Minutiae-based matching techniques have been widely used in the implementation of multiple enrollment fingerprint recognition systems. However, these techniques suffer the difficulty of automatically extracting all minutiae points due to failure to detect the complete ridge structures of a fingerprint. With poor quality fingerprint images, detection of minutiae points as well as describing all the local ridge structures is difficult. It is also difficult to quickly match two fingerprints that have a difference in the number of unregistered minutiae. Non-minutiae based techniques such as Gabor filtering are rich in terms of distinguishing features and can be used as an alternative since they capture both the local and global details in a fingerprint. This paper presents a Gabor filter-based approach; the first of the kind to implement a verification multiple enrollment based fingerprint recognition system. The Gabor filter-based multiple enrollment fingerprint recognition method was compared with a spectral minutiae-based method using two fingerprint databases; FVC 2000-DB2-A and FVC 2006-DB2-A. Although the minutiae-based method outperformed the Gabor filter-based method, the results attained from the later are promising and can be a good basis for implementing Gabor filter-based techniques in designing
multiple enrollment based fingerprint systems.

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Index Terms

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Multiple enrollment, Gabor Filter-based matching, Spectral Minutiae-based matching, Recognition performance, memory consumption, matching speed.