

LOCAL BINARY PATTERNS CALCULATED OVER GAUSSIAN DERIVATIVE IMAGES

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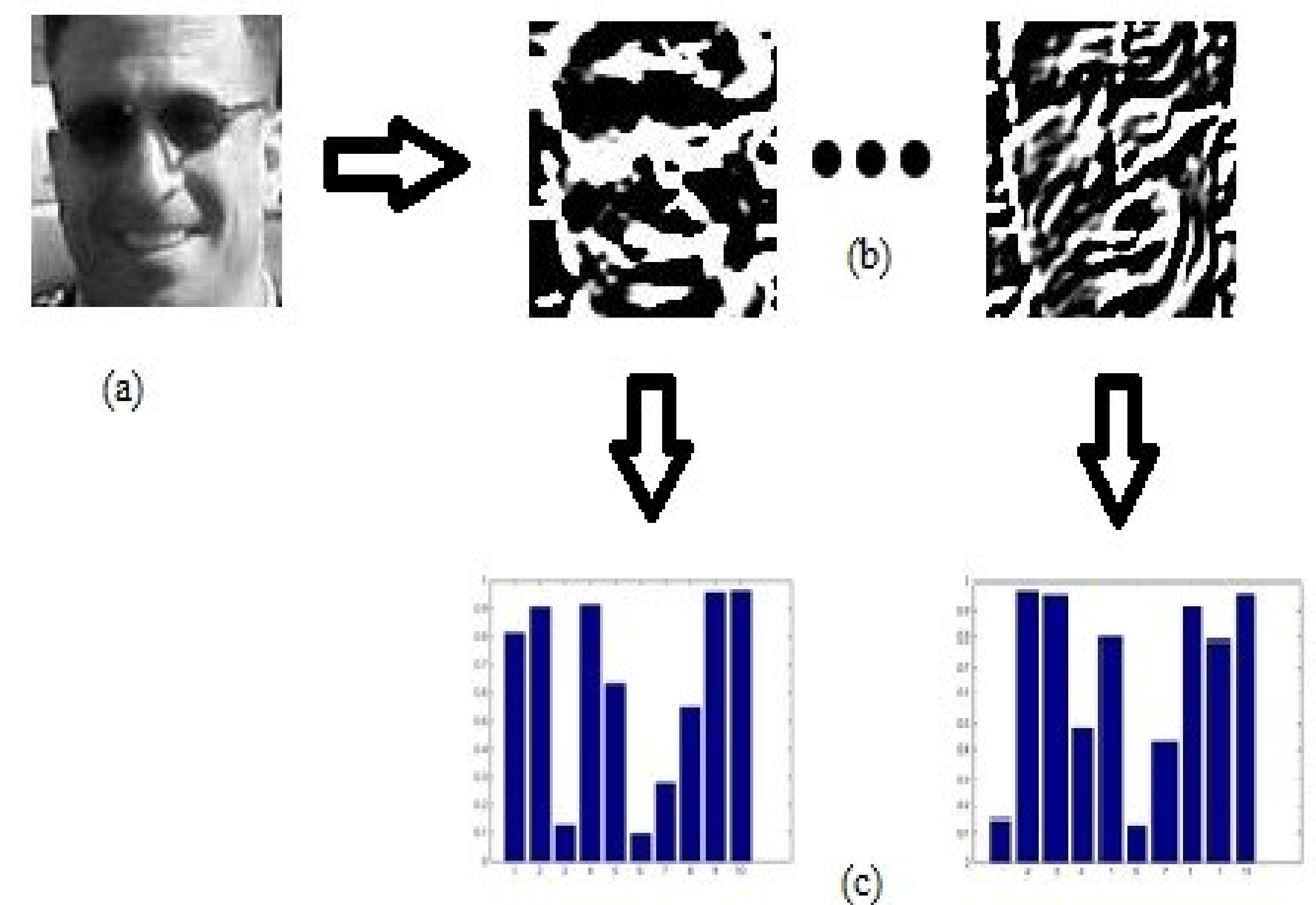
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ABSTRACT

