitous both in natural sciences and in socioeconomic disciplines. In particular, the class of networks represented by bipartite networks has been recognized to provide a particularly insightful representation of many systems, ranging from food webs in ecology to trade networks in economy, whence the need of a pattern detection-oriented analysis in order to identify statistically-significant structural properties. Such an analysis rests upon the definition of suitable null models, i.e. upon the choice of the part of network structure to be constrained while randomizing everything else. However, quite surprisingly, little work has been done so far to implement null models on real bipartite networks. The aim of the present work is to fill this gap, extending a recently-proposed method to randomize monopartite networks to bipartite networks. While the proposed formalism is perfectly general, we apply our method to the binary, undirected, bipartite representation of the World Trade Web, comparing the observed values of a number of structural quantities of interest with their expectation, calculated via our randomization procedure. Interestingly, the behavior of the World Trade Web in this new representation is completely different from the monopartite analogue, showing highly non-trivial patterns of self-organization.

DETECTING HIDDEN CORRELATION PATTERNS IN THE HISTORICAL BEHAVIOR OF COUNTRY MERCHANDISE TRADE

Matteo Barigozzi, Giorgio Fagiolo and Giuseppe Mangioni

In this work, we employ community-detection techniques to identify hidden spatio-temporal correlated behaviors among country merchandise trade in the period 1992-2013. Understanding the extent to which world countries display non-trivial spatio-temporal regularities in the comovements of their macroeconomic indicators is critical to detect their response to economic shocks, the likelihood that worldwide crises diffuse in the whole economy, and the speed at which this may occur. In the economic and econometrics literature, many different approaches have been employed to tackle this issue. For example, Forni and Reichlin (1998, 1999) and Croux, Forni, and Reichlin (2001) for traditional time series approaches and Diebold and Yilmaz (2014) for a network approach. Here, we take a completely different perspective and use a complex-network theory approach to the identification of clusters of correlated behaviors in time and space. More precisely, we consider time-series data of exports for merchandise trade in the period 1992-2013 for 57 world countries and 67 products as given by the SITC 2 digits classification. We then build a signed correlation network where nodes are country-product pairs and links are weighted by the correlation between the time sequences of country product-specific exports. To retain only significant correlation weights, we filter the networks with alternative techniques. We eventually apply a community-detection algorithm to identify the main clusters of country-product nodes. To uncover the community structure we applied the “Multi-Level Coarsening + Multi-Level Refinement” algorithm for signed networks implemented within Pajek tool. This method, originally proposed by Rotta and Noack (2011), extends the Louvain method (Blondel et al. 2008) by iteratively perform- ing coarsening and refinement phase for each obtained level.
We find evidence of 15 clusters and of these the 4 largest contain 90% of the network nodes. When considering countries these 4 clusters are represented by: (1) South American countries, China and India; (2) European countries; (3) Germany; (4) North American countries. From the product point of view the most traded products belong to the Food, Chemicals, and Manufacturing sectors (as defined in the SITC 1 digit classification).
This preliminary analysis does not take into account that the macrodynamics of country characteristics may be driven by common factors channeling in the same direction the behavior of distant and/or heterogeneous countries. To address this issue, we extract the main common factor from export time series estimated as the first principal component of the data and we replicate our community-detection procedure to correlation networks computed on filtered data. Finally, we explore whether the financial crisis has induced structural change in the correlation patterns of trade-export behaviors. In general, our results suggest the existence of hidden correlation patterns in the export behavior of world countries, which resist to the removal of common factors and are independent on economic explanatory factors traditionally identified as drivers of comovements among macro indicators.

FROM INNOVATION TO DIVERSIFICATION: A SIMPLE COMPETITIVE MODEL

Riccardo Di Clemente, Fabio Saracco, Andrea Gabrielli and Luciano Pietronero

We propose a model for the countries products innovation processes that reproduces the main characteristic of the history pattern of the export matrix. The base of our model is the products network, in which countries evolve by occupying different nodes, i.e. exporting different products. Thus, the development of a new product in a country basket appears as the result of two concurrent mechanisms, the introduction of a brand new product respect to the whole products space against the possibility of copying a product from the neighbors; in this way, the topology itself of the products network is evolving, driven by the countries occupation. The countries products development is formalized as a power law, plus an offset: the former is responsible of products copying dynamic, the latter represents the pure innovation process.

BUILDING MINI-CATEGORIES IN PRODUCT NETWORKS

Dmitry Zinoviev, Jane Zhen and Kate Li

We constructed a product network based on the sales data collected and provided by a major nationwide retailer. The structure of the network is dominated by small isolated components, dense clique-based communities, and sparse stars and linear chains and pendants. We used the identified structural elements (tiles) to organize products into mini-categories -- compact collections of potentially complementary and substitute items. The mini-categories extend the traditional hierarchy of retail products (group - class - subcategory) and may serve as building blocks towards exploration of consumer projects and long-term customer behavior.

TECHNICAL SESSION 5: Social Networks, Social Media and the Arts

Thursday, March 26, 17:10

Chair: TBD

THE UNIVERSALITY OF PEER-INFLUENCE IN SOCIAL NETWORKS

Flavio L. Pinheiro, Marta D. Santos, Francisco C. Santos and Jorge M. Pacheco

Social networks pervade our everyday lives: we interact, influence and are influenced by our friends and acquain- tances. The recent availability of large amounts of data on social networks has fostered quantitative analyses of the distribution of information on them, including behavioural traits and fads. In particular, recent studies have shown the existence of positive correlations in the distribution of traits in a social network composed by the participants of the Framingham Heart study. Surprisingly the peer-influence patterns found among the participants went beyond the influence of their closest peers, but also their friends' friends,up to three degrees of influence.

