Comments on Iris Template Aging and IREX VI

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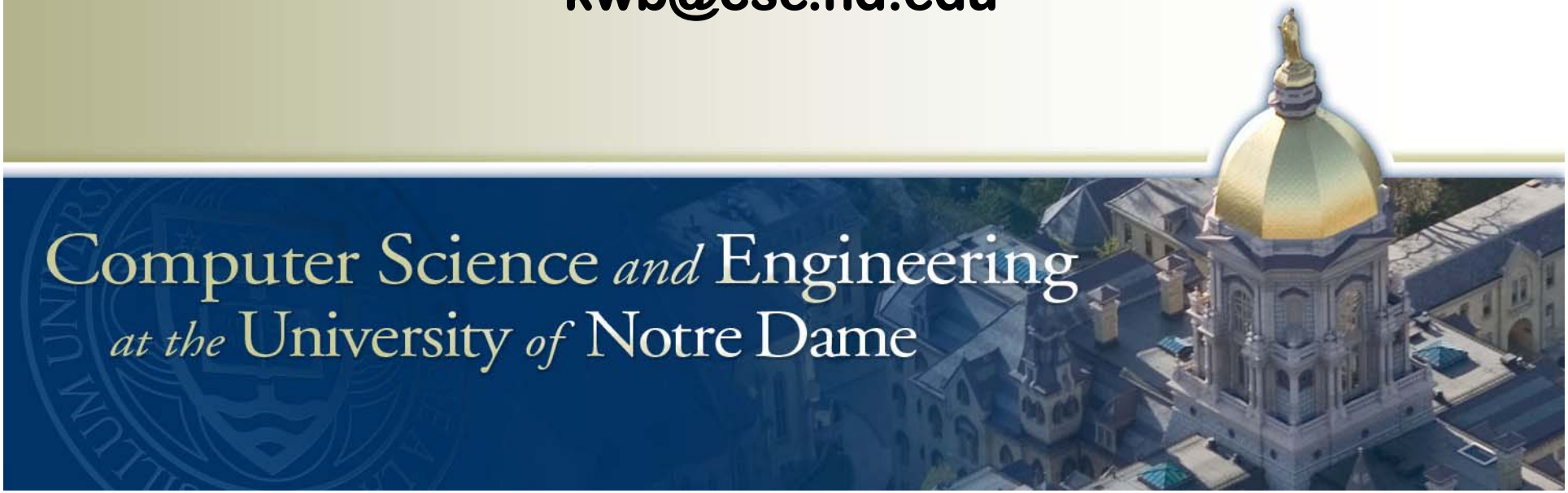


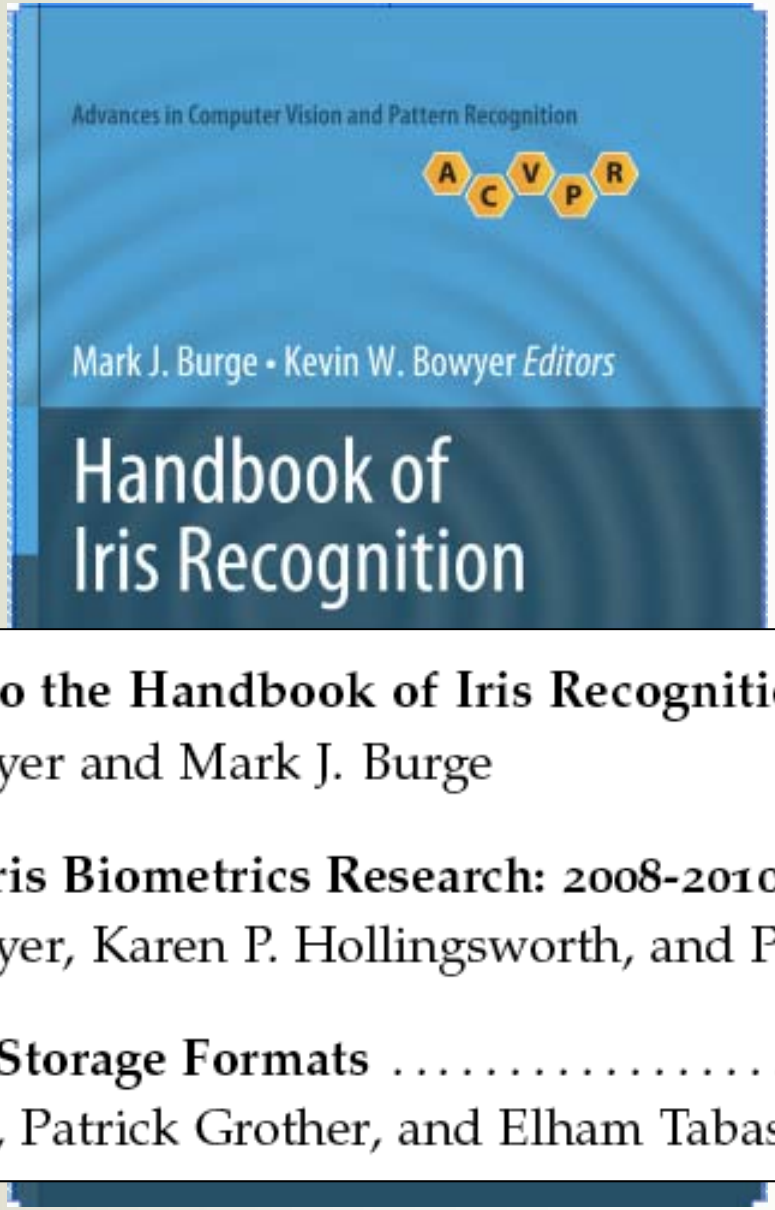
IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, VOL. 27, NO. 2, FEBRUARY 2005

