Statistical Learning Models for Anticipatory Smooth Pursuit Of Eye Movements

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Résumé

The field of anticipatory smooth pursuit eye movements (aSPEM) has been studied extensively in recent years, as researchers look to understand how the brain processes and anticipates visual information. One promising approach to understanding aSPEM is through the use of statistical learning models based on Reinforcement Learning (RL) and Bayesian Learning (BL). These models have been shown to be effective in simulating how the brain processes visual information and can be used to investigate different aspects of aSPEM, which are critical to maintain clear vision while tracking moving objects. In this study, we present a statistical learning model based on RL and BL for the prediction of aSPEM. The model is designed to simulate the behavior of the human visual system during aSPEM tasks. It learns to predict and optimize the direction and velocity of aSPEM based on past visual information. The RL component of the model is used to learn an optimal policy for controlling the eye movements, while the BL component is used to infer the underlying distribution of the model parameters. We evaluated the model using a dataset of aSPEM recordings collected from human participants while they performed a visual motion tracking task. Our results show that the model is able to accurately predict aSPEM with high degree of accuracy, and that it is able to generalize well to new visual information. Furthermore, this model could be used to investigate different aspects of aSPEM, such as the effects of different types of visual stimuli on the direction and velocity of aSPEM, thus giving a basic understanding of the underlying neural mechanisms of aSPEM, and providing insights into how the brain processes and anticipates visual information. In conclusion, our study provides evidence that statistical learning models based on RL and BL are a promising approach for understanding aSPEM and demonstrate the potential of RL and BL as a powerful tool for studying complex sensorimotor behaviours in humans and animals. These models can be used to investigate the underlying neural mechanisms of aSPEM, and can provide valuable insights into how the brain processes and anticipates visual probabilistic information.

Mots-Clés: Anticipatory smooth pursuit of eye movement, Reinforcement Learning, Bayesian Learning

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