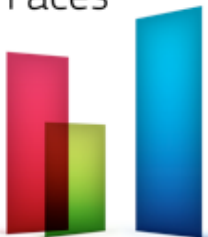




27
Faces



27faces.com

Application for Video Analysis Based on Machine Learning and Computer Vision Algorithms

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Why analyze the audience?

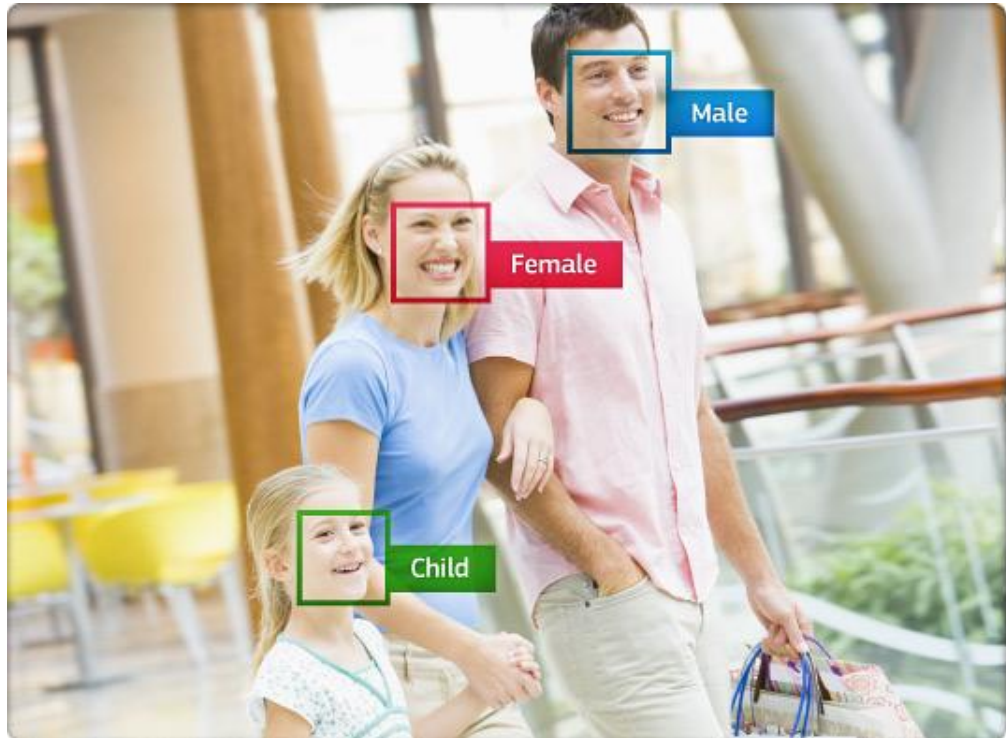
Applications:

