Smart Health (2019)

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[a]Affiliation 1, Address, City and Postal Code, Country
[b]Affiliation 2, Address, City and Postal Code, Country

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ABSTRACT

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*Corresponding author: Tel.: +0-000-000-0000; fax: +0-000-000-0000;
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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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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

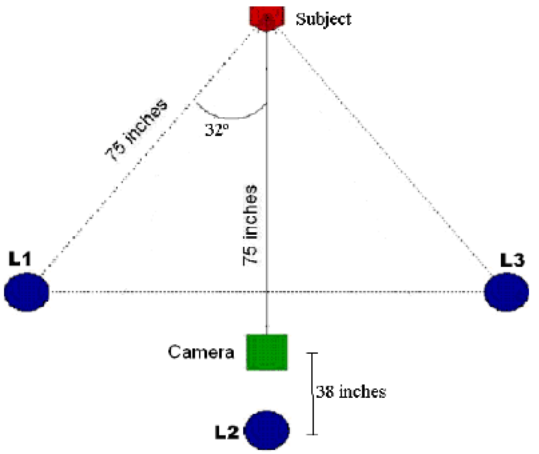

Fig. 1. Studio setup for capturing face images indoor. Three light sources L1, L2, L3 were used in conjunction with normal office lights.

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   2..1 A subentry
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- Another one
- Another one

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

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Acknowledgments

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References

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Vehlow, C., Reinhardt, T., & Weiskopf, D. (2013). Visualizing fuzzy overlapping communities in networks. *IEEE Trans. Vis. Comput. Graph.*, *19*, 2486–2495.

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