Ph.D. in Information Technology
Thesis Defense

May 29th, 2024
at 10:00
Aula PT1 – edificio 20

Fernando Benjamin PEREZ MAURERA – XXXV Cycle

Impression-Aware Recommender Systems

Supervisor: Prof. Paolo Cremonesi

Abstract:

Impression-aware recommender systems (IARS) are innovative recommender systems that leverage a novel data type to learn users' preferences toward items in online systems. Such data type is called impression, a collection of items shown to a user on-screen and generated by an online system.

Traditionally, recommender systems leverage user's actions with the system, such as views or clicks, to learn user preferences. IARS take a comprehensive approach to achieve the same goal. Unlike actions, impressions represent the choices the recommender system provides users at any time. IARS, then, join users' actions and shown impressions to make accurate and serendipitous recommendations. Consequently, IARS, in conjunction with impressions, enable the design and development of novel and more refined recommendation techniques.

Nowadays, many open research directions fundamental for properly developing IARS still need to be answered. This Thesis addresses three directions: characterization, evaluation, and experimentation. The first direction, characterization, addresses the need for sound mathematical foundations to define and describe IARS. In the Thesis, we design and propose a theoretical and mathematical framework to define impressions and IARS. Under this framework, we present a novel classification system for IARS comprised of three taxonomies and three design properties of recommendation models that learn from impressions. Additionally, we comprehensively review existing recommendation models proposed in previous research works.

The second direction, evaluation, addresses the need for standard evaluation methodologies and procedures to assess the recommendation quality of IARS. In the Thesis, we present, describe, and analyze a novel dataset with impressions suitable for evaluating IARS: ContentWise Impressions. We devise a standard evaluation framework for IARS, comprised of guidelines to process and clean datasets with impressions, to define recommendation tasks and goals, to define a set of baseline recommenders, and to search the optimal set of hyper-parameters.

The third direction, experimentation, studies IARS from a practical perspective, i.e., by performing experiments and evaluating their recommendation quality. In the Thesis, we assess whether the reviewed papers provide sufficient and necessary descriptions and tools to reproduce or replicate

their results. Then, we describe two evaluation studies on IARS, one aiming at replicating the results achieved by the literature, while the other aiming to incorporate impressions into graph-based recommender systems in practical and simple approaches to improve recommendation quality.

PhD Committee

Prof.ssa **Franca Garzotto, Politecnico di Milano**

Prof. **Alejandro Bellogin Kouki, Universidad Autònoma de Madrid**

Prof. **Iadh Ounis, University of Glasgow**