Development of a Binocular Eye Tracking System for Quality Assessment of S3D Representations

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Background and Aim
• Support quality assessment of S3D representations.
• Define requirements for binocular eye tracking in the context of S3D quality assessment.
• Combine technical capabilities and knowledge about physical thresholds and limitations.

Problems
• The accuracy of binocular eye tracking systems needs improvement.
• The movements of eyes and head influence the accuracy.
• The camera resolution and recording frequency have to be balanced.

Solutions
• Define thresholds, weighting factors, drift errors, and offset values.
• Develop software modules to make the recorded measuring data more accurate.

Hardware Prototype
Eye tracker:
• Define the influence of head movements.
• Use a fixation variant for investigation.

Eye camera:
• Support accuracy via precise pupil localization.
• Record viewing directions via smaller eye ball parts. [1]

Software Specification Modules
Calibration optimization via physiological parameters:
• Consider information about the individuals’ eyes.
  E.g., position of fovea centralis, optical axis of the eye, eyeball size, corneal refraction. [2]

Information technological calibration optimization:
• Use comparison method with depth maps.
• Define mapping rules based on comparison of binocular eye tracking results with test stimuli (CGI).

Discrete position weighting:
• Support precise position definition by algorithm weighting eye movements and recordable viewing position.
• Define useful measuring frequency and minimize noise.

Scene object recording:
• Analyse measured data for most important fixation metrics (amount, overall time, average time). [3]
• Compare with synthetic images and adapt measured data as well as calibration.

References:

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