

Design of Mathematical Model for Face Detection in Varied Poses and Partially Occluded on Images/Videos



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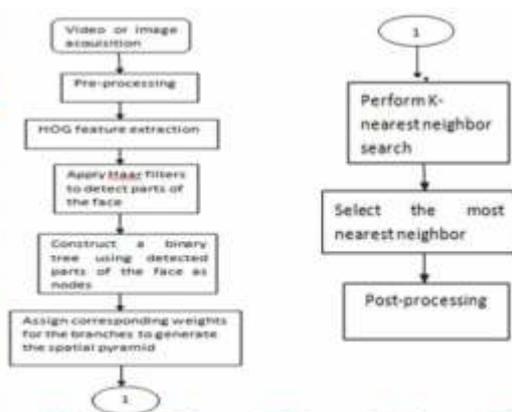
Abstract:

Face detection is a technique of detecting faces from the captured image based on the facial features using HOG feature extraction techniques. Although various algorithms exist for face detection, it becomes challenging when it comes to identify the face against complex background, occluded face and under varied illumination conditions. The aim is to design an efficient algorithm for detection of occluded faces, detecting faces against complex backgrounds and under varying illumination conditions. Face detection can be used in surveillance systems where unknown individuals are restricted to cross the borders, detection of criminals in public places, detection of thieves at ATM machines.

In this work, still images or image frames are captured from live video. Frontal faces, tilted faces at varied angles, multiple and occluded faces are detected by the design of an efficient mathematical model. The methods used are Histogram of Oriented Gradients, Haar filters, spatial pyramid generation and K-nearest neighbour search. The simulation is done using MATLAB simulator and the designed mathematical model is tested to detect the face or multiple faces from image frames, taken from live video. The designed mathematical model is able to detect frontal faces, multiple, occluded and faces tilted at different angles. The results obtained are compared with the other existing algorithm. It is found that using Viola jones algorithm only frontal faces are detected whereas the designed and simulated mathematical model can detect frontal faces, multiple, occluded and faces tilted at different angles.



Detection of frontal, occluded and faces detected tilted at different angles for images from live video



Flowchart for face detection system

Conclusion: This algorithm can be extended for analysis of facial expressions.