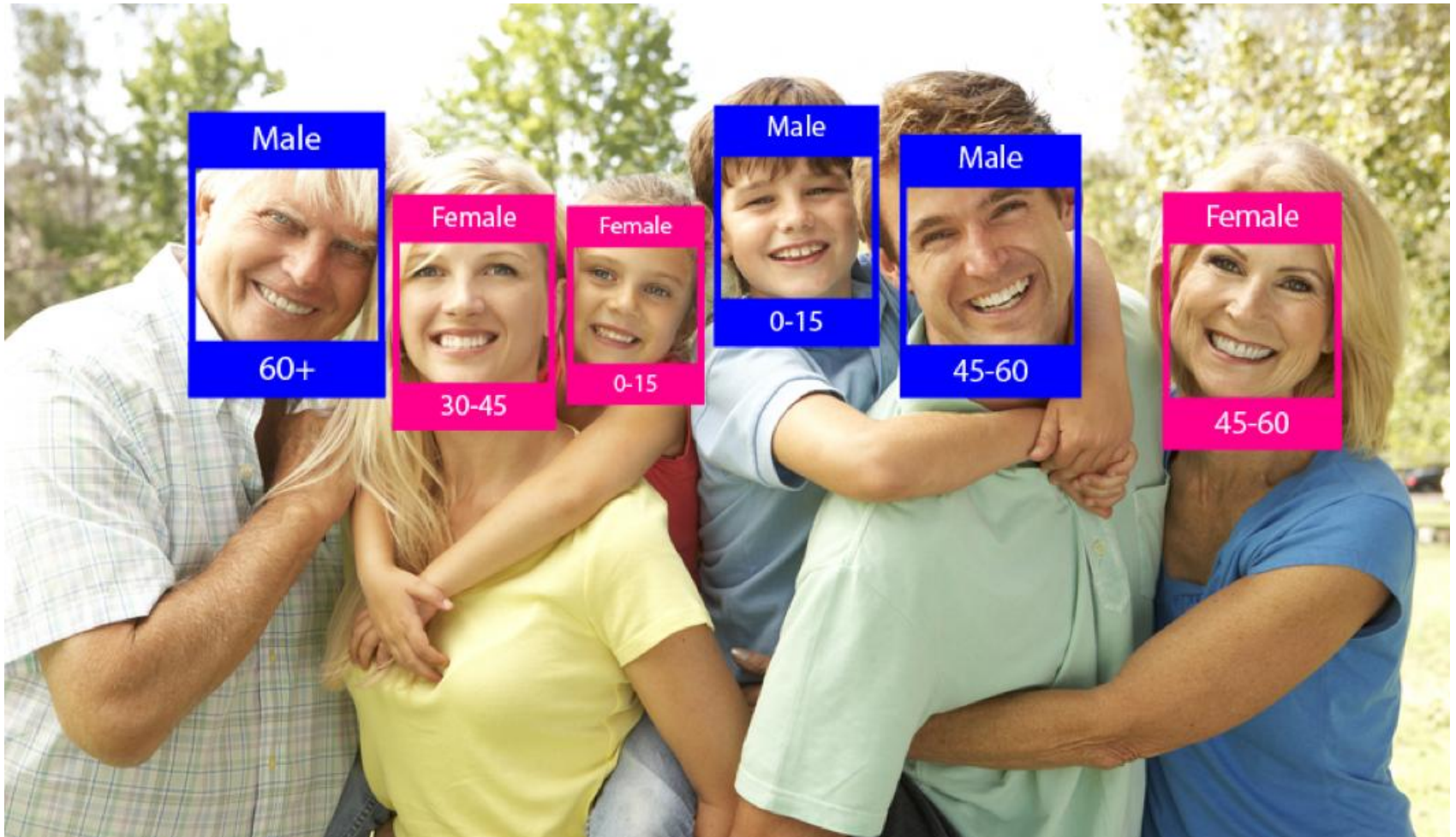# Improving the Face Gender Classification by the Set of Features