In we show how similar patterns of correlations between peers emerge in networked populations through standard models (yet reflecting intrinsically different mechanisms) of information spreading such as the Voter's Model, the SIR epidemic model and Evolutionary Game Theory models of cooperation. We argue that empirically observed patterns of correlation among peers emerge naturally from a wide range of dynamical processes, being essentially independent of the type of information, on how it spreads, and even on the class of underlying network that inter-connects individuals. Finally, we show that the sparser and clustered the network, the more far-reaching the influence of each individual will be.

STRUCTURAL PATTERNS IN BACKBONE NETWORKS OF MULTIPLE-CHOICE TEST RESPONSES

Eric Brewe and Jesper Bruun

The Force Concept Inventory (FCI) is a 30 question, multiple-choice, diagnostic instrument designed to investigate students' understanding of Newtonian Mechanics and is widely used in Physics Education Research. One of the strengths of the FCI is that the distractors are drawn from deeply held student conceptions based in their physical experiences. A primary challenge with the FCI is that the distractors are often more informative about student's understanding than correctly answering the questions as they identify the particular nature of students' alternative conceptions. One way to investigate the student conceptions is to treat students responses on the FCI as a bipartite network, which is then projected into two networks - students and responses. The response network includes all responses that are shared among students. We use the response network, and the LANS backbone extraction algorithm to identify patterns in student responses. We use community detection algorithms on the backbone networks to identify clusters of common responses which map to models held by students, for example, force-is-needed-for-movement and the-active-agent-uses-the-most-force. We also compare pre-instruction test and post-instruction test networks to find out to what degree student understandings change after instruction. We find that post instruction, students' responses cluster around fewer distractors than pre instruction. This method has potential use across a variety of survey instruments and can potentially be productively used to improve instruction by providing in-depth knowledge of student conceptions.

FROM CRIMINAL SPHERES OF FAMILIARITY TO CRIME NETWORKS

Marcos Oliveira, Hugo Barbosa Filho, Tobin Yehle, Sarah White and Ronaldo Menezes

We have never lived in a safer world. After peaking around 1985, both violent crime (homicide, robbery, assault and rape) and property crimes (burglary, larceny and vehicle theft) are on a downward trend; from 1993 and 2012 crime activity has dropped by more than 40\% (total number of crimes). Despite the good news, crime is still prevalent in most large cities. FBI reports that in 2013 there were about 3,098 crimes per 100,000 habitants in the USA, with 2,730 of them being property crimes and 367 violent. What most people can agree is that one preventable crime is one crime that should not have taken place. The unveiling of the structure of criminal activity can lead to a better understanding of crime as a whole which in turn can help us provide better protection to our citizens. We demonstrate in this paper that crime follows a very interesting spatial community pattern regardless of the type of crime, criminal activity aggregates in communities of well defined sizes. We believe the results of this paper is a first step towards a theory of crime modeling using network science.

MEASURING THE GENERALIZED FRIENDSHIP PARADOX IN NETWORKS WITH QUALITY-DEPENDENT CONNECTIVITY

Naghmeh Momeni and Michael Rabbat

The friendship paradox is a sociological phenomenon stating that most people have fewer friends than their friends do. The generalized friendship paradox refers to the same observation for attributes other than degree, and it has been observed in Twitter and scientific collaboration networks. This paper takes an analytical approach to model this phenomenon. We consider a preferential attachment-like network growth mechanism governed by both node degrees and `qualities'. We introduce measures to quantify paradoxes, and contrast the results obtained in our model to those obtained for an uncorrelated network, where the degrees and qualities of adjacent nodes are uncorrelated. We shed light on the effect of the distribution of node qualities on the friendship paradox. We consider both the mean and the median to measure paradoxes, and compare the results obtained by using these two statistics.

NEIGHBOURHOOD DISTINCTIVENESS: AN INITIAL STUDY

Adrian Hecker, Corrie Jacobien Carstens and Kathy Horadam

We investigate the potential for using neighbourhood attributes to match unidentified entities across networks, and to classify them within networks. The motivation is to identify individuals across the dark social networks that underlie recorded networks. We test an Enron email database and show the out-neighbourhoods of email addresses are highly distinctive. Then, using citation databases as proxies, we show that a paper in CiteSeer which is also in DBLP, is highly likely to be matched successfully, based on its in-neighbours alone. A paper in SPIRES can be classified with 80\% accuracy, based on classification ratios in its in-neighbourhood alone.

SENTIMENT CLASSIFICATION ANALYSIS OF CHINESE MICROBLOG NETWORK

Xiaotian Wang, Chuang Zhang and Ming Wu

In recent years, more and more people begin to publish information on online social platforms like Sina Weibo. Via the facilities like posting tweets, retweeting tweets and making comments provided by Weibo service, users can easily express their feelings, giving opinions and make interactions with their friends in real time. The sentiment analysis of the Weibo messages is important for the analysis of human sentiment. The characteristics of Chinese microblogs bring in the difficulty of sentiment classification. In this paper, an effective Chinese microblog sentiment classification model based on Naive Bayes is proposed. Two strategies to do the three polarities classification are compared and the two-step strategy performs better than the one-step strategy.

