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Computers and Graphics submission formatting guidelines⋆

Michael Wimmer[a,*], Joaquim Jorge[a,1], Ross Laman[b], Gail Rodney[b]

[a]*TU Wien, Favoritenstrasse 9-11/186, 1040 Wien, Austria*
[b]*INESC-ID, Rua Alves Redol, 9 1000-021 Lisboa, Portugal*

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ABSTRACT

Example of an abstract: A biometric sample collected in an uncontrolled outdoor environment varies significantly from its indoor version. Sample variations due to outdoor environmental conditions degrade the performance of biometric systems that otherwise perform well with indoor samples. In this study, we quantitatively evaluate such performance degradation in the case of a face and a voice biometric system. We also investigate how elementary combination schemes involving min-max or z normalization followed by the sum or max fusion rule can improve performance of the multi-biometric system. We use commercial biometric systems to collect face and voice samples from the same subjects in an environment that closely mimics the operational scenario. This realistic evaluation on a dataset of 116 subjects shows that the system performance degrades in outdoor scenarios but by multimodal score fusion the performance is enhanced by 20%. We also find that max rule fusion performs better than sum rule fusion on this dataset. More interestingly, we see that by using multiple samples of the same biometric modality, the performance of a unimodal system can approach that of a multimodal system.

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⋆Only capitalize first word and proper nouns in the title.
*Corresponding author: Tel.: +0-000-000-0000; fax: +0-000-000-0000;
e-mail: R.Laman@elsevier.com (Ross Laman)
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2. The first page

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2.1. The Abstract

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The reason is that the Abstract should be understandable in itself to be suitable for storage in textual information retrieval systems.

Example of an abstract: A biometric sample collected in an uncontrolled outdoor environment varies significantly from its indoor version. Sample variations due to outdoor environmental conditions degrade the performance of biometric systems that otherwise perform well with indoor samples. In this study, we quantitatively evaluate such performance degradation in the case of a face and a voice biometric system. We also investigate how elementary combination schemes involving min-max or z normalization followed by the sum or max fusion rule can improve performance of the multi-biometric system. We use commercial biometric systems to collect face and voice samples from the same subjects in an environment that closely mimics the operational scenario. This realistic evaluation on a dataset of 116 subjects shows that the system performance degrades in outdoor scenarios but by multimodal score fusion the performance is enhanced by 20%. We also find that max rule fusion performs better than sum rule fusion on this dataset. More interestingly, we see that by using multiple samples of the same biometric modality, the performance of a unimodal system can approach that of a multimodal system.

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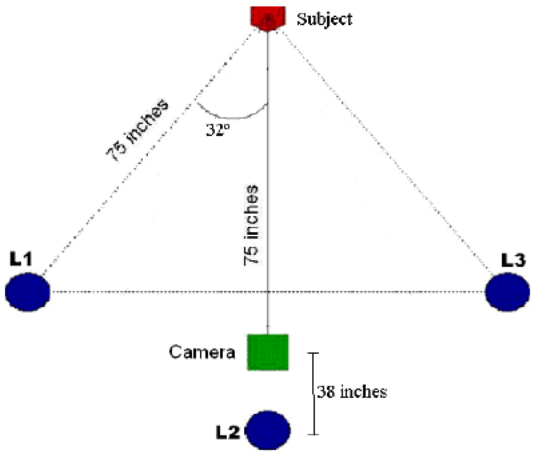

Fig. 1. Studio setup for capturing face images indoor. Three light sources L1, L2, L3 were used in conjunction with normal office lights.

3.1. Tables, figures and schemes

Graphics and tables may be positioned as they should appear in the final manuscript. Figures, Schemes, and Tables should be numbered. Structures in schemes should also be numbered consecutively, for ease of discussion and reference in the text. **Figures should be maximum half a page size.**

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3.2. Lists

For tabular summations that do not deserve to be presented as a table, lists are often used. Lists may be either numbered or bulleted. Below you see examples of both.

1. The first entry in this list

Table 1. Summary of different works pertaining to face and speech fusion

Study	Algorithm used	DB Size	Covariates of interest	Top individual performance	Fusion Performance
UK-BWG (Mansfield et al., 2001)	Face, voice: Commercial	200	Time: 1–2 month separation (indoor)	TAR* at 1% FAR# Face: 96.5% Voice: 96%	–
Brunelli (Brunelli and Falavigna, 1995)	Face: Hierarchical correlation Voice: MFCC	87	Time: 3 sessions, time unknown (indoor)	Face: TAR = 92% at 4.5% FAR Voice: TAR = 63% at 15% FAR	TAR =98.5% at 0.5% FAR
Jain (Jain et al., 1999)	Face: Eigenface Voice: Cepstrum Coeff. Based	50	Time: Two weeks (indoor)	TAR at 1% FAR Face: 43% Voice: 96.5% Fingerprint: 96%	Face + Voice + Fingerprint = 98.5%
Sanderson (Sanderson and Paliwal, 2002)	Face: PCA Voice: MFCC	43	Time: 3 sessions (indoor) Noise addition to voice	Equal Error Rate Face: 10% Voice: 12.41%	Equal Error Rate 2.86%
Proposed study	Face, voice: Commercial	116	Location: Indoor and Outdoor (same day) Noise addition to eye coordinates	TARs at 1% FAR Indoor-Outdoor Face: 80% Voice: 67.5%	TAR = 98% at 1% FAR

*TAR–True Acceptance Rate # FAR–False Acceptance Rate

2. The second entry
   2..1 A subentry
3. The last entry

- A bulleted list item
- Another one

3.3. Equations

Conventionally, in mathematical equations, variables and anything that represents a value appear in italics. All equations should be numbered for easy referencing. The number should appear at the right margin.

$$S'_{\mathrm{pg}} = \frac{S_{\mathrm{pg}} - \min(S_{\mathrm{pG}})}{\max(S_{\mathrm{pG}} - \min(S_{\mathrm{pG}})} \tag{1}$$

In mathematical expressions in running text "/" should be used for division (not a horizontal line).

Acknowledgments

Acknowledgments should be inserted at the end of the paper, before the references, not as a footnote to the title. Use the unnumbered Acknowledgements Head style for the Acknowledgments heading.

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References

[1] Vehlow, C, Reinhardt, T, Weiskopf, D. Visualizing fuzzy overlapping communities in networks. IEEE Trans Vis Comput Graph 2013;19:2486–2495.
[2] Newman, MEJ, Girvan, M. Finding and evaluating community structure in networks. Phys Rev E 2004;69:026113.
[3] Hullermeier, E, Rifqi, M. A fuzzy variant of the rand index for comparing clustering structures. In: in Proc. IFSA/EUSFLAT Conf. 2009, p. 1294–1298.

Supplementary Material

Supplementary material that may be helpful in the review process should be prepared and provided as a separate electronic file. That file can then be transformed into PDF format and submitted along with the manuscript and graphic files to the appropriate editorial office.