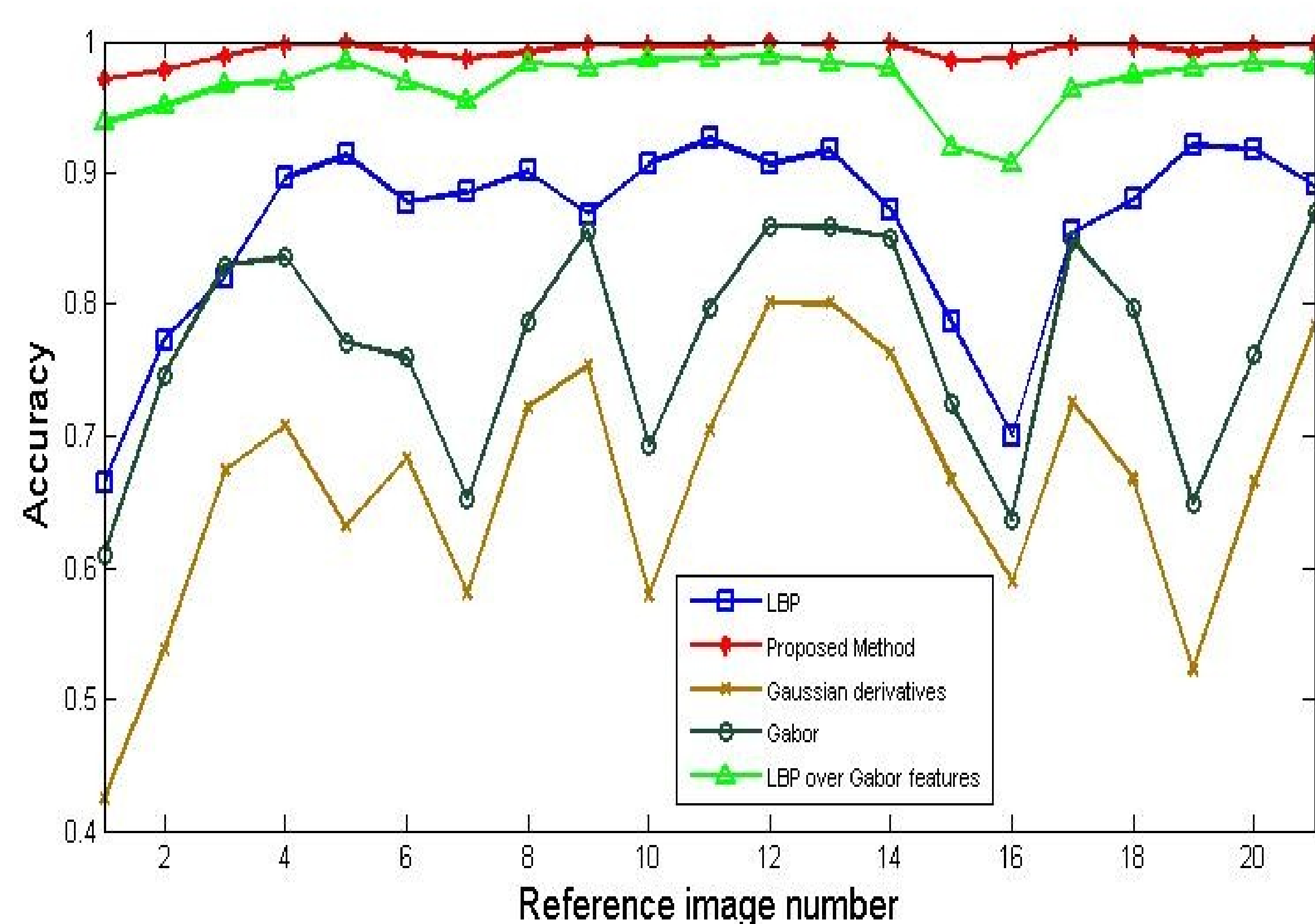
In this work we present a new static descriptor for facial image analysis. We combine Gaussian derivatives with Local Binary Patterns to provide a robust and powerful descriptor especially suited to extracting texture from facial images. Gaussian features in the form of image derivatives form the input to the Linear Binary Pattern(LBP) operator instead of the original image. The proposed descriptor is tested for face recognition and smile detection. For face recognition we use the CMU-PIE and the YaleB+extended YaleB database.