Vladimir Khryashchev
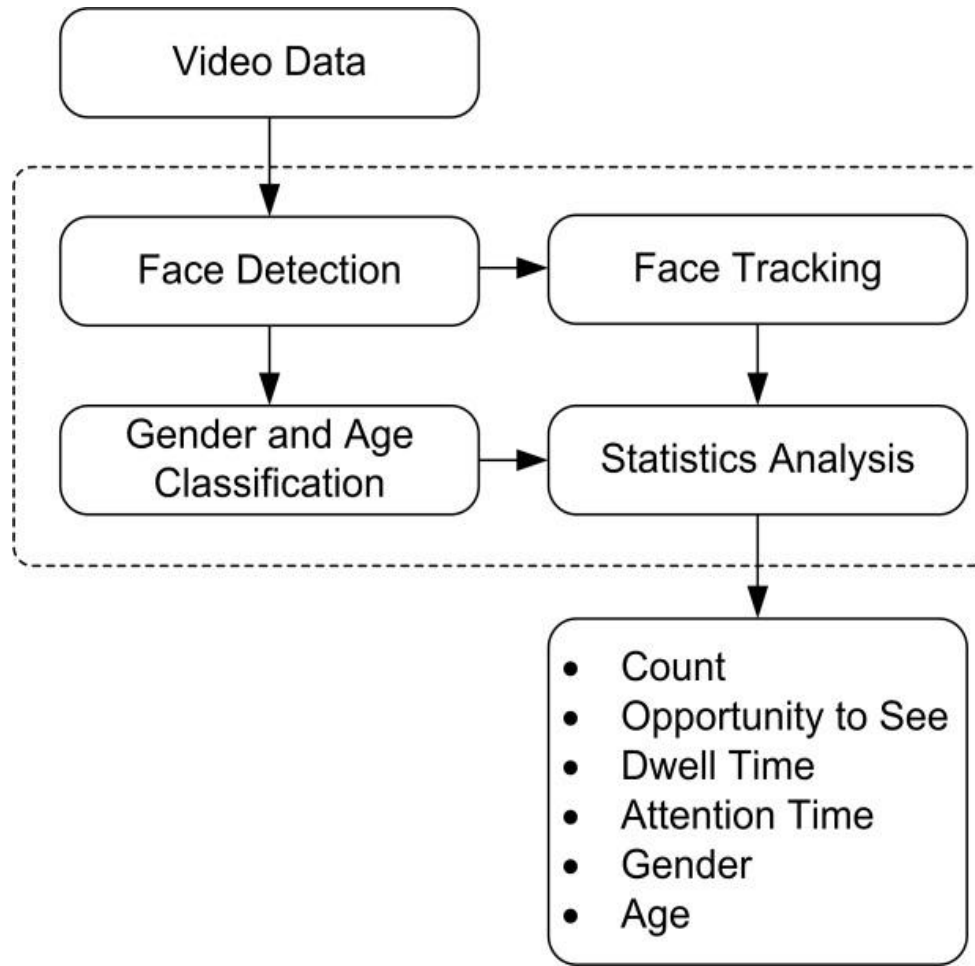
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Gender Classification

Scheme of an application for video analysis

Face gender classification algorithm

A new gender classification algorithm is based on non-linear SVM classifier and has several types of features:

- The Scale-Invariant Feature Transform

- Histogram of Oriented Gradients

- Gabor filters

- Pre-selection of blocks

Training and testing image dataset examples

LFW-a

RUS-FD

Training and testing image dataset parameters

Parameter	Value
The total number of images	6 000
The number of male faces	4 000
The number of female faces	2 000
Minimum image resolution	60×60
Color space format	RGB
Face position	Frontal
People's age	From 18 to 65 years old
Race	Caucasian

Experimental results with learning on LFW dataset

Approach				Recognition Rates (%)		
Features	Learning Database	Test Database	Classifier	Female	Male	Overall
Raw pixels	LFW	LFW	SVM	86.89	94.13	91.27±1.67
Standart LBP	LFW	LFW	SVM	89.78	95.73	93.38±1.50
Boosted LBP	LFW	LFW	Adaboost	91.98	95.98	94.40±0,86
Boosted LBP	LFW	LFW	SVM	92.02	96.64	94.81±1.10

Experimental results with learning on LFW dataset

Approach				Recognition Rates (%)		
Features	Learning Database	Test Database	Classifier	Female	Male	Overall
HoG	LFW	LFW	SVM	85.49	95.79	90.64
HoG	LFW	LFW	SVM	91.76	96.08	93.92
HoG+Gabor+SIFT	LFW	LFW	Adaboost	89.51	97.12	93.32
HoG+Gabor+SIFT	LFW	LFW	Adaboost	95.65	97.92	96.79
HoG+Gabor+SIFT	LFW	RUS-FD	Adaboost	83.7	84.23	83.97

Experimental results with learning on RUS-FD dataset

Approach					Recognition Rates (%)		
Features	Learning Database	Test Database	Pre-processing	Classifier	Female	Male	Overall
HoG	RUS-FD	LFW	DoG + contrast alignment	SVM	78.78	89.14	83.96
HoG	RUS-FD	RUS-FD	DoG + contrast alignment	SVM	91.48	92.60	92.04

Conclusions

1. Adopting SVM with the selected LBPH bins, we obtain the classification rate of 94.81% on the LFW database.

2. We obtain the performance of 96.79% by applying boosting learning on LFW dataset 92.04% by applying Support Vector Machine (SVM) on RUS-FD dataset.

3. The approach proposed in this paper is promising to be further studied on other face classification tasks, such as age estimation and emotion recognition.

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