Predictive User Interface for Emerging Experiences

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Abstract. *This research paper focuses on the use of predictive techniques to improve interaction with user interfaces in emerging experiences such as Virtual Reality, Augmented Reality, Metaverse, and touchless kiosks and dashboards. We propose the concept of intelligent snapping, which uses gaze tracking, head-pose tracking, hand tracking, as well as gesture recognition and hand posture recognition to catch the intent of the person rather than the actual input.*
Keywords: *Virtual Reality, Augmented Reality, User Experience, artificial intelligence*

1. Introduction and methodology

Virtual reality (VR), augmented reality (AR), and touchless interfaces are becoming increasingly popular for a variety of applications, including gaming, education, and healthcare. However, interacting with these systems using touch gestures or hand (controller) tracking can be inaccurate and imprecise, leading to frustration and decreased user engagement. To address these challenges, predictive user interfaces (PUIs) have been proposed to improve the interaction between the user and the virtual world, though many of the previous works were mostly concentrated on using gaze tracking [1] in order to predict the user's action.

The proposed PUI utilizes a combination of techniques to predict the user's intent and provide more efficient and accurate interactions. We use a multi-modal approach and combine hand posture recognition and gesture recognition, gaze tracking, head pose tracking and full body tracking with a neural network based on Transformer architecture. This allows us to infer the actual "intent" of the user and create a predictive and not reactive experience, as well as provide more efficient and accurate interactions in VR, AR, and touchless interfaces.

The approach is a natural progression of the work on Redirection Techniques (RETs) in VR, that allows exploring vast virtual environments while being constrained by physical room [2] [3]. They prove that it is possible to deceive the player in regard to rotation and translation mapping. Our work expands on this concept by introducing advanced trajectory prediction in order to achieve intelligent redirection of hand or controller movement mapping that is imperceptible to the player. This makes it possible to eliminate jarring object snapping in VR. By capturing the intent, it is also possible to build truly predictive User Interfaces by calculating the probability heatmap for all the UI elements. Moreover, by capturing the intent, it is possible to predict more advanced actions in real-time, such as changing gears in a driving simulator or reloading a weapon in an FPS and make these actions seem natural to the player.

References

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