



2024 Dutch NetSci Symposium

Schedule: Friday, October 18, 2024

09:50
to 10:00

Opening remarks

10:00
to 10:40

Keynote talk: Caterina de Bacco

Probabilistic modeling of hypergraphs: structure, inference and computational challenges

10:40
to 11:00

Coffee break

11:00
to 11:50

Education session

11:50
to 12:30

Keynote talk: Pieter Trapman

Two successive SIR epidemics on the same network and herd immunity

12:30
to 14:00

Lunch + Poster session

14:00
to 14:40

Keynote talk: Vincent Merckx

Unearthing underground networks between plants and fungi

14:40
to 15:10

Young Talent Prize

15:20
to 16:40

Lightning talks

16:40
to 18:50

Industry pitches, Mock interviews, Drinks

18:50
to 19:00

Closing remarks

Education session (11:00 – 11:50)

This session features three contributed short talks where network scientists will share their teaching tools and techniques.

Nicos Starreveld

The Network Pages – Bridging Network Science and Real-World Applications

Mike van Santvoort:

Let them do the work! – Guided Reinvention in Network Science

Huijuan Wang:

Integration of NetSci Education and Research

Poster session (12:30 – 14:00)

Enjoy discussing recent findings over lunch with the following poster presentations:

Noam Abadi: Maximum entropy in dynamic complex networks

David Almasan: Generating Temporal Contact Graphs Using Random Walkers

Alexandru Babeanu: Asynchronous multi-agent computation: from adaptive parallelism to relativistic viability

Mohammad Behbahani: Exploring Hidden Patterns in Relational Event History Data: an extension of Hidden Markov Model for the Relational Event Model

Andrea Cavallo: Spatiotemporal Covariance Neural Networks

Bishwadeep Das: Online Filtering over Expanding Graphs

David Ferenczi: Inferring signed networks from contact patterns

Éverton Fernandes da Cunha: Identify structures underlying out-of-equilibrium reaction networks with random graph analysis

Ting Gao: A Dual Graph-Based Approach for Bicycle Travel Time Estimation Using GPS Trajectory Data

Jiaze Li Li: Detectability of Minority Communities in Networks

Chengen Liu: Hodge-Aware Matched Subspace Detectors

Riccardo Milocco: Multi-Scale Node Embeddings For Networks

Valentina Sánchez: Topological Deep Learning for Brain Network Analysis

Hassan Shafiei: Application of network sciences in coastal sediment connectivity

Mingrong She: Gender differences in collaboration and career progression in physics

Sergey Shvydun: Centrality in Complex Networks: Models and their Comparison

Young talent prize (14:40 – 15:10)

The Dutch NetSci Society Young Talent Prize is awarded to an early-career talent in Network Science. This session features the award ceremony and a presentation by the winner. The prize is sponsored by Centraal Bureau voor de Statistiek, CBS.



Lightning talks (15:20 – 16:40)

This fast-paced session features over 20 talks of at most three minutes each:

Emanuele Agrimi: A higher-order interaction-based analysis of the synergistic neural correlates of fluid intelligence.

Eszter Bokanyi: Increasing mobility is linked to decreasing cohesion of personal networks over the lifecourse of an entire population

Elena Candellone: Community Detection on Signed Bipartite Networks

Alessio Catanzaro: Solution and Coarse-graining of Second Order Random Networks

Lucia Cavallaro: Sparse Neural Networks at the Edge: A Comparative Analysis

Alberto Ceria: The relevance of higher-order networks

Matteo D'Alessandro: Fractional derivative in Markovian epidemics on networks: a novel microscopic description

Rachel de Jong: Anonymity in Complex Networks

Elze de Vink: Fairness Metrics for Community Detection Methods in Social Networks

Elizaveta Evmenova: Who are your collaborators?