Smile detection is performed on the benchmark GENKI 4k database. Even with minimal machine learning our descriptor outperforms the state of the art at smile detection and compares favorably with the state of the art at face recognition.

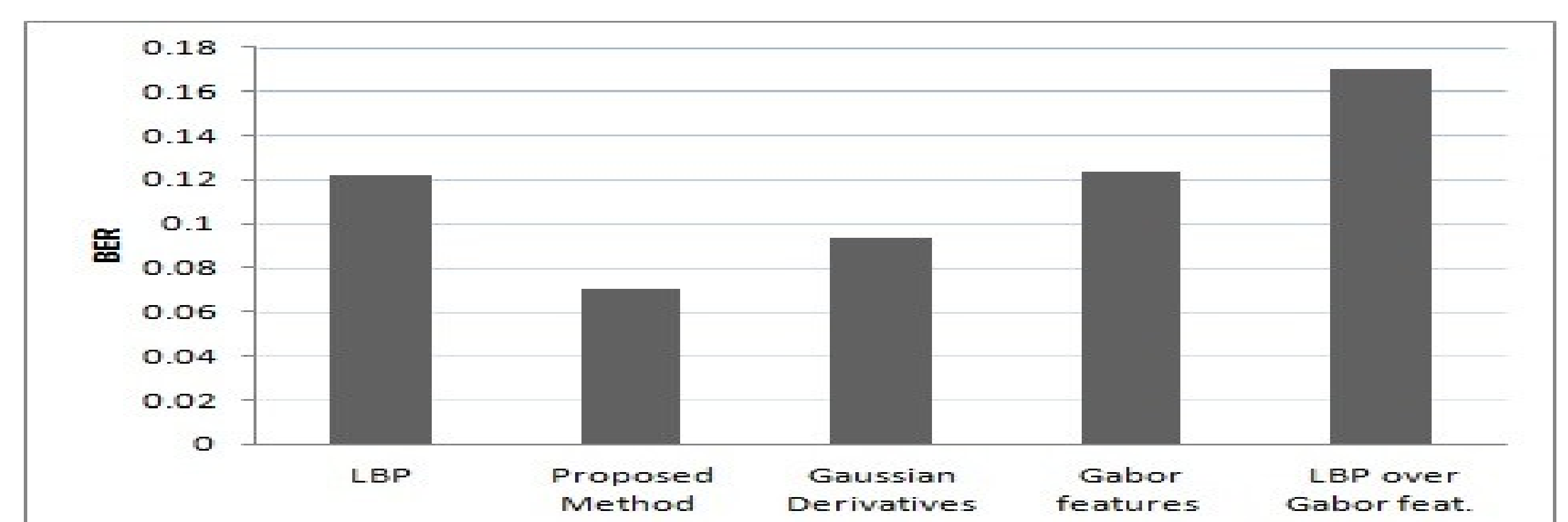
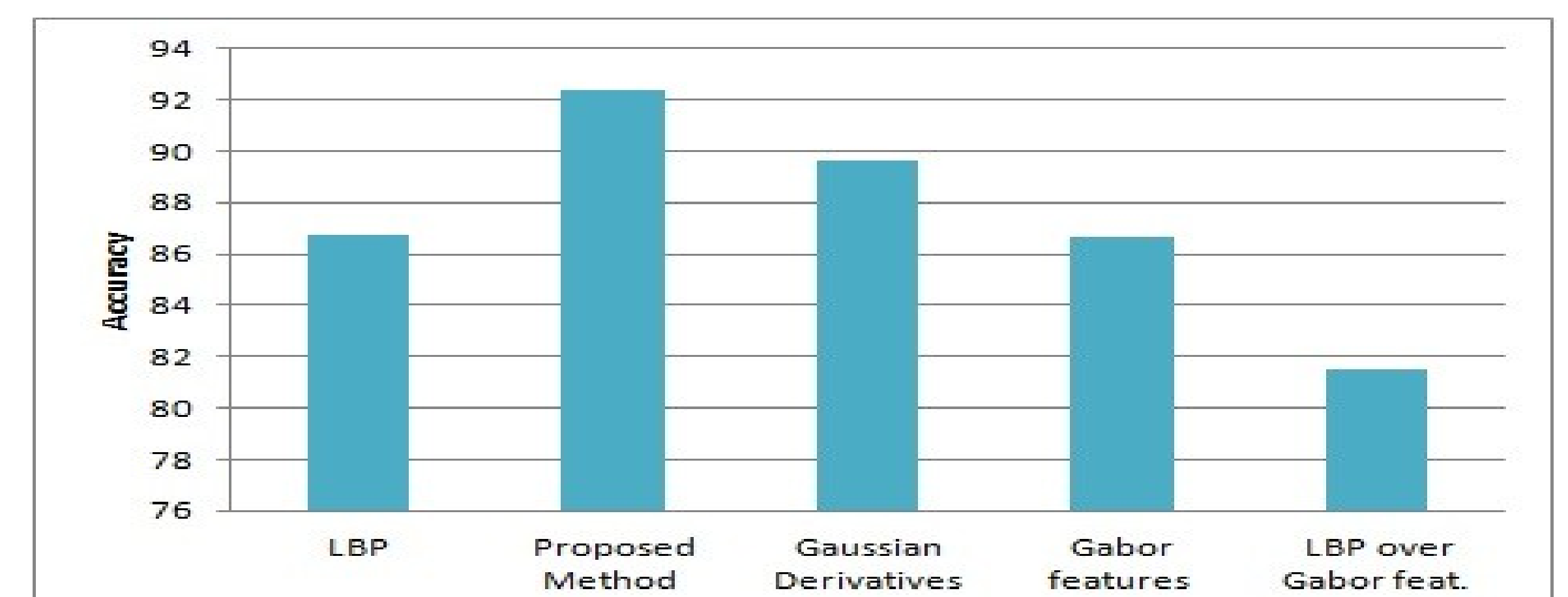
APPROACH