The HumanID Gait Challenge Problem: Data Sets, Performance, and Analysis

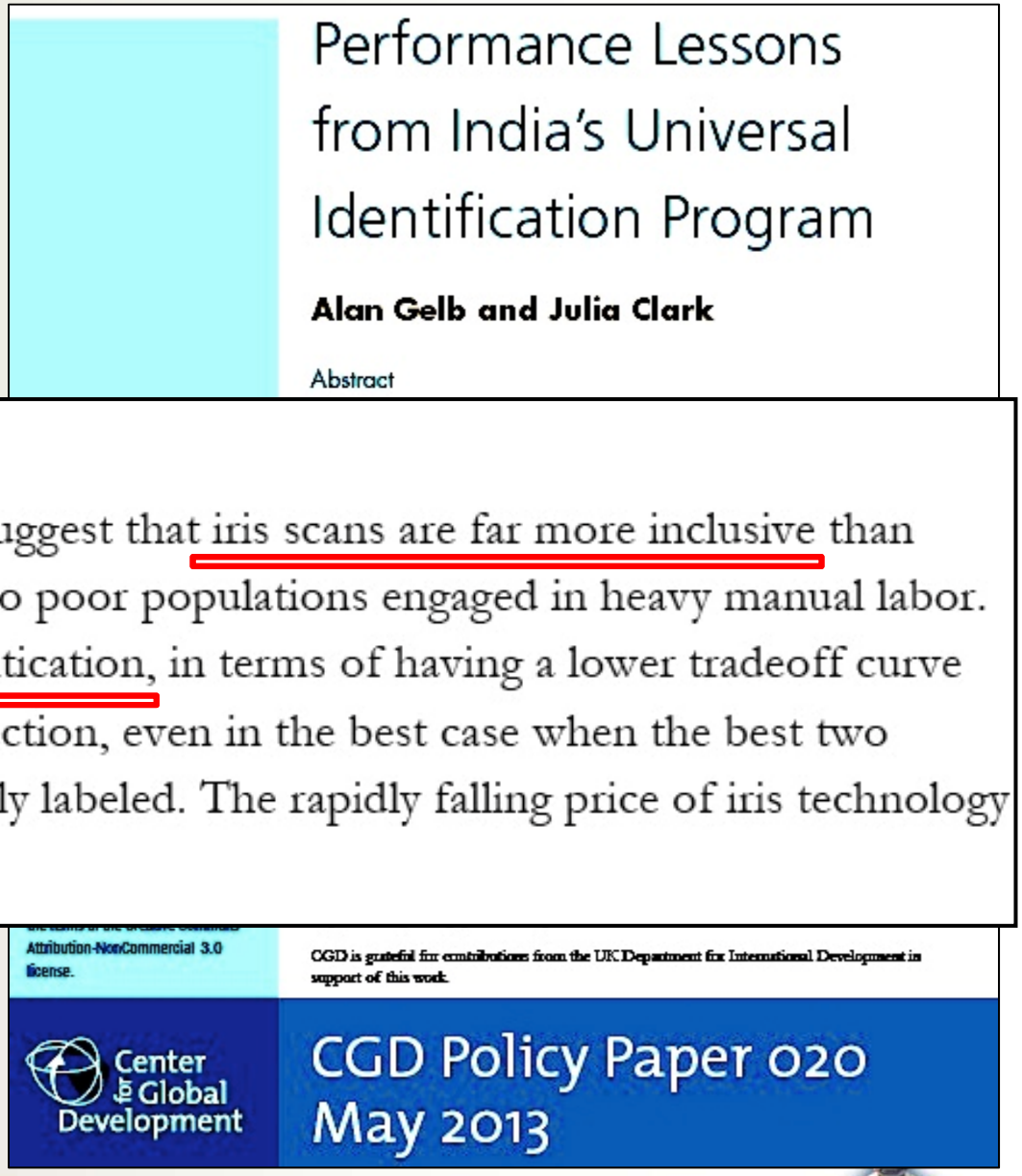
Sudeep Sarkar, *Member*, *IEEE*, P. Jonathon Phillips, *Member*, *IEEE*, Zongyi Liu, Isidro Robledo Vega, *Member*, *IEEE*, Patrick Grother, and Kevin W. Bowyer, *Fellow*, *IEEE*