TECHNICAL SESSION 6: Network Theory, Modeling and Metrics #2

Friday, March 27, 11:00

Chair: TBD

AN EFFICIENT ESTIMATION OF A NODE'S BETWEENNESS

Manas Agarwal, Rishi Ranjan Singh, Shubham Chaudhary and S.R.S. Iyengar

Betweenness Centrality measures, erstwhile popular amongst the sociologists and psychologists, have seen wide and increasing applications across several disciplines of late. In conjunction with the big data problems, there came the need to analyze large complex networks. Exact computation of a node's betweenness is a daunting task in the networks of large size. In this paper, we propose a non-uniform sampling method to estimate the betweenness of a node. We apply our approach to estimate a node's betweenness in several synthetic and real world graphs. We compare our method with the available techniques in the literature and show that our method fares several times better than the currently known techniques. We further show that the accuracy of our algorithm gets better with the increase in size and density of the network.

HOW PAGERANK ATTACHMENT PROCESS IS AFFECTED BY NETWORK TOPOLOGY

Vincenza Carchiolo, Alessandro Longheu, Michele Malgeri and Giuseppe Mangioni

PageRank is one of the most used centrality measure. Probably, it is well-recognized since its adoption by Google Search to rank websites in their search engine results. Even if PageRank has been deeply studied in the past, there are still a number of issues that need to be investigated. In this work we analyze the link building problem (aka the in-links attachment problem) consisting in maximizing the PageRank value (or rank) of a given target vertex in a directed graph by adding new links pointing to the target.
More specifically, we conduct a set of experiments to study the relation between the attachment problem and the structural properties of different types of networks. In order to focus only on the effects of the connectivity pattern of a network, we adopt a pure random node selection attachment strategy. On the base of this strategy, at every step our target node is connected by an in-link with a node chosen at random among those of the network. The process is stopped when the target node becomes the top ranked node in the sense of the PageRank metric. Adopting this attachment strategy, we explore the trend of the target node rank on different network topologies. In particular, we consider Erdos-Renyi random networks (ER), scale-free networks (SF) and random networks with a well defined community structure (COMM). A first set of experiments are made by considering networks with 2k and 1M nodes and considering the rank as a function of the number of in-links of the target node. A second set of experiments are devoted to study the relation between network size and the minimum number of in-links the target node must have to get the top rank and how it depends on the network topology.
We discovered that these three types of networks display very different behavioural pattern. First of all, the number of in-links (or steps) to reach the top ranked position heavily depends on the kind of network. Scale-free networks exhibit a rapid dynamics, indeed with few links the target node gains a better position in a SF network rather than in ER or COMM networks. Conversely, while in ER networks the target node reachs the top-ranked position in relatively few steps, in the COMM networks it needs about twice steps, while in the SF networks it needs more than three times the steps required in ER networks! Another interesting result regards the minimum number of links (TMNL) the target node needs to get the top rank, it is essentially independent from the size of the network for ER and COMM, while the same cannot be said for SF networks. In fact, in SF networks TMNL increases as network size increases, following a power-law trend.
In conclusion, our results are particular interesting in the case of scale-free networks, where we discovered that a very good rank is achievable with very few in-links, while a top rank positioning require a very high number of in-links. In real world, in-links usually means costs, for instance consider a company that wants to increase its visibility on the marketplace; to do this, it plans both a target position and the corresponding capital investment it has to support over years to endorse its promotion. Referring to this example, results means that the company can reach an acceptable market position some how limiting the effort (saving money).

NETWORK MODELS WITH REALISTIC CONTROL PROFILES

Colin Campbell, Justin Ruths, Derek Ruths, Katriona Shea and Réka Albert

A major goal of complex systems research is the development of practical strategies for controlling system behavior. A common approach is to identify a subset of so-called control nodes, whose dynamics are supplemented with external control signals such that the system may be driven from any state to any other state in finite time. It was recently shown (Ruths and Ruths, Science 2014) that (a) networks representing complex systems may be characterized according to the distribution of control nodes across the network topology (i.e., the so-called network control profile) and (b) common models of network generation do not reproduce control profiles observed in many empirical networks. Therefore, there is a pressing need to develop new and updated network models that address this gap. The development of such models stands to inform our understanding of the underlying mechanisms that give rise to a diverse array of complex systems including, for instance, the World Wide Web, food webs, and social influence networks. In this presentation, key properties of models with realistic network control profiles will be discussed, and specific models will be proposed.

FINDING NETWORK MOTIFS USING MCMC SAMPLING

Tanay Kumar Saha and Mohammad Hasan

Network motifs play an important role in the life science domain. Scientists have shown that network motifs are key building block of various biological networks. Most of the existing exact methods are inefficient simply due to the inherent complexity of this task. In recent years, researchers are considering approximate methods that save computation by sacrificing exact counting of the frequency of potential motifs. However, these methods are also slow when one considers the motifs of larger size. In this work, we propose two methods for approximate motif find- ing, namely SRW-rw, and MHRW based on Markov Chain Monte Carlo (MCMC) sampling. Both the methods are significantly faster than the best of the existing methods, with comparable or better accuracy. Further, as the motif size grows the complexity of the proposed methods grows linearly.