RESULTS ON FACE RECOGNITION



RESULTS ON SMILE DETECTION



CONCLUSION

We present a versatile descriptor which performs well on two facial image processing tasks. It is simple to compute, robust to illumination changes and performs better than more computationally expensive methods. It is interesting to see that a general purpose descriptor like ours works better in most cases than the specialized descriptors such as LGH and SGI for face recognition.

Its robustness to head pose variations helps avoid expensive image alignment calculations. The success of the technique at smile detection suggests that it should be utilized for other facial expression problems

Principal References

- [1] J.L. Crowley and O. Riff. Fast computation of scale normalised Gaussian receptive fields. Proceedings Scale-Space, Isle of Skye, Scotland, Springer Lecture Notes on Computer Science, volume 2695, 2003.
- [2] N. Gourier, D. Hall and J.L. Crowley. Estimating face orientation from robust detection of salient facial features. In Proceedings of POINTING'04 International Workshop on Visual Observation of Deictic Gestures, 2004.
- [3] J. Whitehill et al. Towards Practical Smile Detection. IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 31, no. 11, pp. 2106-2111, November 2009.
- [4] J.A. Russell, A. Mehrabian, Evidence for a three-factor theory of emotions, Journal of Research in Personality, vol 11, no. 3, pp. 273-294, September 1977.