Abstract—Identification of people by analysis of gait patterns extracted from video has recently become a popular research problem. However, the conditions under which the problem is "solvable" are not understood or characterized. To provide a means for measuring progress and characterizing the properties of gait recognition, we introduce the HumanID Gait Challenge Problem. The challenge problem consists of a baseline algorithm, a set of 12 experiments, and a large data set. The baseline algorithm estimates silhouettes by background subtraction and performs recognition by temporal correlation of silhouettes. The 12 experiments are of increasing difficulty, as measured by the baseline algorithm, and examine the effects of five covariates on performance. The covariates are: change in viewing angle, change in shoe type, change in walking surface, carrying or not carrying a briefcase, and elapsed time between sequences being compared. Identification rates for the 12 experiments range from 78 percent on the easiest experiment to 3 percent on the hardest. All five covariates had statistically significant effects on performance, with walking surface and time difference having the greatest impact. The data set consists of 1,870 sequences from 122 subjects spanning five covariates (1.2 Gigabytes of data). The gait data, the source code of the baseline algorithm, and scripts to run, score, and analyze the challenge experiments are available at http://www.GaitChallenge.org. This infrastructure supports further development of gait recognition algorithms and additional experiments to understand the strengths and weaknesses of new algorithms. The more detailed the experimental results presented, the more detailed is the possible meta-analysis and greater is the understanding. It is this potential from the adoption of this challenge problem that represents a radical departure from traditional computer vision research methodology.

(currently showing 700+ citations on Google Scholar)



