

# An Efficient Support Vector Machine Algorithm for Age and Gender Detection from Face Pictures

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## Abstract

In this paper, a novel kernel function is proposed to perform an efficient Support Vector Machine, SVM, classification for age and gender estimation and detection. A robust, easy-to-execute algorithm is proposed based on the SVM as a core method to simultaneously predict the age and gender of highly variable pictures. Owing to its efficiency because of kernel function proposed in this paper, the SVM based algorithm is able to powerfully classify the features, leading to more accurate and precise estimation of age and gender. The algorithm is modified to solve the simple problems as well as complex situations, estimating age and gender simultaneously. The mean error of proposed method is between 5.2% – 7.3% that the less accurate results higher ages are due to lack of sample pictures in training phase. To be fair, all of the comparisons with other methods were done on the same database, FG-NET, including 1002 pictures with different qualities, diverse styles, and various rate of face coverage. The simulation results show that the proposed method has lower mean error in comparison with other recent related works.

Keywords: Gender Detection, Age Estimation, Support Vector Machine, Supervised Learning, Machine Vision, Machine Learning

## 1. Introduction

Age and gender detection from face pictures has been getting dramatic attention nowadays due to its applications in human modern and crowded life. This process, like any other advantageous technologies, is rather complex and hard to accomplish. Actually, because the face features could be highly variable as a result of ethnic deviation, gender differences, and genetics factors, the process of classification and feature selection is the primary difficulty of recognition procedure (Kinnunen and Li, 2010; Lanitis, 2010). Therefore, considerable effort has been done to improve the accuracy, or decrease the approximation error over time (Nixon *et al.*, 2015).

Actually, face detection is the more generalized field with ample applications; one prominent of them is access control. In face recognition, the feature detection is not that easy but has some advantages over age or gender estimation. Because all of the face pictures are present in a database, finding one of them

by comparing the features among existing pictures is somehow easier than age or gender detection, which aims to detect one feature for a new unknown picture. That is to say, in face detection, an algorithm is required to search the database, rapidly and accurately, in comparison, in gender or age detection, there is no existing database. Unlike this seeking and searching algorithm, gender and age detection need to be trained using the learning methods and (known) samples, then, estimate the age and gender of other individuals which do not necessarily belong to the primary database. Therefore, this process requires machine learning methods. However, the detection methods can be used to improve the operation of the learning algorithms.

Estimation of age or detection of gender is a classification problem. Recently, it has been established among researchers that the classification problems can be done by supervised learning methods more efficiently compared to other methods. However, the accuracy of the age estimation or