ANALYSIS OF THE ROBUSTNESS OF DEGREE CENTRALITY AGAINST RANDOM ERRORS IN GRAPHS

Sho Tsugawa and Hiroyuki Ohsaki

Research on network analysis, which is used to analyze large-scale and complex networks such as social networks, protein networks, and brain function networks, has been actively pursued. Typically, the networks used for network analyses will contain multiple errors because it is not easy to accurately and completely identify the nodes to be analyzed and the appropriate relationships among them. In
this paper, we analyze the robustness of centrality measure, which is widely used in network analyses, against missing nodes, missing links, and false links. We focus on the stability of node rankings based on degree centrality, and derive Top_m and Overlap_m, which evaluate the robustness of node rankings. Through extensive simulations, we show the validity of our analysis, and suggest that our model can be used to analyze the robustness of not only degree centrality but also other types of centrality measures. Moreover, by using our analytical models,
we examine the robustness of degree centrality against random errors
in graphs.

NON-TRIVIAL INTER-LAYER DEGREE CORRELATIONS IN HETEROGENEOUSLY GROWING MULTIPLEX NETWORKS

Babak Fotouhi and Naghmeh Momeni

The multiplex network growth literature has been confined to homogeneous growth hitherto, where the number of links that each new incoming node establishes is the same across layers. This paper focuses on heterogeneous growth.
We first analyze the case of two preferentially growing layers and find a closed-form expression for the inter-layer degree distribution, and demonstrate that non-trivial inter-layer degree correlations emerge in the steady state. Then we focus on the case of uniform growth. Surprisingly, inter-layer correlations arise in the random case, too. Also, we observe that the expression for the average layer-2 degree of nodes whose layer-1 degree is k, is identical for the uniform and preferential schemes. Throughout, theoretical predictions are corroborated using Monte Carlo simulations.

TECHNICAL SESSION 7: Diffusion, Spreading and Searching on Networks

Friday, March 27, 13:45

Chair: TBD

EPIDEMIC SPREADING IN NON-MARKOVIAN TIME-VARYING NETWORKS

Kaiyuan Sun, Andrea Baronchelli and Nicola Perra

Most real networks are characterized by connectivity patterns that evolve in time following complex, non-Markovian, dynamics.
Here we investigate the impact of this ubiquitous feature by studying the Susceptible-Infected-Recovered (SIR) and Susceptible-Infected-Susceptible (SIS) epidemic models on activity driven networks with and without memory (i.e., Markovian and non-Markovian). We show that while memory inhibits the spreading process in SIR model, where the epidemic threshold is moved to larger values, it plays the opposite effect in the case of the SIS, where the threshold is lowered.
The heterogeneity in tie strengths, and the frequent repetition of connections that it entails, allows in fact less virulent SIS-like diseases to survive in tightly connected local clusters that serve as reservoir for the virus. We confirm this picture by evaluating the threshold of both processes on a real temporal network. Our findings confirm the important role played by non-Markovian network dynamics on dynamical processes.

STATISTICALLY EXACT SIMULATION OF EEPIDEMIOLOGICAL DYNAMICS ON NETWORKS

Peter Fennell, Sergey Melnik and James Gleeson

Continuous-time Markov processes are very widely used in an epidemiolog- ical modelling context; well-known examples include the susceptible-infected susceptible (SIS) and susceptible-infected-recovered (SIR) models of disease spread [1]. Numerical simulation of such processes is important not only for the insight it can afford into the process but also for acting as a baseline against which to judge the accuracy of mathematical theories.
It may be the case, however, that the numerical simulations are not an accurate reflection of the underlying dynamical process. This may occur for various reasons. Numerical simulations are generally performed in discrete time, where time advances by fixed amounts dt, and if the time step dt is too large then the simulations can be inaccurate. Other discrepancies can arise depending on whether node updates occur sequentially (asynchronously) or in parallel (synchronously).
In our work, we rigorously examine numerical simulation schemes for epidemiological dynamics on complex networks with the aim of quantifying how accurate they are and how closely they reproduce the underlying dynam- ics. In particular, we focus on two commonly used numerical schemes called Asynchronous updating [2] and Synchronous updating [1, 3]. We begin by deriving the exact statistical description of continuous-time Markov processes on networks and show how this can be implemented in a statistically exact algorithm called the Gillespie algorithm after the seminal work of D. T. Gille- spie on simulating chemical reaction dynamics [4]. The statistical description and the Gillespie algorithm are then used to analyse Asynchronous and Syn- chronous updating. We derive upper bounds dtAS and dtS on the values of the time step that should be used in the Asynchronous and Synchronous schemes respectively, and compare the statistical distributions associated with the evolution of the dynamics in these schemes to the exact distributions.
The conclusions of our analysis are the following. Asynchronous updating, when the upper-bound time step dtAS is used, is accurate to a very high preci- sion. On the other hand Synchronous updating, even when a time step smaller than dtS is used, shows errors which are significant. We attribute these inac- curacies to the parallel updating mechanism of Synchronous updating, noting that Synchronous updating better describes discrete-time systems. Aside from the accuracy, Asynchronous updating is shown to be computationally more
1efficient than Synchronous updating. Thus we conclude that Asynchronous updating is the optimal numerical simulation scheme for performing numerical simulations of continuous-time epidemiological dynamics.
Finally, we illustrate the importance of our work by analysing a prominent current strand of research, namely the behaviour of the SIS model on infinite networks with power-law degree distributions [1, 3, 5, 6, 7, 8]. We show examples from this literature where Synchronous updating simulations are used to incorrectly reject continuous-time theories in favour of less accurate discrete-time theories, and comment on how the epidemic thresholds given by discrete-time theories can differ from continuous-time theories.

