

Report on IET Travel Award for International Travel

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Recommender Systems constitute a strongly significant domain of Machine Learning (ML) in terms of societal impact and commercial value. They involve the design and analysis of mathematical ML algorithms to serve item recommendations to the users in various recommendation platforms (streaming, music, news, etc). Moreover, this field also includes research on explainability and trustworthiness, ethics and fairness, business objectives of commercial recommenders, links to economics and psychology, and so forth. Indeed, recommenders are ubiquitous in our daily lives and shape our experience with digital products and services, so this field exists at the intersection of academic and company ML research!

The ACM Conference on Recommender Systems (RecSys) is the premier international conference in the field of Recommender Systems. Occurring annually, RecSys brings together the leading researchers from the academic, company and public-service sectors to present their cutting-edge work on recommenders and advance the frontiers of Recommender Systems. Hence, RecSys is one of the most important venues for practitioners in the field to connect and share knowledge on trends, challenges and novel results in recommendations.

One of the key challenges in recommendations is the *Cold Start problem*, which occurs when the recommendation platform contains many “cold users” who have interacted with very few (or zero) items, or many “cold items” that have been selected by very few (or zero) users. The resulting lack of information about these new users and items severely degrades the performance of recommender algorithms. Therefore, Cold Start is highly pertinent to most recommendation platforms, due to the large portion of new and infrequent users, and the dynamic item catalogue with new items constantly being added.

Addressing the Cold Start problem, which is very important for improving recommendation quality for new users and fairly promoting new items, was my focus for my Undergraduate Dissertation project at UCL. I conducted this project over the 2022-23 academic year in collaboration with the BBC. I commenced the project by analysing millions of real BBC data on Cold-Start interactions of users with the items on the BBC iPlayer streaming service, and I noticed that item popularity varies over time based on various factors, such as the day of the week, time since the item’s release, and metadata associated with the item (e.g. item

genre). Importantly, I mathematically demonstrated that, under some reasonable assumptions, recommending the most popular items on a given day maximises recommendation accuracy for new users. I then generalised this model to non-new cold users via popularity forecasting. This popularity modelling outperforms existing recommender algorithms for very cold users; however, it produces highly non-diverse recommendations, which limits users' exploration of the item catalogue and encourages a filter bubble. To fix this limitation, I designed a novel diversity-boosting method called Metadata Infusion, which significantly improves the recommendation diversity for my popularity model and many other recommender algorithms, for a marginal trade-off in model accuracy.

My novel popularity model and Metadata Infusion are the main contributions in my paper "[Bootstrapped Personalized Popularity for Cold Start Recommender Systems](#)", which I lead-authored alongside my four supervisors from UCL and the BBC. My paper was accepted and published at the RecSys 2023 conference (18-22 September 2023), so I travelled to Singapore this September to present my paper in the conference's Poster Session.

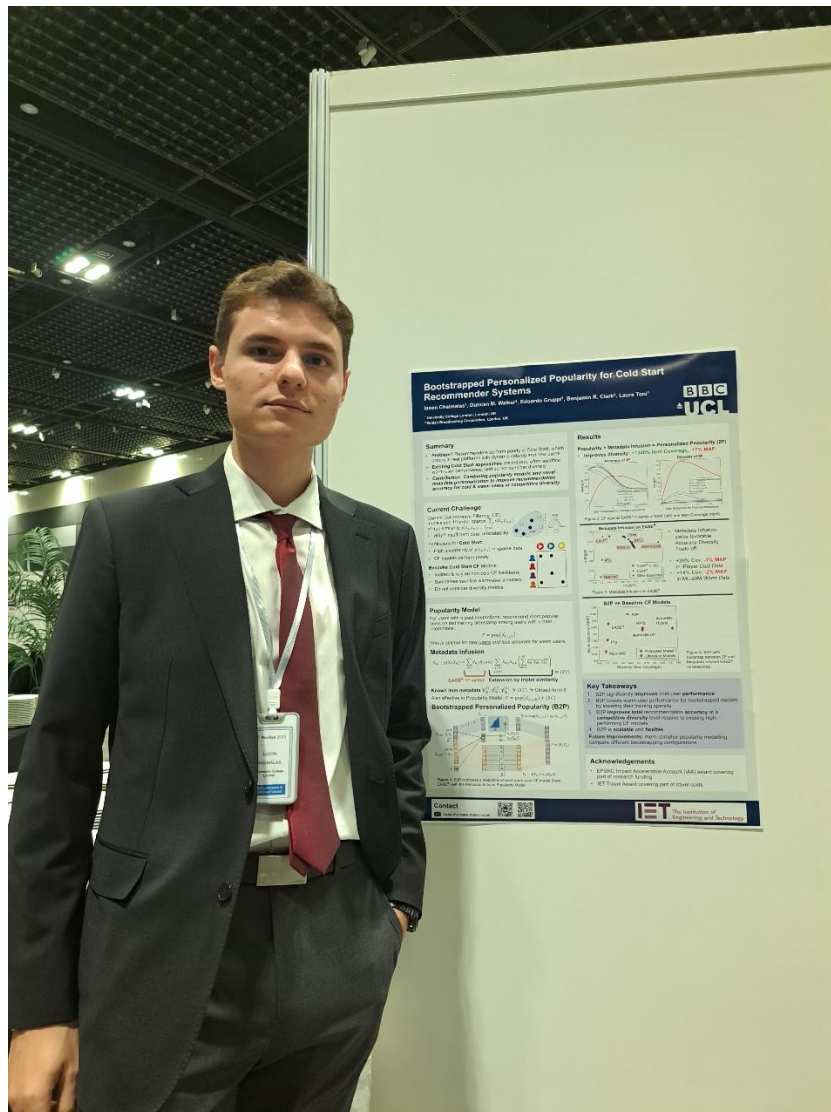


Photo: Presenting my paper at the poster session in RecSys 2023.

Presenting my paper to leading experts from academia and industry was a highly rewarding opportunity! We discussed the derivation, implications and future directions of my work, as well as related applications in those researchers' experience. For instance, I had the chance to talk to ML Engineers from broadcasting and e-commerce companies about their own deployment of popularity methods to treat cold users; they were really interested in my proposal of Metadata Infusion, as it addresses the known limitation of popularity in terms of non-personalisation and low diversity.

Furthermore, the broader RecSys 2023 conference experience was truly eye-opening for me. I attended multiple workshops and tutorials on emerging recommendations trends and existing technologies, watched the paper presentations of other authors, and networked with research academics and professionals from top universities and companies. Additionally, I explored the sights and food of the beautiful Singapore, which was an insightful cultural experience for me. I thoroughly enjoyed my first conference experience at RecSys 2023, and I do believe that this has solidified my desire to pursue further ML research in my career!

I would like to sincerely thank the IET for awarding me with a Travel Award that covered a significant part of my travel costs. This award was instrumental in enabling me to attend RecSys 2023 in person: to experience the world of cutting-edge Recommender Systems research first-hand, to present my work and network with experienced researchers, and to inspire my further research ideas! I wholly recommend to early-career researchers – particularly students like me – to apply for the IET Travel Awards for their research activities.