Center for Global Development report



Performance Lessons from India's Universal Identification Program

Alan Gelb and Julia Clark

Abstract

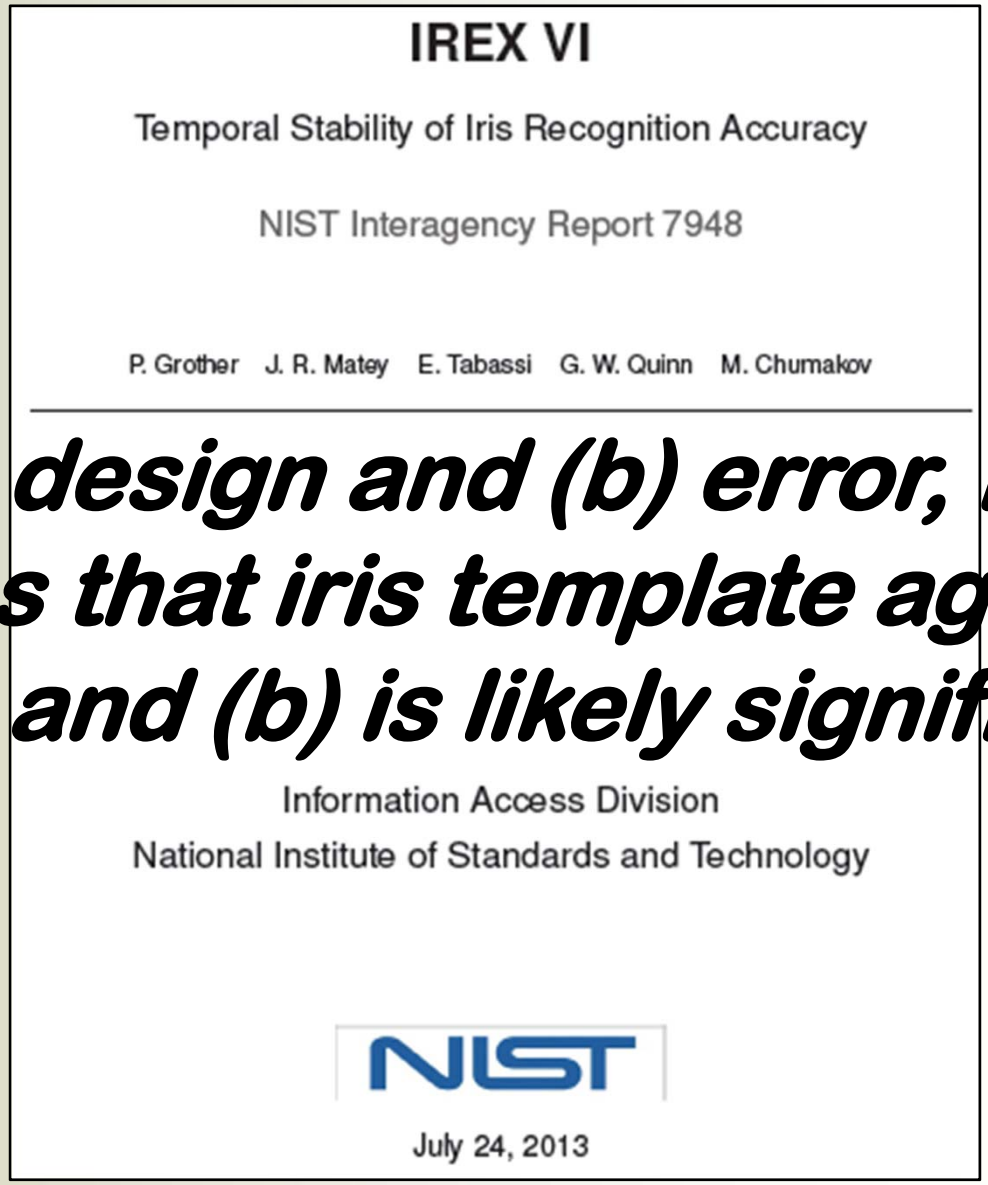
The Eyes Have It

Iris trumps fingerprints. UID's data suggest that iris scans are far more inclusive than fingerprints, especially when applied to poor populations engaged in heavy manual labor. They are also more precise for authentication, in terms of having a lower tradeoff curve between errors of acceptance and rejection, even in the best case when the best two fingerprints are known and individually labeled. The rapidly falling price of iris technology

CGD is grateful for contributions from the UK Department for International Development in support of this work.

Center for Global Development

CGD Policy Paper 020
May 2013



IREX VI

Temporal Stability of Iris Recognition Accuracy

NIST Interagency Report 7948

P. Grother J. R. Matey E. Tabassi G. W. Quinn M. Chumakov

By (a) design and (b) error, IREX VI tells us that iris template aging (a) exists and (b) is likely significant.

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ISO iris template aging - ... *increase in error rates caused by time-related changes in the biometric pattern, its presentation and the sensor*

By design, IREX VI can give evidence that iris template aging exists, but not that it doesn't exist.

IREX VI iris aging - *irreversible changes to the healthy iris or neighboring anatomy that yield mated dissimilarity scores that increase monotonically with time-separation of the compared images*

IREX VI

Temporal Stability of Iris Recognition Accuracy

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Results: The primary results of this investigation are as follows.

