Ph.D. in Information Technology
Thesis Defense

June 27th, 2024
at 17:00 pm
Room BIO1 – building 21

Marco MUSSI – XXXVI Cycle

Online Learning Methods for Pricing and Advertising

Supervisor: Prof. **Marcello Restelli**

Abstract:

Nowadays, when it comes to selling a product online, there are several key factors that require careful consideration. Two of the most significant factors are the pricing strategy and the investments in advertising. When determining the price of a product, it is essential to strike a balance. The price should neither be set too low, as this would result in a reduced revenue from the single sale, nor too high, as it may deter potential buyers. The amount of money we invest in advertising should be balanced to let people know our offer without overspending or reaching people who are not interested. These two aspects are usually handled disjointedly by humans, but this, even if we proceed to optimize for the two components individually, may lead to a suboptimal solution. In this thesis, we focus on the adoption of online learning to solve the task of finding the optimal price for a product and how to advertise it properly. This thesis encompasses various facets of pricing and advertising, offering both theoretical frameworks and practical solutions for addressing the associated challenges. The first part of the thesis faces pricing methods. Initially, we introduce a practical and efficient approach tailored to e-commerce pricing. This method empowers e-commerce businesses to price properly the long tail. Subsequently, our focus shifts to theoretical aspects of pricing, particularly emphasizing the problem of learning temporal dynamics. In the second part, we discuss the theoretical aspects of advertising, with a particular focus on marketing mix models and how to handle them in a tractable way. In the third and final part, we bring together the problems of pricing and advertising, presenting a unified approach to address both aspects concurrently. This integrated approach allows us to strive for efficient and optimal solutions in the complex landscape of online product sales.

PhD Committee

Prof. **Matteo Papini, Politecnico di Milano**

Prof. **Alessandro Lazaric, META**

Prof. **Tom Cesari, University of Ottawa**