Visitors calculation systems

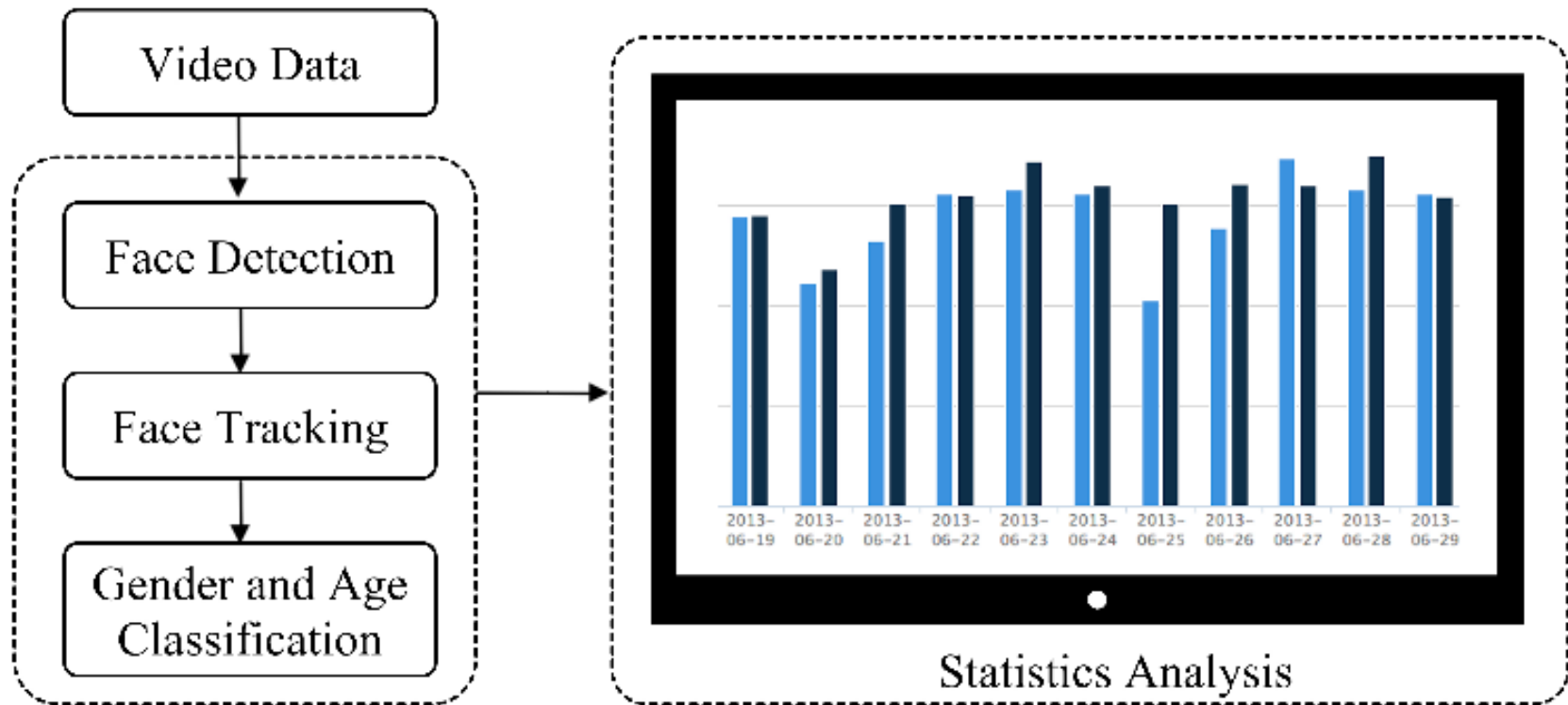
Video surveillance

Automatic systems of accident prevention

Digital signage



Audience Analysis System



A block diagram of the proposed application for video analysis.

Face Detection

Viola-Jones Object Detection Algorithm:

- Integral image representation
- Learning classification functions using AdaBoost
- Combining classifiers in a cascade structure



Viola P., Jones M. Rapid object detection using a boosted cascade of simple features // Proc. Int. Conf. on Computer Vision and Pattern Recognition. 2001. № 1. P. 511-518.

Face Tracking

Lucas-Kanade Method:

It assumes that the flow is essentially constant in a local neighbourhood of the pixel under consideration, and solves the basic optical flow equations for all the pixels in that neighbourhood, by the least squares criterion



B. Lucas and T. Kanade. An iterative image registration technique with an application to stereo vision. In Proceedings of the International Joint Conference on Artificial Intelligence, pp. 674–679, 1981.

Face Tracking

3 Tracking Problems:

1. Detected face window scaling and offset calculation during motion
2. Face overlapping with other objects
3. Face crossing

Lucas-Kanade Modification

Lucas-Kanade-1

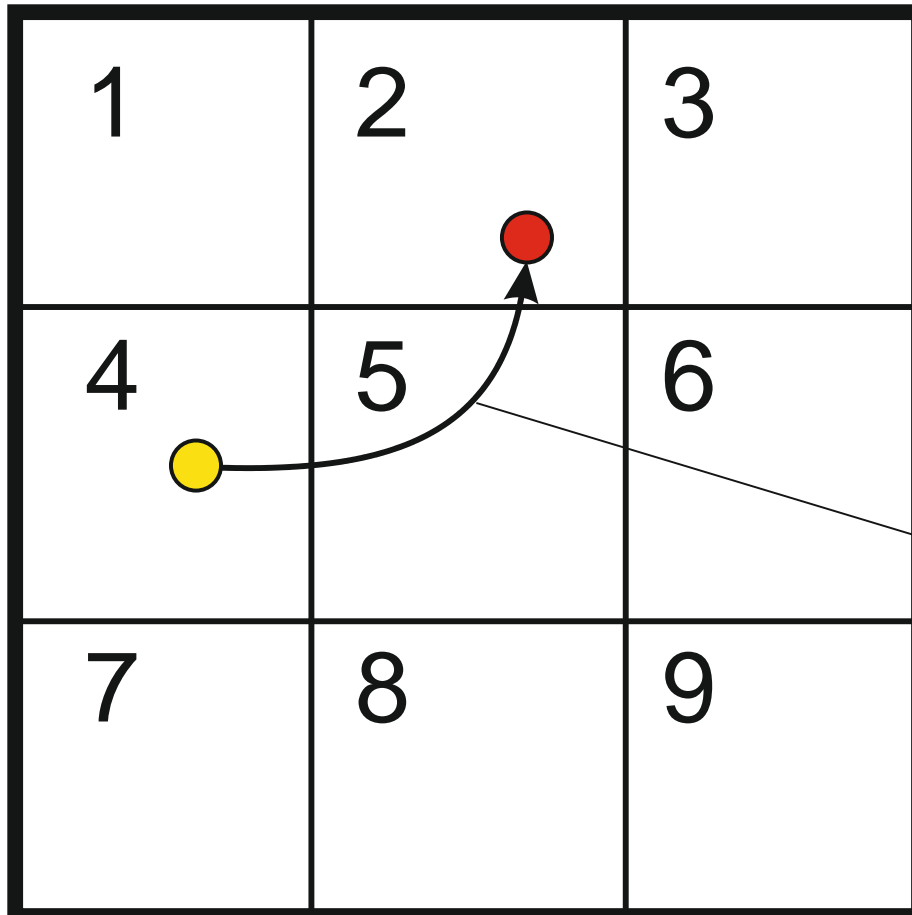
Tracked object offset is estimated as an average value of key pixels offsets. Face window scaling factor is defined as key pixels scaling factors averaging.