▷ *Rate of accuracy change*: Our best estimate of iris recognition ageing is derived from a 7876 person subset of an operational registered traveler deployment[5] who have used the system on forty or more occasions over at least four years and up to nine years. The estimate is a population-average from a linear mixed-effects regression model. It states Hamming distances increase at a rate of $(8 \pm 2)\text{x}10^{-7}$ per day. Sec. 4.2

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eye-specific terms

$$d_{ij} = \beta_1 + \beta_2 T_{ij} + \beta_3 \Delta D_{ij} + \beta_4 \Delta D_{ij}^2 + \beta_5 D_{ij} + \beta_6 D_{ij}^2 + \beta_7 C(r) + b_{i1} + b_{i2} T_{ij} + b_{i3} \Delta D_{ij} + b_{i4} D_{ij} + b_{i5} D_{ij}^2 + e_{ij}$$

Time lapse

Dilation difference

(Dilation difference)^2

Dilation of probe

(Dilation of probe)^2

Multicollinearity is not a problem unless either (i) the individual regression coefficients are of interest, or (ii) attempts are made to isolate the contribution of one explanatory variable to Y, without the influence of the other explanatory variables.

Makridakis et al, Forecasting: Methods and Applications, Wiley, 1998.

The simple model:

$$HD = 0.127 + 3.5 \times 10^{-5} \times Time\_Lapse$$

Adding one variable for dilation:

$$HD = 0.115 + 1.4 \times 10^{-5} \times Time\_Lapse + 0.41 \times Dilation\_Difference$$

IREX VI

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This operational system reduced the threshold as enrolled population size increased in order to maintain a low calibrated false match rate. This complicates our analysis because the distribution is truncated differently earlier in the period. CBSA confirmed the use of a threshold of 0.2797 in the earliest events (in 2007), reducing to 0.2704 at the end of the period (in 2012). We therefore *re-thresholded* the data removing all points with Hamming distances above 0.27. The original logs

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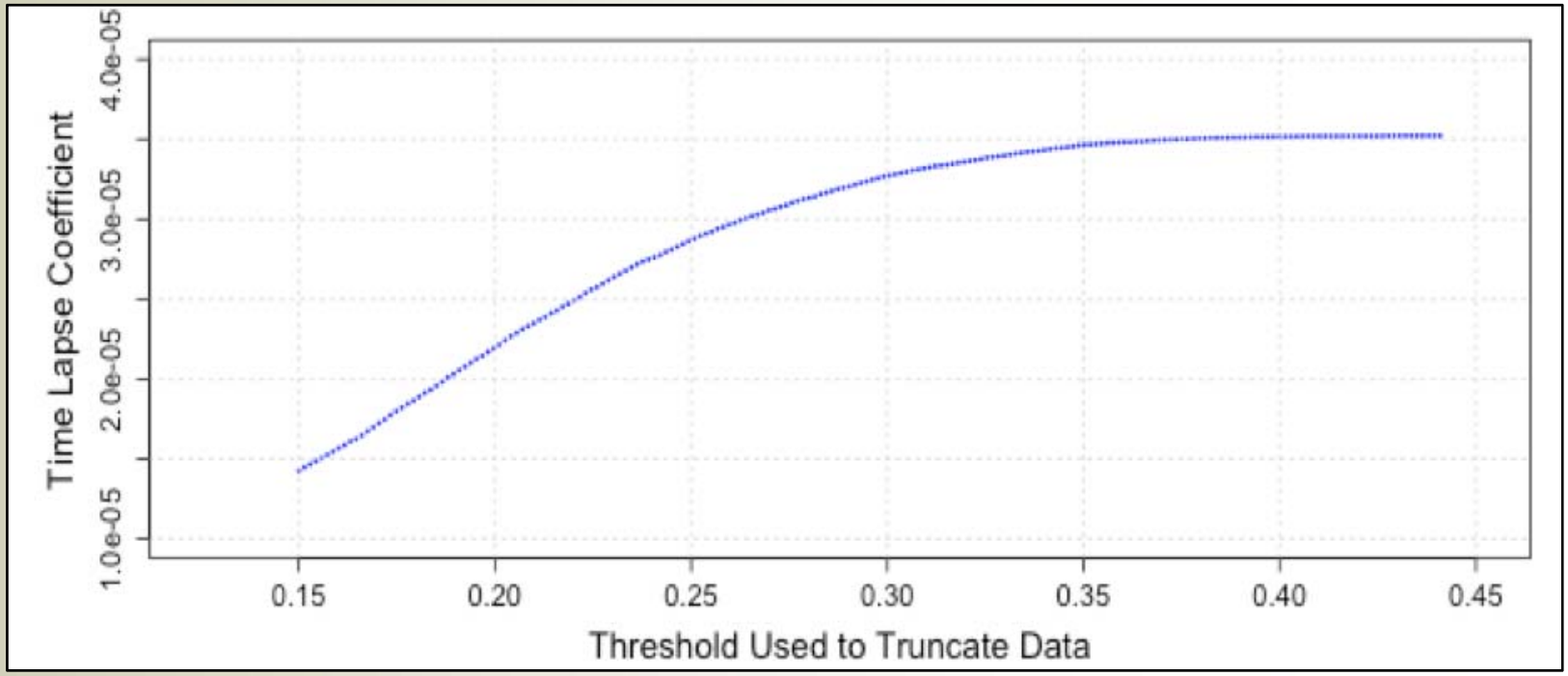
OLS regression will not adjust the estimates of the coefficients to take into account the effect of truncating the sample … and the coefficients may be severely biased. This can be conceptualized as a model specification error.

