

New spectral eye video database SPEED revolutionises eye-tracking



Info-graph for SPEED showing the gender diversity, iris-colour diversity, and nationality diversity within the database as well as example images taken from the spectral video streams. The videos were taken under two illumination conditions: sunny daylight and office light. The example images demonstrate the different conditions incorporated into the database: a) standard conditions, b) shadows, c) strong reflections from daylight, d) use of sunglasses, e) strong reflections from office light, f) extreme angles in daylight g) hair occlusion, h) extreme angles and make up in office light. Credit: University of Eastern Finland

June 22 2017



Techniques to acquire spectral data have been static for a long time until now. Exciting and novel spectral video technologies are emerging, allowing us to extract increasingly dynamic knowledge from light. Using a spectral video device in eye-tracking, computational spectral imaging and eye-tracking researchers from the University of Eastern Finland have created a novel - first of its kind - combined spectral video/spectral image database: the SPectral Eye vidEo Database, SPEED.

The potential of spectral imaging technologies has been shown in many fields, such as medicine, life science and industry where the spectrum has been used, for example, to differentiate healthy and unhealthy tissue or separate real and counterfeit objects. However, these technologies are often too slow to capture spectral <u>images</u> from dynamic objects. This created an evolutionary need for the extension of spectral imaging to the recording of spectral video. In a spectral video, each frame of the video stream contains a spectral image cube. In this way, spectral video systems capture spatial, spectral and temporal information, and combine the advantages of <u>spectral imaging</u> and video capture.

A recent PhD thesis completed at the University of Eastern Finland explored the potential of such spectral video <u>technology</u> by testing an existing spectral video system and challenging it in practical eye-tracking application.. As a result, the study developed protocols for the characterization of spectral video that may serve as future guidelines on spectral video systems evaluation in this emerging field. In addition, the study used a spectral <u>video</u> camera to capture spectral videos of a fastmoving object: the human eye. As a very concrete outcome of the study, the SPectral Eye vidEo Database, SPEED, was born.

The unique database, SPEED, was motivated by the challenges faced in eye-tracking, especially under harsh conditions. When users wear



eyewear or make-up, reflections and extreme eye positions interfere with eye-tracking technologies. The team proposed and demonstrated that spectral signatures can be exploited to create new approaches for imaging, training, analysis and interpretation of eye-tracking data, especially in harsh conditions. SPEED consists of over 180 spectral videos, it continues to grow and it is publicly available to all researchers (e.g., for teaching-related needs or creating and testing new methods of dynamic eye analysis via spectra). Although published only in 2016, the database has already attracted attention from the scientific community and industry. Aside from its use in eye tracking, SPEED also has the potential to be utilised in other eye-related research areas, such as medicine, biometrics, and eye and vision research.

More information: "SPEED: SPectral Eye vidEo Database" In Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing: Adjunct. ACM. pp. 1666-1675, 2016. DOI: 10.1145/2971648.2971724

Provided by University of Eastern Finland

Citation: New spectral eye video database SPEED revolutionises eye-tracking (2017, June 22) retrieved 3 May 2024 from https://phys.org/news/2017-06-spectral-eye-video-database-revolutionises.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.