Face Parts Labelling

CS365A - Project Proposal

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1 *Introduction*

Grouping and organising image regions into logical and consistent parts are critical mid-level computer vision tasks. The fundamental techniques involved are *segmentation* and *labelling the regions*.

Image segmentation is the process of dividing a digital image into various segments(superpixels) without applying labels to those segments[6]. It is generally used for *locating objects* and *deciding boundaries*. Region labelling then assigns specific names to those segments. The purpose of segmentation and region labelling is to unravel an image so that it is easier to analyze.

2 *Motivation*

Face segmentation is an extremely important step in the recognition of faces because majority of face recognition methods are such that they only work with labelled face images[3]. The overall performance and accuracy of a face recognition system depends on the correctness of the face area labelling, thus making face segmentation an extremely important task in a face recognition system. The purpose of the face segmentation step is to extract the area containing the face, from a given image which also contains other things.

In this work, we will segment the face into three regions and label them with *hair*, *skin*, and *background* labels suitably. This particular segmentation and labelling is chosen because in a paper by Huang[1], he remarked that a variety of high-level features, such as hair characteristics,gender and pose can often be deduced guided by the labelling of a face image into hair, skin and background segments.

3 *Previous Work*

The *Conditional Random Field(CRF)*[4] is a very useful and efficient tool for building models which can segment and label images. They are particularly useful to model the local interactions among labels for regions (superpixels).

4 *Overview*

The *CRF* can correctly differentiate between the hair and background labels when there is a clear distinction between those regions. However, the CRF may have difficulty deciding the boundary between the regions when there is less or no distiction,for example if a persons hair color is similar to that of the background, it will face difficulty. To solve such issues, a *global shape constraint* can be used to reject the irrelevant label configurations. Therefore in addition to and in association with CRF,the *Restricted Boltzmann Machine(RBM)*[5] will be used to design global shapes resulting from segmentation and then use it as a bias.

In this work, we wish to use a new model[2] that combines the useful features of these two different networks to build an efficient labeller, and then test its labelling performance on various complex face images.In particular, we will address the issue of labelling and segmenting faces in the test set into hair, skin and background regions.

5 *Data Set*

Part Labels Database

We will be using the *Part Labels Database*. This database contains about 2927 face images which are labelled into hair,skin and background regions. The face images are a subset of the Labelled Faces in the Wild (LFW) funnelled images.All funnelled images have been segmented into *superpixels* and are then manually labelled with the hair,skin and background tags.

References

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