Different regions of the face do not equally contribute to the identification of gender from a face image. The performance of facial gender recognition degrades significantly when some important regions, e.g. eye and eyebrow, are occluded. Most of the existing gender recognition studies have demonstrated that the eye, eyebrow, jaw and face outline are the most important parts for identifying gender. Unfortunately, the eye and eyebrow are often self-occluded, e.g. by eye-glasses or hair, and can significantly affect gender recognition. Developing a gender recognition method that is robust to self-occlusion is challenging because self-occlusion happens unpredictably and is hard to detect.

A need therefore exists to provide a method and system for real-time facial gender recognition that seeks to address at least one of the abovementioned problems.

SUMMARY

According to the first aspect of the present invention, there is provided a method of building a classifier for use in facial image gender recognition based on both LBP features and Gabor features~~.~~, the method comprising

~~The method may comprise:~~ extracting LBP features from respective images of a training set of facial images; extracting Gabor features from respective images of a training set of facial images; applying a weighted feature selection algorithm to the extracted LBP and Gabor features; and building the classifier based on selected features from the weighted feature selection algorithm.

The weighted feature selection algorithm may be applied to a concatenation of the extracted LBP and Gabor features.

The weighted feature selection algorithm may be applied separately to the extracted LBP and Gabor features respectively, and the building of the classifier comprises building an LBP classifier based on selected LBP features, and building a Gabor classifier based on selected Gabor features.

Extracting the Gabor features may comprise performing face component recognition on the respective images from the training set of facial images, and

extracting the Gabor features from two or more selected components of the respective images.

The method may further comprise performing an evaluation of the classifier on a sample set of facial images, and, if an accuracy of the classifier is below a first threshold value, applying the classifier to a new set of facial images, adding selected images to a training set of facial images, the selected images being incorrectly classified ones of the new set of facial images by the classifier, and re-training the classifier based on the training set of facial images including the selected images.

The method may further comprise processing respective images of a training set of facial images to occlude selected areas of the image, and training the classifier based on the processed training set of facial images.

According to a second aspect of the present invention, there is provided a method of facial image gender recognition based on both LBP features and Gabor features~~.~~, wherein the

~~The~~ LBP features and Gabor features may be determined from training of a classifier in accordance with the first aspect of the invention~~as described above~~.

The method may comprise applying a first classifier based on a training set of facial images, and, if an absolute score of the classifier is below a first threshold value, applying a second classifier based on a modified training set of facial images, the modified training set of facial images comprising processed respective images of the training set of facial images to occlude selected areas of the image.

According to a third aspect of the present invention, there is provided a system for building a classifier for use in facial image gender recognition, the system configured such that the classifier is trained based on both LBP features and Gabor features~~.~~, and the system comprising:

~~The system may comprise~~ means for extracting LBP features from respective images of a training set of facial images; means for extracting Gabor features from respective images of a training set of facial images; and means for applying a weighted feature selection algorithm to the extracted LBP and Gabor features and;

means for building the classifier based on selected features from the weighted feature selection algorithm.

The means for applying a weighted feature selection algorithm may be configured to apply the weighted feature selection algorithm to a concatenation of the extracted LBP and Gabor features.

The means for applying a weighted feature selection algorithm may be configured to apply the weighted feature selection algorithm separately to the extracted LBP and Gabor features respectively, and the means for building of the classifier may be configured to build an LBP classifier based on selected LBP features, and to build a Gabor classifier based on selected Gabor features.

The means for extracting the Gabor features may be configured to perform face component recognition on the respective images from the training set of facial images, and may extract the Gabor features from two or more selected components of the respective images.

The system may further comprise a means for performing an evaluation of the classifier on a sample set of facial images, and the system may be configured to, if an accuracy of the classifier is below a first threshold value, apply the classifier to a new set of facial images, to add selected images to a training set of facial images, the selected images being incorrectly classified ones of the new set of facial images by the classifier, and to re-train the classifier based on the training set of facial images including the selected images.

The system may comprise means for processing respective images of a training set of facial images to occlude selected areas of the image, and for training the classifier based on the processed training set of facial images.

According to a fourth aspect of the present invention, there is provided a system for facial image gender recognition, the system configured such that the gender recognition is based on both LBP features and Gabor features~~.~~, wherein the

~~The~~ LBP features and Gabor features are provided by the system for building a classifier in accordance with the second aspect of the invention~~as described above~~.