

MASTER II INTERNSHIP

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

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keywords: machine learning | big data | eye-tracking | spatial navigation | video game | individual differences

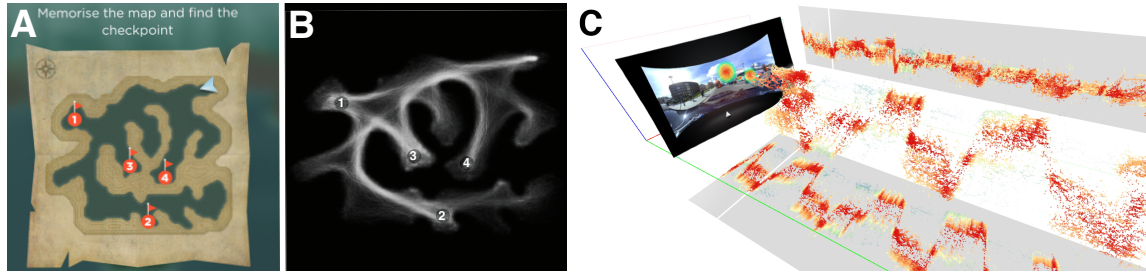


Figure 1. A-B Spatial trajectories recorded from a video game [1]. C Gaze trajectories recorded with an eye-tracker [2].

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

During this internship, 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 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.

Starting date: 01/02/2019 - Duration: 6 months

This internship will open on a fully-funded 3-years PhD position on a similar topic.

References

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