COMPETING SPREADING PROCESSES ON MULTIPLEX NETWORKS: AWARENESS AND EPIDEMICS

Clara Granell, Sergio Gomez and Alex Arenas

Epidemic-like spreading processes on top of multilayered interconnected complex networks reveal a rich phase diagram of intertwined competition effects.
A recent study by the authors [Granell et al. Phys. Rev. Lett. 111, 128701 (2013)] presented the analysis of the interrelation between two processes accounting for the spreading of an epidemics, and the spreading of information awareness to prevent its infection, on top of multiplex networks. The results in the case in which awareness implies total immunization to the disease, revealed the existence of a metacritical point at which the critical onset of the epidemics starts depending on the reaching of the awareness process. This work presents a full analysis of these critical properties in the more general scenario where the awareness spreading does not imply total immunization, and where infection does not imply immediate awareness of it. We find the critical relation between both competing processes for a wide spectrum of parameters representing the interaction between them. We also analyze the consequences of a massive broadcast of awareness (mass media) on the final outcome of the epidemic incidence. Importantly enough, the mass media makes the metacritical point to disappear. The results reveal that the main finding i.e. existence of a metacritical point, is rooted on the competition principle and holds for a large set of scenarios.

EXPLOSIVE TRANSITIONS TO LARGE SOCIAL CONTAGIONS

Jesus Gomez-Gardenes, Laura Lotero, Sergei Taraskin and Francisco Perez-Reche

In this talk we will discuss some recent results about the nature of the phase transition to the epidemic state in social contagions. During the last decade the study of epidemic models in complex networks, such as the Suceptible-Infected-Recovered (SIR) and the Susceptible-Infected-Susceptible (SIS), has attracted the attention of physicists, computer scientists and epidemiologists. The motivation is clear, the networked architecture of the social environment where diseases spread and that of the Internet in which computer virus are transmitted influences to a large extent the impact of the epidemic processes unfolded. The most striking result in this line of research is that when the network is scale-free the so-called epidemic threshold vanishes, so that any small fraction of infected individuals or computers can spread the viruses to the system.
Epidemic models have been also considered as the formal benchmark for studying social contagion processes. In fact, contagion processes are at the core of the emergence of many collective social phenomena including the spread of information and gossips, the adoption of beliefs and behaviors, or the massive use of products and innovations. In this way, the results derived for epidemics in complex networks are straightforwardly generalized to the realm of social systems.

Here, we analyze how the incorporation of real social ingredients to epidemic models affects the nature of the epidemic transition. The novel ingredient incorporated is the influence of the surrounding in the contagion process. Namely, we include the feature that the probability that an idea/product spreads from an active (infected) individual to an ignorant (healthy) is no longer a constant (as in epidemic models) but depends on the state (active or ignorant) of the other neighbors of the ignorant individual. As an example, consider that a peer aims at convincing us of using a new social communication platform (such as Whatsapp, Telegram or Line). Apart from the intrinsic quality of the tool, before accepting incorporating it we evaluate the degree of usage that it has. This evaluation takes place by exploring our surrounding, i.e., our social contacts. In this way, we will tend to avoid using the tool if our neighborhood is not using it at all, regardless of the quality of the platform itself.

We have incorporated this social "synergistic" ingredient to the dynamics of both the SIS and SIR models. Surprisingly, the epidemic onset is delayed significantly as the synergy with the surrounding increase its importance in our decisions with respect to the intrinsic quality of the idea/product. Moreover, as the synergy strength increases, and the onset is delayed, there is sudden change in the nature of the epidemic transition so that it transforms from smooth (second order) to explosive (first order). This explosive regime is characterized by a sudden jump for number of active users from zero to a macroscopic fraction of the system. In social terms the explosive transition found points out that, when the activity of our surrounding plays a role in our decisions, the dissemination of ideas/products turns into viral so that a small increment in the intrinsic quality of these ideas/products changes its degree of spreading from zero to large scale.

We will present this results by showing three different approaches: Montecarlo simulations, the solution of the associated Merkovian evolution equations and an analytical mean field derivation. All of these approaches reproduce the results mentioned above and allow us to determine whether the dissemination of innovative ideas or products is smooth or explosive.

THE ROLE OF MIGRATION PATTERNS IN THE SPREAD OF EPIDEMICS IN COMPLEX NETWORKS

Jordi Ripoll, Joan Saldaña, Marta Pellicer and Albert Avinyó

We investigate the impact of the migration on the spread of the epidemics. The approach of complex networks can be suitable to deal with a set of local populations pairwise-connected by migratory flows. We enhance our previous works to a non-linear diffusion term and demographic turnover. We deal with a mean-field type model as a system of ordinary differential equations which combines (random, memoryless) the movement of individuals among patches (nodes) with a local SIS-epidemics within each patch. The model includes a density-dependent number of contacts, and also two density-dependent diffusion rates in order to deal with demographic effects on the migration process, e.g. the human mobility from rural areas to big cities to look for job opportunities, or the other way round, from crowded areas to small villages to get rid of stress. We determine the equilibrium driven by the migration process without epidemics and quantify the percentage of urban population corresponding to each migratory diffusion. Our analytical approach reveals that the optimal migratory diffusion for controlling the epidemic spreading consists in strengthen the emigration from urban areas to small villages. Moreover, depending on the migration pattern, epidemic outbreaks not always occur in big cities as one may expect, but it may happen only in mid-size towns or even only in the smallest villages.