Truncated Regression, UCLA Institute for Digital Research and Education.

Thresholded Dataset Biases Results

Does deleting a substantial % of the matches with the largest HD affect the results of an aging study?



Of course it does. It lowers the estimated aging term.

If your first attempt to open a door fails, do you make the same effort or a greater effort on your second attempt? And on your third attempt?

The IREX VI dataset is an unlabeled mixture of HDs resulting from first, second and third attempts to obtain a successful match !

- **The IREX VI "best estimate of iris recognition aging" is based on at least 3 methodological errors.**
  - **Failure to take multicollinearity into account**
  - **Failure to appreciate the truncated nature of the dataset**
  - **Failure to separate out first-, second- and third-attempt match scores**

- **The IREX VI "best estimate of iris recognition aging" is based on at least 3 methodological errors.**
- **Each one of these errors has the potential to change / negate / reverse IREX VI's conclusion about the "small" aging effect.**
- **Because of these problems, IREX VI should be withdrawn and redone.**

11th IEEE International Conference on Automatic Face and Gesture Recognition

FG2015

http://www.fg2015.org

http://www.facebook.com/faceandgesture

CALL FOR PARTICIPATION

The **11th IEEE International Conference on Automatic Face and Gesture Recognition (FG 2015)** will be held in Ljubljana, Slovenia on May 4-8, 2015. The IEEE conference series on Automatic Face and Gesture Recognition is the premier international forum for research in image and video-based face, gesture, and body movement recognition. Its broad scope includes: advances in fundamental computer vision, pattern recognition and computer graphics; machine learning techniques relevant to face, gesture, and body motion; new algorithms and applications. The conference presents research that advances the state-of-the-art in these and related areas, leading to new capabilities in various application domains. For FG 2015 we are soliciting papers in all areas of face and gesture recognition. Topics of interest include but are not limited to:

- Face recognition, analysis and synthesis,
- Facial expression analysis and synthesis,
- Gesture recognition, analysis and synthesis,
- Body motion analysis and synthesis,
- Action recognition,
- Psychological and behavioral analysis,
- Technologies and applications

Submissions

Paper submissions may be up to eight pages in conference format. Papers longerthan six pages will be subject to a page fee for the additional pages (two max). Submissions to FG 2015 should represent original research work that is not under review elsewhere. All submissions will be rigorously reviewed and should clearly demonstrate improvements over the existing state of the art. Papers accepted and presented at FG 2015 will be submitted for inclusion into **IEEE Xplore**. A selection of the best-reviewed papers from FG 2015 will be invited to a special issue of the **Image and Vision Computing** journal. Submission details are available on the conference website.

Workshops and tutorials

Workshops and tutorials will be held on May 4 and May 8. Have a look at the conference website for instructions regarding workshop and tutorial proposals.

Conference Venue

The conference will be held in Cankarjev Dom - Congress Center Ljubljana, which is located at the heart of Slovenia's capital Ljubljana, at a walking distance from the attractive old part of the city and other major attractions.

IMPORTANT DATES

Paper submission	**30 September 2014**
Rebuttal	**15-19 December 2014**
Decision to authors	**6 January 2015**
Camera ready version	**27 January 2015**
Main conference	**4-8 May, 2015**

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Questions?

In conclusion, despite its inherent limits, the OPS-FIELD dataset reveals no evidence of an ageing effect.

Not "despite" but "because of" !

Would you say "Despite it being dusk, and foggy, and my glasses being dirty, I don't see any cars coming"?

Or would you say "Because it is dusk, and foggy, and my glasses are dirty, I can't tell for sure if any cars are coming" ?