Project title:

Stochastic modelling of partially-observed information diffusion across platform boundaries

Project title:

Dr. Marian-Andrei Rizoiu, Behavioral Data Science, University of Technology Sydney
email: Marian-Andrei.Rizoiu@uts.edu.au
website: www.rizoiu.eu
Google scholar: https://scholar.google.com/citations?user=J9sjxXYAAAAJ

Topic

This project will develop and evaluate stochastic models for the spread of information over complex social networks, in which the individual actions -- such as retweets, posts or shares -- are only partially observed. This can arise when only the actions of particular individuals are observed (say, when following some individuals on Twitter), or when only counts of actions are recorded (as in the case of Youtube attention series).

Stochastic point process modelling is the class of models behind several state of the art work for modelling diffusion in online social systems [1-4]. However such models typically require observing every online action, and they make restrictive modelling assumption. This project leverages recent advances in linking micro-modelling (individual actions) to macro-modelling (interval-censored observations) [5], and it aims to develop tools and methods to model diffusion of information across platform boundaries (say, from Reddit to Twitter and Youtube) and at different granularities. The privileged avenue are multi-variate point processes, in which some dimensions are observed as interval-censored.

The PhD student will be located within the newly formed DataSci Research Centre at UTS, in the Behavioral Data Science group. DataSci counts 15 members, with research interests spanning across smart logistics, transportation, and human dynamics. The Research Centre has both strong ties with industry, as well as world-class research, providing the ideal environment for solving real-world originating issues, in close proximity to both academia and industry.

The candidate

Interested candidates must have solid background knowledge in statistics, machine learning, and strong programming capabilities. Experience with big social data, extracting and handling web- and social media-originating data is a big plus. We are looking for a candidate with a master by research qualification, and demonstrated research capabilities (preferably through publications). Candidates with publications in major conferences/journals will be prioritised. The position will be open until the ideal candidate is identified.

Collaborations

This project will advance both the theoretical tools, as well as apply it to real problems in sociology and political science, through inter-disciplinary collaborations.

How to apply

To apply, please send by email (Marian-Andrei.Rizoiu@uts.edu.au) the following documents:

- your CV, showing your education and professional experience, prizes (such as university medals etc), awards and publications, if any;
- a cover letter (no more than one page), outlining I) your profile's match with the current subject, ii) your machine learning experience (example: describe one prior project involving Machine Learning)

and iii) **why do you want to research machine learning in social media. Please be precise, not vague;**

- grades transcripts from undergrad and Masters;
- Masters thesis (if applicable) or equivalent **research thesis**;
- 3 referees (academic or industrial supervisors, co-authors): name, position and email;
- (if you have one) one of your publications **which is most relevant for this position**.

References

[1] Zhao, Q., Erdogdu, M. A., He, H. Y., Rajaraman, A., & Leskovec, J. (2015). SEISMIC: A Self-Exciting Point Process Model for Predicting Tweet Popularity. In ACM SIGKDD Conference on Knowledge Discovery and Data Mining.

[2] Mei, H., & Eisner, J. (2017). The Neural Hawkes Process: A Neurally Self-Modulating Multivariate Point Process. In Advances in Neural Information Processing Systems 30 (pp. 6757–6767).

[3] Zarezade, A., De, A., Rabiee, H., & Rodriguez, M. G. (2017). Cheshire: An Online Algorithm for Activity Maximization in Social Networks. http://arxiv.org/abs/1703.02059

[4] Farajtabar, M., Du, N., Rodriguez, M. G., Valera, I., Zha, H., & Song, L. (2014). Shaping Social Activity by Incentivizing Users. In Advances in Neural Information Processing Systems (Vol. 27, p. 5365).

[5] Rizoiu, M.-A., Mishra, S., Kong, Q., Carman, M., & Xie, L. (2018). SIR-Hawkes: Linking Epidemic Models and Hawkes Processes to Model Diffusions in Finite Populations. In Proceedings of the 2018 World Wide Web Conference on World Wide Web - WWW '18 (pp. 419–428). Lyon, France: ACM Press. https://arxiv.org/abs/1711.01679