

Evaluation of Eye Tracking Data in VR-Headsets

Using virtual reality for professional flight simulation

Students



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Introduction: In our modern world, virtual reality opens new possibilities to simulate flights and train the abilities of pilots. VRM Switzerland AG, our industry partner for this thesis, is a start-up based in Dübendorf, Zürich. With their goal to build the most realistic and professional flight training solution, they are already one of the leading companies in the field of research for flight training solutions. At the moment a supervisor needs to be present, who controls and evaluates the behaviour of the pilot. The goal is that the pilot can train independently and receives feedback from the developed software regarding the reliability of his skills. The feedback is generated by processing various data. To detect and verify multiple gaze patterns algorithms are required.

Definition of Task: First, the design for a realistic representation of a Robinson R22 helicopter cockpit with an appropriate environment in Unity was required. In a next step the eye movements from the pilot needed to be evaluated. The focus is on identifying the instruments of the aircraft and making statements about gaze patterns, which are performed by the pilot. For the assessment of recognizing patterns, the Markov Chain was required. Additionally, all evaluations and logged gaze patterns needed to be visualized in a concise manner. So, that it will be easy for the instructor to give a constructive feedback to the students.

Conclusion: As a result of this thesis, an environment including an accurate model of a R22 helicopter was implemented in Unity. With the help of an eye tracker, a ray cast system was implemented, which follows the pilot's gaze and provides data of the range of instruments the pilot focuses at in real time. For a post flight evaluation, a Markov Chain has been

implemented which visualizes three different gaze patterns. To be able to directly evaluate different gaze patterns in training, a visible circle on how long an instrument was looked at and a trail, which shows the history of gaze for a certain amount of time were implemented.

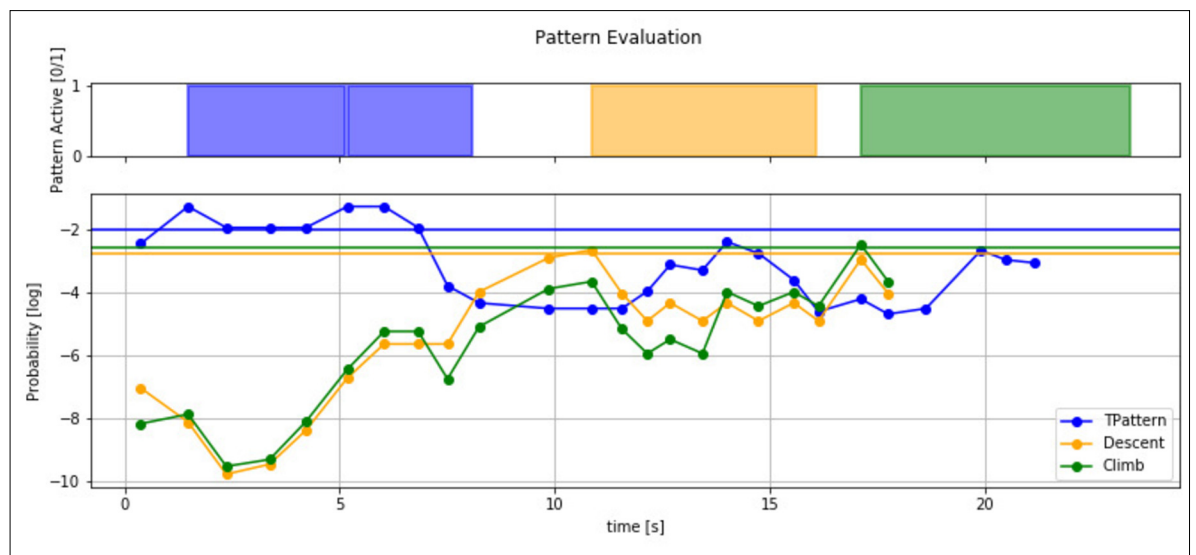
Left: the cockpit in the simulation. Right: the cockpit in the simulator.
<https://vrm-switzerland.ch/videos/>



Helicopter cockpit sight in virtual reality with a visual trail of gaze history.
Own presentation



If the probability exceeds its limit, a pattern was performed correctly and it will be displayed in the upper subplot.
Own presentation



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Subject Area
Image Processing and
Computer Vision

Project Partner
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