

FULLY-FUNDED PHD POSITION

Using machine learning to capture and model the singularity of gaze and spatial trajectories

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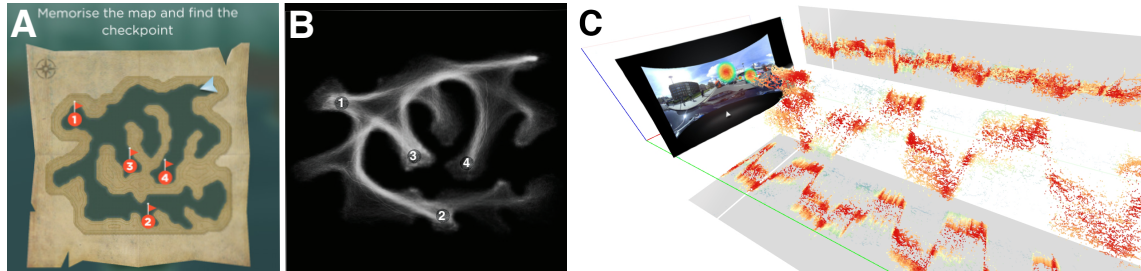


Figure 1. A-B Spatial trajectories recorded from a video game [1]. C Gaze trajectories recorded with an eye-tracker [2].

Context

Understanding how people navigate and explore the world is critical to many scientific fields, including image processing [3], clinical diagnosis [4, 5] and cognitive states inference [6]. In the last few years, many studies proposed models of visual attention trying to predict what in a scene attracts the observers' attention [7]. However, models' prediction are still far from human behavior.

Project

In this PhD project, the candidate will use machine learning to capture observer's singularity in how they explore the world. By capturing and modelling these singularities, the candidate will build models tailored for specific subgroups of the population (e.g. patients). The candidate will work with a planetary-wide database of over 4 million spatial trajectories crowd-sourced via a video-game, Sea Hero Quest [1]. This constitutes one of the largest database of human behavior designed for scientific purposes in the history of science. The portability of the developed approaches from gaze to spatial navigation trajectories will be studied.

Implications

Models able to automatically adapt to a specific population and predict their gaze / spatial navigation trajectories will have strong implications in a number of fields such as

- Clinic, as gaze and spatial navigation are reliable biomarkers of many diseases such as Alzheimer's,
- Robotics, e.g. implementing human-like behavior in robots' visual and navigation system,
- Image compression, e.g. personalized foveated rendering in virtual reality,

- Deep learning, e.g. using for the first time a 4 million human database to train networks,

Candidate profile & Position

We are looking for a PhD candidate with a solid background in computer science, machine learning, applied statistics, or in a related field. Interest for artificial intelligence and neuroscience, as well as experience with large and noisy human signals will be a strong plus. Good programming and English skills are expected.

This is a fully-funded 3-years PhD position in a highly dynamic and multicultural environment (~2025€/month with teaching responsibilities). Funds are secured for travels to conferences in exotic locations. Starting date is flexible, between 01/01/2019 and 01/09/2019.

References

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