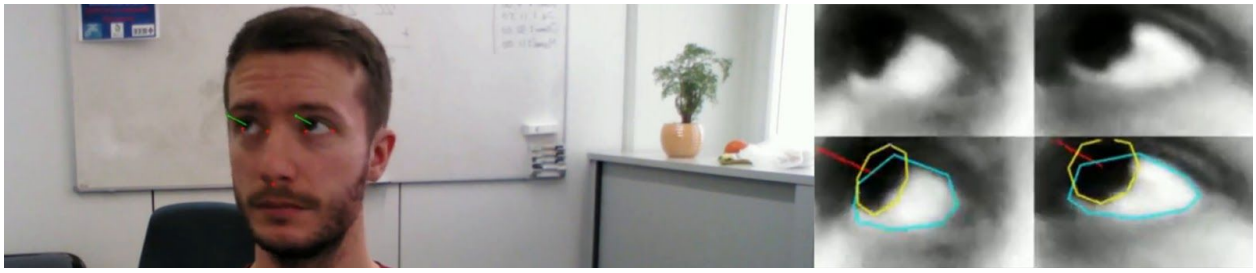
Eye Gaze Estimation



Instruction

Eye tracking can improve the lives of users with motor disabilities by providing an intuitive and convenient input method, or provide detailed insights into users' attention. Previously, eye tracking technology was limited to laboratory environments for psychology research and dedicated hardware. In this project, we will focus on developing the gaze estimation method can work with the ordinary webcam in challenging real-world settings. We are providing you two challenging gaze estimation datasets GazeCapture and MPIIFaceGaze. The data were collected from participants' own devices (cellphone, tablet and laptop) under real-life conditions, i.e. natural head poses, various illumination conditions, and diverse personal appearances. The difficulty of this task increases with the lower number of pixels, motion blur, less ideal illumination conditions, and ambiguity in determining the extent of the eyeball or shape of the iris. To categorize better, we can state the challenges as (a) low sensor quality or unknown/challenging environments, and (b) large variations in eye region appearance. (b) can in practice be further separated into physical differences between individuals, variations in head pose, or situational changes in decorations such as eyeglasses or cosmetics.

Task

You will learn how to solve the real-world gaze estimation task by leveraging a large amount of data and selective input components. We will split the GazeCapture dataset into training validation and test sets, and the MPIIFaceGaze will server as a part of the test set only. Your task is predicting the gaze estimation with the low angular error on the test set. The design choices include different input components such as full-face patch, two eye images, connected two eye patch, head pose, and facial landmarks. You are also supposed to play with different CNN architectures such as AlexNet, VGG, GoogLeNet, ResNet, and DenseNet as well as the adaptation of these architectures for gaze estimation task.

Further Reading

Kyle Krafka et al. Eye Tracking for Everyone. In CVPR '16.

Xucong Zhang et al. (2017) MPIIGaze: Real-World Dataset and Deep Appearance-Based Gaze Estimation. In TPAMI '17.

Seonwook Park et al. Learning to Find Eye Region Landmarks for Remote Gaze Estimation in Unconstrained Settings. In ETRA '18.