



Trinity College Dublin  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin

**Dr. Cornelius Fritz**

School of Computer Science and Statistics  
Trinity College Dublin  
Lloyd Institute  
42A Pearse St, Dublin, D02 R123

## **Structured PhD Position in Statistics (4-years full-time)**

**Project title:** Modeling Large-Scale Digital Trace Data with Local Dependence

**Project supervisor:** Dr. Cornelius Fritz (Assistant Professor at Trinity College Dublin).

**Project locations:** Discipline of Statistics and Information Systems, School of Computer Science and Statistics, Trinity College Dublin.

**Application deadline:** 30th April 2025

**Start date:** 1st September 2025

**PhD structure:** This is a full-time 4-year structured PhD project, based in the Discipline of Statistics and Information Systems at Trinity College Dublin. The funding for the project includes a tax-free stipend. EU fees are provided for in the funding.

**PhD topic:** Surrounded by smart devices that collect interpersonal data, we must explore novel ways of measuring and understanding social behavior through digital trace data, such as email traffic, follower networks on a social platform, or spatial co-location networks. The gathered data offers a planetary-scale view of online interpersonal relations, enabling a more nuanced investigation of biases in information diffusion, polarization, and echo chamber effects. To harness this information, novel models that handle large network sizes and additional information – such as fine-grained temporal information for email traffic or additional neighborhood structures – are essential. A key challenge in modeling large networks is ensuring local dependence in the assumed model, reflecting the natural perception that individuals primarily interact within their local neighborhoods rather than the entire network. To address this, the PhD candidate will develop network models for such trace data with a strong focus on real-world applications. These applications can be developed in collaborations with substantive scientists from, e.g., Sociology, Political Science, or Economics. The PhD candidate will also develop state-of-the-art optimization algorithms specifically tailored to the proposed large-scale network models. These methods will be implemented in efficient, scalable software packages, ensuring their applicability to real-world social and computational challenges.

**The Institution:** The School of Computer Science and Statistics at Trinity College Dublin is a collegiate, friendly, and research-intensive centre for academic study and research excellence. The School has been ranked 1<sup>th</sup> in Ireland, top 25 in Europe, and top 100 Worldwide (QS Subject Rankings 2018, 2019, 2020, 2021, 2023).

**Requirements:** Applicants should have (or expect to attain prior to project start) at least a 2.1 honours degree or equivalent in the areas of mathematics, applied mathematics or statistics. Applicants must demonstrate proficiency in statistical modelling and have some experience

with statistical computing through R, Python or C++. Applicants for whom English is a second language will be required to demonstrate their competence in the English language in line with Trinity College Dublin requirements as appropriate.

**Funding notes:** Stipend of €25,000 per year for four years. Fees for Home/EU students will be covered by the university.

**Application:** Applicants should email Dr. Cornelius Fritz (fritzc@tcd.ie) to apply. The application should include a 2-page comprehensive CV, academic transcripts of the degree/ degrees, and a short cover letter/statement of purpose (2-pages max) indicating how their skills align with the project and their motivation for applying. Please include “PhD Application” followed by your name in the subject line. The application CV should, at minimum, include the applicant’s name, educational institution, qualification stating overall grade/percentage (predicted grades are acceptable for those still studying) and contact details of two academic referees. Informal queries can be made to: fritzc@tcd.ie. Please include “PhD Query” followed by your name in the subject line.