A TWO-PARAMETER METHOD TO CHARACTERIZE THE NETWORK RELIABILITY FOR DIFFUSIVE PROCESSES

Madhurima Nath, Stephen Eubank, Mina Youssef, Yasamin Khorramzadeh and Shahir Mowlaei

We introduce a new method to characterize the network reliability polynomial of graphs based on few parameters using well-known functions. The exact evaluation of the reliability polynomial is almost impossible for large graphs, however, the estimation of the reliability based on estimating the reliability coefficient is feasible. Moreover, the estimation of the reliability coefficients is feasible yet requires large numerical computation. Thus, we aim to estimate few information about the reliability polynomial that can be combined with well-known functions to obtain the reliability polynomial. We validate the numerical approach by fitting the reliability polynomials of random graphs with different sizes and synthetic social networks to the Error function. We found that the Error function is a good fit to estimate the reliability polynomial based on two parameters.

RICH CLUB NEURONS DOMINATE INFORMATION TRANSFER IN LOCAL CORTICAL NETWORKS

Sunny Nigam, Masanori Shimono, Olaf Sporns and John Beggs

The performance of complex networks depends on how they route their traffic. Despite the importance of routing, it is virtually unknown how information is transferred in local cortical networks, consisting of hundreds of closely-spaced neurons. To properly address this, it is necessary to record simultaneously from hundreds of neurons at a spacing that matches typical axonal connection distances, and at a temporal resolution that matches synaptic delays. We used a 512 electrode array (60 μm spacing) to record spontaneous activity at 20 kHz, simultaneously from up to 700 (347 ± 119; mean ± s.d.) neurons in slice cultures of mouse somatosensory cortex (n = 13) for 1 hr at a time. We used transfer entropy to quantify directed information transfer between pairs of neurons. Similar to in vivo reports, we found an approximately lognormal distribution of firing rates. Pairwise information transfer strengths also were nearly lognormally distributed, similar to reports of synaptic strengths. We observed that information transfer strengths coming into, and going out of, cortical neurons were correlated, consistent with the predictions of studies that modelled lognormal firing rates and synaptic weights. Neurons with the strongest total information transfer were significantly more densely and strongly connected to each other than chance, thus forming a “rich club” network. Finally, the top 20% of the richest neurons accounted for 70% of the total information transfer. This highly unequal distribution of information transfer has implications for the efficiency and robustness of local cortical networks, and gives clues to the plastic processes that shape them.

TECHNICAL SESSION 8: Language Networks and Science of Science

Friday, March 27, 16:55

Chair: TBD

NETSCI HIGH: BRINGING NETWORK SCIENCE RESEARCH TO HIGH SCHOOLS

Catherine Cramer, Lori Sheetz, Hiroki Sayama, Paul Trunfio, H. Eugene Stanley and Stephen Uzzo

We present NetSci High, our NSF-funded educational outreach program that has been bringing network science research to regional US high schools since 2010. This program connects high school students and teachers in the Northeast US to regional university research labs and provides them with the opportunity to work on a year-long research project on network science, culminating in a formal presentation at a network science conference. This short paper reports the contents and materials we have developed to date, lessons learned from our experiences, and the future goals of this program.

UNDERSTANDING TEAM SUCCESS

Michael Szell, Roberta Sinatra and Albert-László Barabási

A multitude of creative fields, from scientific knowledge generation to software development, thrive from important discoveries and products made by coordinated groups of individuals. The most successful teams can be defined as those which generate the highest impact in their respective target communities. Despite the dynamics of success and failure of political systems, companies, ideologies, etc., playing an essential role in the development of mankind, as well as in fundamental funding decisions in science, surprisingly little is known about team success, mainly due to the complexity of the problem and sparsity of available data. Here, we investigate the success of teams and the effects which lead to it, using a number of large-scale data sets. We start examining a set of millions of software projects on Github, where software developers develop software code alone or in teams, and where we can measure both effort and success. We first show that effort is bounded while success is unbounded, providing evidence for understanding success as a collective phenomenon. Next, using appropriate null models, we find a highly significant "constructive interference" effect in team effort, where the effort per team member depends nontrivially on team size. This observation suggests the existence of an interplay between coordination loss or social facilitation and social loafing effects well-known from social psychology. Surprisingly, the average share of success per team member is flat, while effort and success are correlated. We discuss these results, also taking into account properties of individual Github "careers". Finally, we extend our approach to other fields were effort and/or success is measurable, such as in wikipedia editing, group coordination within online games, or in science, and discuss our insights on field-specific effects versus potentially universal mechanisms.

SCIENTIFIC SUCCESS AND ITS CONTEXTUAL FACTORS

Roberta Sinatra

Scientific discovery is the key driver for technological and cultural innovation, and a foundational pillar of society. The assessment of scientific career paths comes with deep policy issues, whether it is about grant allocation, promotion of scientists or, on a larger scale, the identification of science areas to focus on. More broadly, quantifying the social component of success is relevant for all forms of human performance, from entrepreneurial to artistic accomplishments. In science, impact has a simple currency: citations. Scientists share their discoveries through research papers and acknowledge previous work by citing it. Truly influential discoveries inspire an avalanche of new research and gather a large number of citations. In this talk, we show how using a large bibliometric dataset, which includes information about citations, we can untangle randomness from skill and detect a series of regularities in impact of scientific careers [6]. The resulting stochastic model provides a mathematical framework to condense all the individual attributes into a single quantity, a scientist’s excellence parameter. Finally, combining different layers of information, e.g. the collaboration network and the mobility patterns of scientists among institution, we will uncover the components scientific excellence originates from.

