PhD research topic proposal

BME, Doctoral School of Mathematics and Computer Science

Name and degree of supervisor :

Dr Gergő Orbán

Are you willing to supervise Stipendium Hungaricum applicants?

Yes

Title of the topic:

Reverse engineering the internal models underlying decisions based on human behavioral data

Short description:

The sequence of decisions that we make reflects what we believe about how the world works. These beliefs can be formalized as internal models of the environment. Eye movements and reaction times measured in a given situation might seem to be a noisy source of information but by harnessing cutting-edge machine learning techniques, a substantial fraction of this variance can be traced back to the specifics of the internal model maintained by an individual. Although there are existing methods to uncover the internal representations of humans, these almost exclusively work on subject-averaged data therefore it is the key characteristics of internal models their subjective nature is lost. The goal of the PhD research is to harness the latest developments of machine learning to develop a tool to efficiently infer an individualized, high-dimensional, dynamical internal model underlying behavior. The significance of the research is that 1, efficient internal model inference is required for artificial agents to make decisions in situations where these need to interact with humans; 2, accurate internal models provide an opportunity to develop regressors for neural imaging techniques so that we can characterize factors that determine the behavior of healthy humans and those facing with disorders.

The research project provides an opportunity to obtain state-of-the-art knowledge in hot topics of machine learning, to acquire expertise in the domain of the interactions between artificial and biological agents, and to apply the insights obtained through behavior to questions relevant in neuroscience.

Requirements:

Contact:

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Place of work:

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