COMPARATIVE STUDY AND ANALYSIS OF EYE GAZE ESTIMATION MODELS

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ABSTRACT

The study compares and analyses three deep learning eye-tracking models: iTracker, FAZE, and ODABE, using GazeCapture and MPIIGaze datasets. iTracker excels in accuracy and dataset versatility, ODABE brings innovative online transfer learning, and FAZE offers precise, calibration-efficient tracking. This analysis advances knowledge in the field, tackling issues of accuracy and adaptability in eye-tracking.

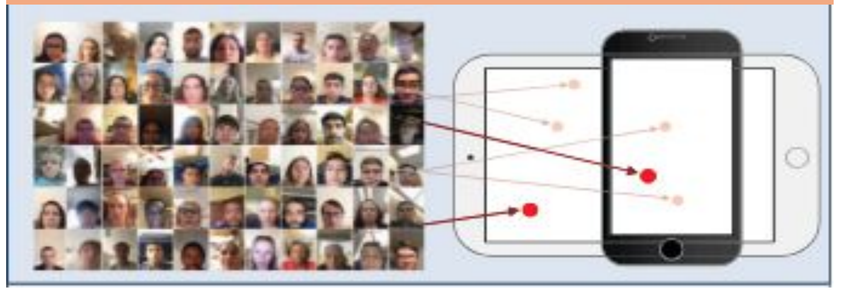
PROJECT GOALS

Implementation of models (iTracker, FAZE, ODABE)

Comparison Analysis: Results of three models (iTracker, FAZE, ODABE)

Enhancements: Improve models performance

DATASET

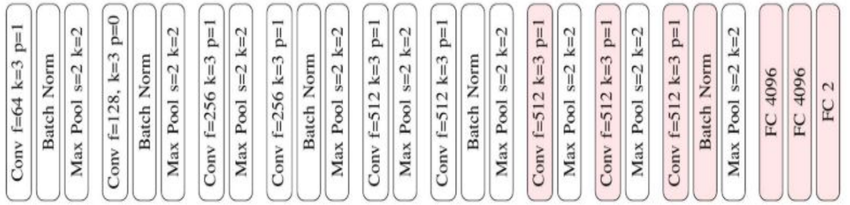


The GazeCapture dataset was employed for iTracker, FAZE while ODABE utilized a combination of the MPIIGaze dataset fine-tuned with the GazeCapture dataset. This approach enhanced their performance by incorporating valuable insights from the GazeCapture dataset, ultimately refining their gaze-tracking capabilities.

iTRACKER

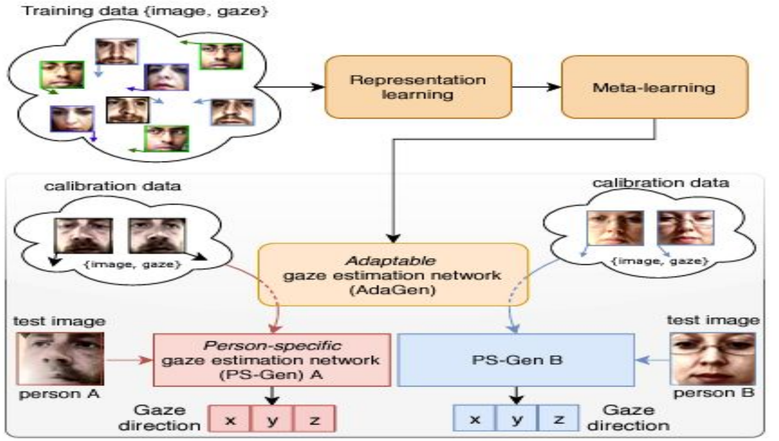
iTracker, a convolutional neural network tailored for eye tracking, surpasses appearance and shape-based models in accuracy. Leveraging the extensive GazeCapture dataset, it ensures generalization across diverse datasets. Addressing common challenges like accuracy and mobile compatibility, iTracker integrates dark knowledge to create a smaller, faster network for real-time applications with minimal accuracy loss.

ODABE



ODABE tackles the issue of limited generalization of appearance-based eye tracking models across diverse user combinations, devices, and environments. Leveraging online transfer learning, ODABE initially undergoes pre-training on the MPIIGaze dataset before fine-tuning to adapt to new contexts. This approach significantly reduces prediction error demonstrating the efficacy of online learning in enhancing eye tracking performance across varied scenarios.

FAZE



This frame- work which is developed to find the accurate gaze estimation using very few calibration samples. Recent progress on gaze estimation evolving from classical model-based approach to appearance based using CNNs has significantly improved the accuracy and applicability of gaze estimation in the real- world. Despite the advancements, achieving high accuracy especially in personalized settings, insufficiency of person- independent gaze estimation, training person-specific models with thousands of training images per subject remains challenging

CONCLUSION

The systematic approach to dataset preparation, image preprocessing, and deep learning model training is evident in iTracker, FAZE, and ODABE implementations. While iTracker and FAZE focus on general model training, ODABE emphasizes adaptability through fine-tuning mechanisms. Each model addresses specific challenges in eye tracking, advancing HCI.