Recognition of Face, Gender and Facial Expressions in the Near Infrared Spectrum

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Abstract

Visible face recognition systems are subjected to failure when recognizing the faces in unconstrained scenarios. So, recognizing faces under variable and low illumination conditions are more important since most of the security breaches happen during night time. Near Infrared (NIR) spectrum enables to acquire high quality images, even without any external source of light and hence it is a good method for solving the problem of illumination. Further, the soft biometric trait, gender classification and non verbal communication, facial expression recognition has also been addressed in the NIR spectrum.

Two methods have been discussed to recognize the face along with gender classification and facial expression recognition in NIR spectrum. First method is based on transfer learning for face feature extraction and classification using three, separate SVM classifiers. Second method is an end to end light CNN model to perform the above mentioned tasks. The methods have been analyzed on the publicly available, challenging, benchmark datasets CASIA NIR-VIS 2.0, Oulu-CASIA NIR-VIS, PolyU, CBSR, IIT Kh and HITSZ for face recognition. Further, for gender classification the Oulu-CASIA NIR-VIS, PolyU,and IIT Kh has been analyzed and for facial expression the Oulu-CASIA NIR-VIS dataset has been analyzed.