**Abstract**

Among the new human-computer interaction technologies such as eye tracking and gesture recognition, the human-computer interaction technology based on eye movements improves the intelligence, naturalness, and efficiency of human-computer interaction. This paper investigates the potential of using eye movements to operate a computer mouse cursor, enhancing accessibility for individuals with physical limitations or those seeking alternative input methods. By analyzing eye images to detect gaze direction and eye locations, the feasibility of converting eye movements into cursor actions using Convolutional Neural Networks (CNNs) and Support Vector Machines (SVMs) is explored. The research examines the geometric model of an eye-tracking system with a single camera under natural light, focusing on the optimal placement area of the camera when the user’s head is stationary and the maximum allowable rotation range when the user’s head is free to move. Key components include data collection from various user eye movements, training machine learning models, and real-time processing for precise cursor control. This paper aims to advance the development of eye-tracking systems that can offer practical solutions for hands-free computer interaction.

**Keywords:**Convolutional Neural Networks, Support Vector Machines, Gaze Detection

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