CHARACTERIZING THE HETEROGENEITY OF HUMAN MOBILITY RANGES

Luca Pappalardo, Filippo Simini, Salvatore Rinzivillo, Dino Pedreschi and Fosca Giannotti

The availability of massive digital traces of human whereabouts has offered a series of novel insights on the quantitative patterns characterizing human mobility. Indeed, satellite-enabled Global Positioning Systems (GPS) and mobile phone networks allow for sensing and collecting societywide proxies of human mobility, like the GPS trajectories from vehicles and call detail records from mobile phones. This broad social microscope has attracted scientists from diverse disciplines, from physics and network science to data mining, and has fueled advances from public health to transportation engineering, urban planning, and the design of smart cities. All these studies document a stunning heterogeneity of human travel patterns: most of the individuals travel very short characteristic distances, while a small but significant fraction travel very large characteristic distances.

In this work we use both mobile phone data and GPS tracks from vehicles to characterize the heterogeneity of human mobility ranges in two different directions. First, we show that an heterogeneous distribution of the radius of gyration, a measure describing the characteristic distance traveled by individuals, also emerges if we consider a small subset of individuals' visited locations. In particular, we compare the distributions of total radius of gyration and the partial radius of gyration, i.e. the radius of gyration computed on a subset of the visited locations, finding that both curves are long-tailed. Hence, from a qualitative point of view a few locations are sufficient to determine the heterogeneity in the characteristic distance traveled by individuals. From a quantitative point of view the exponent of the curves are different. Moreover, the correlation between the total radius and the partial radius reveals two different profiles of individuals: returners, who are individuals whose partial radius is very similar to the total one, and explorers who have low partial radius compared with the total one. We also compute the total and partial radii after having aggregated individuals' locations in dense clusters at various spatial scales (districts, cities, municipalities) and find that both the heterogeneity of the traveled distances and the returners/explorers dichotomy persist at all spatial scales.

Secondly, we investigate how the geographical proximity influence the values of the radius of gyration of individuals. Here, we show that the heterogeneity of mobility ranges is not uniform over the territory but it changes according to some variables like population density, per capita income and poverty. Although individuals possess their own, unique way of communicating and moving, their environment on a city scale implies some sort of convergence towards the behavior of other individuals in their geographical proximity.

POSTER SESSION

Wednesday, March 25, 17:30

COLLABORATION NETWORKS IN EUROPEAN SPONSORED PROJECTS

Panos Argyrakis and Maria Tsouchnika

SYNCHRONIZATION AND DECISION TIME IN OPINION DYNAMICS

Lev Guzmán-Vargas, Daniel Aguilar-Velázquez, Roberto Júarez-López, Ivan Y. Fernández-Rosales and José Luis Romero-Rodríguez

SYSTEMIC FAILURE IN INTERCONNECTED BANKING SYSTEMS: THE ROLE OF EXPOSURE NETWORKS AND HETEROGENEITY

Annika Birch, Zijun Liu and Tomaso Aste

MODELING THE SPATIAL EFFECT OF SOCIAL INFLUENCE - OPINION DYNAMICS ON RANDOM GEOMETRIC GRAPHS

Weituo Zhang, Chjan Lim, Gyorgy Korniss and Boleslaw Szymanski

SOCIAL DIFFUSION AND GLOBAL DRIFT ON NETWORKS

Hiroki Sayama and Roberta Sinatra

MULTISCALE CONNECTIVITY PATTERNS IN NEOCORTICAL MICROCIRCUITS

Eyal Gal, Amir Globerson, Mickey London, Eilif Muller, Michael Reimann, Henry Markram and Idan Segev

SOLUTION OF TWO PARTICLE URN PROBLEMS BY SPECTRAL ANALYSIS

William Pickering and Chjan Lim

PERSISTENCE AND STRONGHOLDS IN A MODEL OF SOCIAL INFLUENCE AND RECURRENT MOBILITY FOR ANALYSING ELECTION RESULTS

Toni Perez, Juan Fernandez-Gracia, Jose Javier Ramasco and Victor M Eguiluz

ANALYTICAL SOLUTION OF CLUSTERING COEFFICIENT FOR FINITE SIZE NETWORKS OF THE BARABÁSI-ALBERT MODEL

Ricardo Ferreira, Rita M.C. Almeida and Leonardo Brunnet

INFLUENCE OF NODE CHARACTERISTICS ON INTER-ORGANIZATIONAL INNOVATION NETWORKS

Giovanna Ferraro, Antonio Iovanella and Gianluca Pratesi

EFFICIENCY OF HUMAN ACTIVITY ON INFORMATION SPREADING ON TWITTER

Alfredo Morales, Javier Borondo, Juan C Losada and Rosa M Benito

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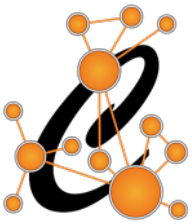
Soon-Hyung Yook, Kyung Hee University, SOUTH KOREA
Anna Zygmunt, AGH, PO

