

Thesis subject

Contributing machine learning methods to better understand what determines food choices in order to devise personalized recommendation systems

Location: Équipe LINK (Learning and INtegration of Knowledge),
UMR MIA AgroParisTech / INRA

Supervision: Antoine CORNUÉJOLS & Cristina MANFREDOTTI

Area: Machine learning, recommendation, causality learning

1 Context of the project

The Ph.D thesis work will take place in the context of the ANR-SHIFT project (Substituting for Healthier foods, Investigating Food-choices Transitions - Crossing disciplinary views on food substitutions acceptability) funded on the period Autumn 2018 - Autumn 2021.

This project aims at a better understanding of what determines people to choose some meals in the various circumstances of their life. The goal *in fine* is to propose personalized recommendations so as to help guide people toward better consumption habits in terms of both health and sustainability of the agricultural production in the world.

The project involves an interdisciplinary team including specialists of machine learning, nutrition sciences, neurosciences and social sciences.

2 Subject of the thesis

The thesis work is deemed to investigate two related goals :

1. Identify *what drives the acceptability of proposed food substitutions*. The aim is to understand what makes a food substitution proposal acceptable by a person in a given context, and given his/her past history of food consumption.
2. *Devise a personalized recommendation system*. In order to make food recommendation and, in particular, to suggest food substitutions, this system should take into account the context of the food consumption: sociological, days of the week, season, state of the consumer, past history of consumption.

With respect to classical recommender systems, which may for instance suggest a new book to buy, we are in this project looking for recommendation systems that present **two big novelties**. First, recommendations are about food items of which the consumption is generally repeated over time, unlike the purchase of a book. Second, and even more importantly, the recommendations must take place in an overall recommendation strategy that covers weeks, months or even years in order to install long lasting and healthier new food consumption habits.

The Ph.D student will have to become familiar with the state of the art in recommendation systems, causality and online learning and tracking. He/she is expected to contribute to these fields, publishing papers in the top conferences and journals, while helping devise an operational food recommendation system.

Data will come from existing databases on dietary consumption and from ongoing data gathering projects. The data provides information at various levels : individual and population consumptions, the sociological and general contexts of the food consumption.

The Ph.D student is expected to interact a lot with the members of the ANR project as need of the various expertises will feel necessary to bear on the project.

3 Requirements

- M.Sc. degree in computer science, or related fields.
- Strong mathematical background. Knowledge of machine learning is required.
- Ability to program and perform simulations in Python/Java.
- Good oral and written English skills.
- Motivated, enthusiastic, positive person.

4 Person to contact

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Applicants should send by email, to the two supervisors, a CV and a motivation letter together with any additional material they deem useful to support their application.

Paris, October 10th, 2018