Shreyas Gadge: Inferring Heterogeneity from Household Survey Data: Characterising Household Agents adapting to water scarcity

Francesca Giuffrida: Network Safe Testing: E-Values for Maximum Entropy Models

Yuliia Kazmina: The Closing Window? Network Determinants of Economic Prosperity in a Longitudinal Population-scale Social Network

Qiu Liang: Anomaly Detection in Preferential Attachment Network

Tianrui Mao: Estimating nodal spreading influence using partially observed temporal network

Riccardo Milocco: Multi-Scale Node Embeddings For Networks

Frederike Oetker: The Effect of Incarceration on Criminal Cocaine Networks in the Netherlands

Bart Peters: Higher-Order Temporal Network Prediction and Interpretation

Zhihao Qiu: Inverse all shortest path problem

Mike van Santvoort: Using inhomogeneous random digraphs to model cell-cell interaction networks

Alexander Van Werde: Towards generalized spectral determinacy of random graphs

Maosheng Yang: Topological Schrödinger Bridge Problem

Industry pitches – Mock interviews - Drinks (16:40 – 18:50)

The session will run jointly with the drinks.

Starting from 17:10, short pitches will be given by industry representatives of KPN, TNO, and CBS about their workplace and their hiring practices. Subsequently, volunteer job candidates will be invited on stage to be interviewed for the mock positions they were interested in. Following each interview, the hiring committee will share their feedback and advice with both the candidate and the audience.

No actual job offers will be made at the session.

Keynote Speakers

Caterina De Bacco (TU Delft)

Probabilistic modeling of hypergraphs: structure, inference and computational challenges

Probabilistic models of networks have been successful in modeling datasets with pairwise interactions. Modeling the probability of observing a given set of edges between pairs of nodes allows to solve a variety of inference tasks. Relevant examples are predictive tasks (e.g. link prediction), data sampling (sampling synthetic networks that are similar to those observed in input) or clustering (e.g. community detection). In addition, by suitably defining latent variables that explain the mechanism of edge formation, one can also provide interpretation of the learned parameters that can be useful for practitioners.



Ideally, all these above could be easily translated to hypergraphs, where interactions involve more than pairs of nodes. This is not the case, one main obstacle being the computational complexity required to estimate a probability distribution over a much larger space as determined by all the possible hyperedges of size larger than two.

In this talk I will present recent work aimed at extending probabilistic models to hypergraphs in ways that are both theoretically principled and also computationally feasible to run, addressing some of the challenges described above.

Pieter Trapman (University of Groningen)

Two successive sir epidemics on the same network and herd immunity

We present a stochastic model for two successive SIR (Susceptible, Infectious, Recovered) epidemics in the same large (configuration model) network structured population. In this model, individuals infected during the first epidemic might have (partial) immunity for the second one.



We explain when and how the first epidemic be analysed through a bond percolation model. After that we discuss the model for the second epidemic: This process is approximated by a 3-type branching process in which the types of individuals depend on their position in the percolation clusters used for the first epidemic. This branching process approximation enables us to calculate a threshold parameter and the probability of a large outbreak for the second epidemic.

We relate our results to herd-immunity thresholds for infectious diseases, and show that the herd-immunity threshold through homogeneous vaccination in the population is not generally the same as the herd immunity threshold obtained through earlier spread of a disease.

Based on joint work with Frank Ball, Abid Lashari and David Sirl

Vincent Merckx (Naturalis biodiversity center, Leiden)

Unearthing underground networks between plants and fungi



Common mycorrhizal networks are formed when mycorrhizal fungi connect the roots of plants underground, thus connecting plants within a community. These complex underground networks are thought to be ubiquitous and play a key role in the functioning of most terrestrial ecosystems, particularly in forests. Also known as the 'wood-wide web', they capture the interest of science and society, sometimes leading to hyperbole and misinterpretation.

In this talk I will discuss the recent controversies, progress and challenges in our understanding of the characteristics and functions of common mycorrhizal networks in forests.