Abstract

With the advancement of communication and security technologies, it has become crucial to have robustness of embedded biometric systems. This paper presents the realization of such
technologies which demands reliable and error-free biometric identity verification systems. High dimensional patterns are not permitted due to eigen-decomposition in high dimensional feature space and degeneration of scattering matrices in small size sample. Generalization, dimensionality reduction and maximizing the margins are controlled by minimizing weight vectors. Results show good pattern by multimodal biometric system proposed in this paper. This paper is aimed at investigating a biometric identity system using Support Vector Machines (SVMs) and Linear Discriminant Analysis (LDA) with MFCCs and implementing such system in real-time using SignalWAVE.

References

- Belhumeur P., Hespanha J., and Kriegeman D., “Eigenfaces vs Fisherfaces”, 1997.
- Recognition Using Class Specific Linear Projection, IEEE Trans. PAMI, 19(7): pp. 711-729.
- Nello Cristianini and John Shawe-Taylor, “An Introduction to Support Vector Machines and other Kernel-based Learning Methods”, Cambridge University Press, 2000.
- Burges C., “A Tutorial on Support Vector Machines for Pattern Recognition”, In Data Mining and Knowledge Discovery, Vol. II, Kluwer Academic Publishers, Boston, 1998.
- V. Vapnik, S. Golowich, and A. Smola, “Support Vector Method for Function Approximation, Regression Estimation and Signal Processing”, In M. Mozer, M. Jordan, and T. Petsche, (edited), Advances in Neural Information Processing Systems 9, pp.281–287, Cambridge, MA, MIT Press 1997.
- C. Cortes and V. Vapnik “Support Vector Networks. Machine Learning”, 20: pp.273 – 297, 1995.
- N. Heckman. “The Theory and Application of Penalized Least Squares Methods for Reproducing Kernel Hilbert-spaces Made Easy”, 1997.
- David M Skapura, “Building Neural Networks”, ACM press, 1996.
- M. Farhan, "Investigation of Support Vector Machine as Classifier", MS Thesis Nottingham University Malaysia Campus, 2010.
- Tom Mitchell, “Machine Learning”, McGraw-Hill Computer Science Series, 1997.
- David M Skapura, “Building Neural Networks”, ACM Press, 1996.
- M. Aizerman, E. M. Braverman, and L.I. Rozonoér “Theoretical Foundations of Potential Function Method in Pattern Recognition Learning”, Automation and Remote Control, 25: pp. 821–837, 1964.
- N. Aronszajn, “Theory of Reproducing Kernels”, Transaction American Mathematical Society, 686: pp. 337-404, 1950.
- Anil K. Jain, Jianchang Mao, K. M. Mohiuddin, Artificial Neural Networks: A Tutorial, Computer, v.29 n.3, p.31-44, March 1996
- Simon Haykin, Neural Networks: A comprehensive foundation, 2nd Edition, Prentice Hall, 1998
- Alexander J. Faaborg, Using Neural Networks to Create an Adaptive Character Recognition System, March 2002
- E. W. Brown, Character Recognition by Feature Point Extraction, unpublished paper authored at Northeastern University, 1992, available at: http://www.ccs.neu.edu/home/ferneric/charrecnn.html
- S. Furui, “An overview of speaker recognition technology”, ESCA Workshop on
Automatic Speaker Recognition, Identification and Verification, pp. 1-9, 1994.
- F.K. Song, A.E. Rosenberg and B.H. Juang, “A vector quantisation approach to speaker recognition”, AT&T Technical Journal, Vol. 66-2, pp. 14-26, March 1987.
- S. Balakrishnama, A. Ganapathiraju, Linear Discriminant Analysis - A Brief Tutorial, Institute for Signal and Information Processing, Department of Electrical and Computer Engineering, Mississippi State University, page 2-3.
- Bishop, C. (1995). Neural Networks for Pattern Recognition. Oxford: University Press. Extremely well-written, up-to-date. Requires a good mathematical background, but rewards careful reading, putting neural networks firmly into a statistical context.

Index Terms

Computer Science  Pattern Recognition

Keywords

Support Vector Machines (SVMs)  Linear Discriminant Analysis
Speech Recognition  FPGA

Biometric System