BUDGET PREVISIONNEL
Faites de la science Bourgogne 2016

DEPENSES			RECETTES	
Postes	Précisions	Montant TTC	Postes	Attendues TTC
Aide au montage de projet	Collège Malraux A 21	300,00	**UFR Sciences Vie Terre et Environnement**	**632,00 €**
	Collège Malraux B 21	300,00	**UFR Sciences et Techniques**	**632,00 €**
	Collège Clos de Pouilly 21	300,00	**Région (CCSTI Bourgogne)**	**250,00 €**
	Lycée pro LEGTA La Barotte 21	300,00	**MAIF**	500,00 €
	Collège Boris Vian 21	300,00	**SEB**	**300,00 €**
	Collège Carnot 21	0,00	**Société Française de Physique**	150,00 €
	Collège Croix Menée 71	204,00	**Société Chimique de France**	**400,00 €**
	Collège Centre 71	300,00	**Université de Bourgogne**	1 200,00 €
	Lycée Léon Blum 71	300,00	**AFFDU Bougogne**	150,00 €
	Collège Les Guillerault 58	300,00	**Conseil Départemental 21**	1 000,00 €
	Collège Les Deux Rivières 58	30,00	**Grand Dijon**	1 000,00 €
	Collège Mallarmé 89	300,00	**Ville de Dijon**	500,00 €
Frais de restauration CROUS	Carrefour épicerie-boissons-réception finale	500,00		
	Viennoiseries Garcia les Douceurs de Facs	180,00		
	CROUS repas	500,00		
Frais déplacement de l'équipe lauréate à la finale à Saint Etienne		1 200,00		
Organisation journée et communication (photographe, reprographie,...)	Impression affiches par C Génial	0,00		
	Banderoles projets	30,00		
	Sacs UB	20,00		
Frais de déplacement du jury à finale nationale	TRAIN Pierre ANDREOLETTI	150,00		
1er prix	1er prix lauréats Dijon	500,00		
Lots	lots récompenses aux participants	700,00		
TOTAL des DEPENSES		**6 714,00**	**TOTAL des RECETTES**	**6 714,00 €**

Etablissement	Ville	Dépt	PROJET	Porteur	classe	Discipline
Collège Malraux	DIJON	21	Le pendule de Foucault.	David GOUT	5ème, 4ème	Physique
Collège Malraux	DIJON	21	Fabrication de fusées et de véhicules propulsés par réaction chimique.	Sophie DESCHARMES	4ème, 3ème	Physique
Collège Clos de Pouilly	DJON	21	Les experts au collège.	Isabelle RICHARD	3ème	Physique SVTE
Lycée LEGTA La Barotte	CHATILLON sur SEINE	21	A la découverte du lait cru et celui servi à la cantine.	Mounguengui WENCESLAS	2nd GT	Biologie
Collège Boris Vian	TALANT	21	Etude de la différence entre bâtiments anti-sismiques et les bâtiments normaux.	Amélie CHRISTEL	4ème	SVTE Physique
Collège Carnot	DIJON	21	La lumière comme outil de mesuret.	Hervé LEFRANC	3ème	Physique
Collège Croix Menée	LE CREUSOT	71	Les sabres lasers existeront-ils un jour.	Alexandre BUFFENOIR	5, 4, 3ème	Physique
Collège Centre	LE CREUSOT	71	Mystère dans les labos de science : les experts mènent l'enquête.	Alain PERRUCHET	3ème	SVTE
Lycée Léon Blum	LE CREUSOT	71	Etude de l'influence de la lumière sur les graines de radis (germination).	Hélias Frédéric	1ère SSI	SVTE Physique
Collège Les Guillerault s	POUILLY / LOIRE	58	Des plis dans toutes les sciences.	Delphine POLGE	5ème, 4ème	SVTE
Collège Les Deux Rivières	MOULINS-ENGILBERT	58	Comment déterminer les dimensions des cratères de la lune ?	Eric CAMELIN	6ème, 4ème	Physique
Collège Marllamé	SENS	89	Enquête dans le domaine des sons.	Vincent DEVAUX	3ème	Physique

= 12 projets



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Plan de Financement

DEPENSES PAR POSTE (TTC EN EUROS)			RECETTES (TTC EN EUROS)	
Intitulé	***Formule de calcul utilisée***	***Montant en Euros***	***intitulé***	***Montant En Euros***
Frais de préparations	2000	2000	**Inscriptions Payantes**	38100
Frais de Communications	1000	1000	**Subventions :**	
Bourses étudiants	3x500	1500	Conseil régional	5000
Location matériel info/vidéo	900	900	CNRS	5000
Location panneaux posters	600	600	Université de Bourgogne	5000
Conférenciers invités	9x1500	13500	Grand Dijon	5000
Organisateurs	4x1500	6000		
Editions des actes papier	60€X120	7200		
pauses (6)	6X120X5	3600		
Déjeuner-	17€X120X3	6120		
Repas de gala	45€x120	5400		
Visite guidée « dijon et le vin »	120x 15€	1800		
Cadeau souvenir	120x6	720		
Fourniture papeterie	500	500		
Cartables	120x12€	2400		
Impression Programmes	120x5€	360		
Badges	120X2,5€	300		
Création et gestion site Web		1500		
Frais postaux		1600		
Photocopies		600		
Téléphone/ fax		500		
Total général des dépenses		**58100**		**58100**