Lucas-Kanade-2

Median filtration of key pixels offsets and scaling factors is added.

Lucas-Kanade Modification

Lucas-Kanade-3



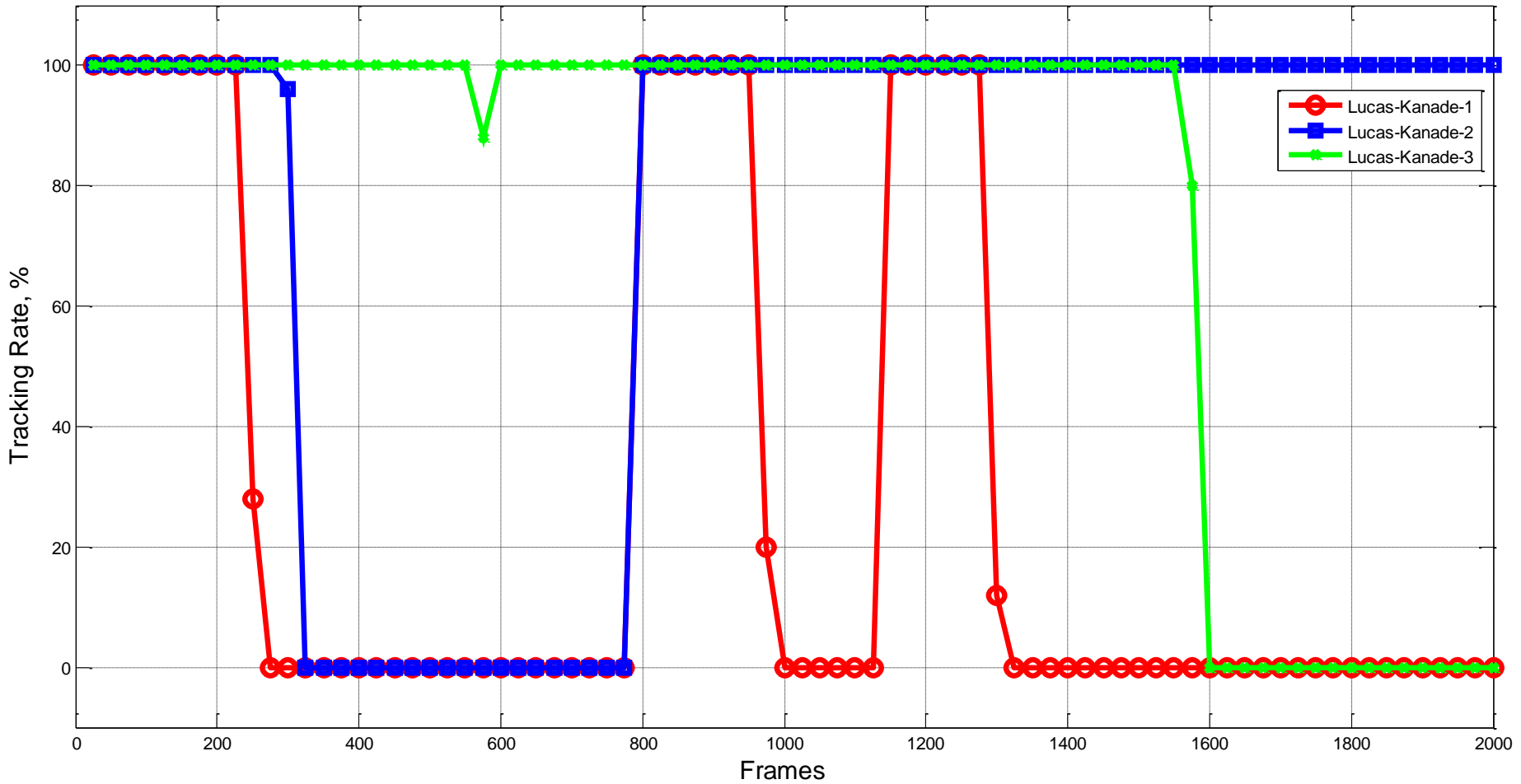
Lucas-Kanade-3 detects overlapping and crossing by dividing the window into square regions and labelling each key pixel to the corresponding region. If a pixel moves out of its region, as it is showed in fig., then such pixel is removed from further consideration being suspected as an overlapped one.

Displacement of a point in an incorrect area

Face Tracking Test Video

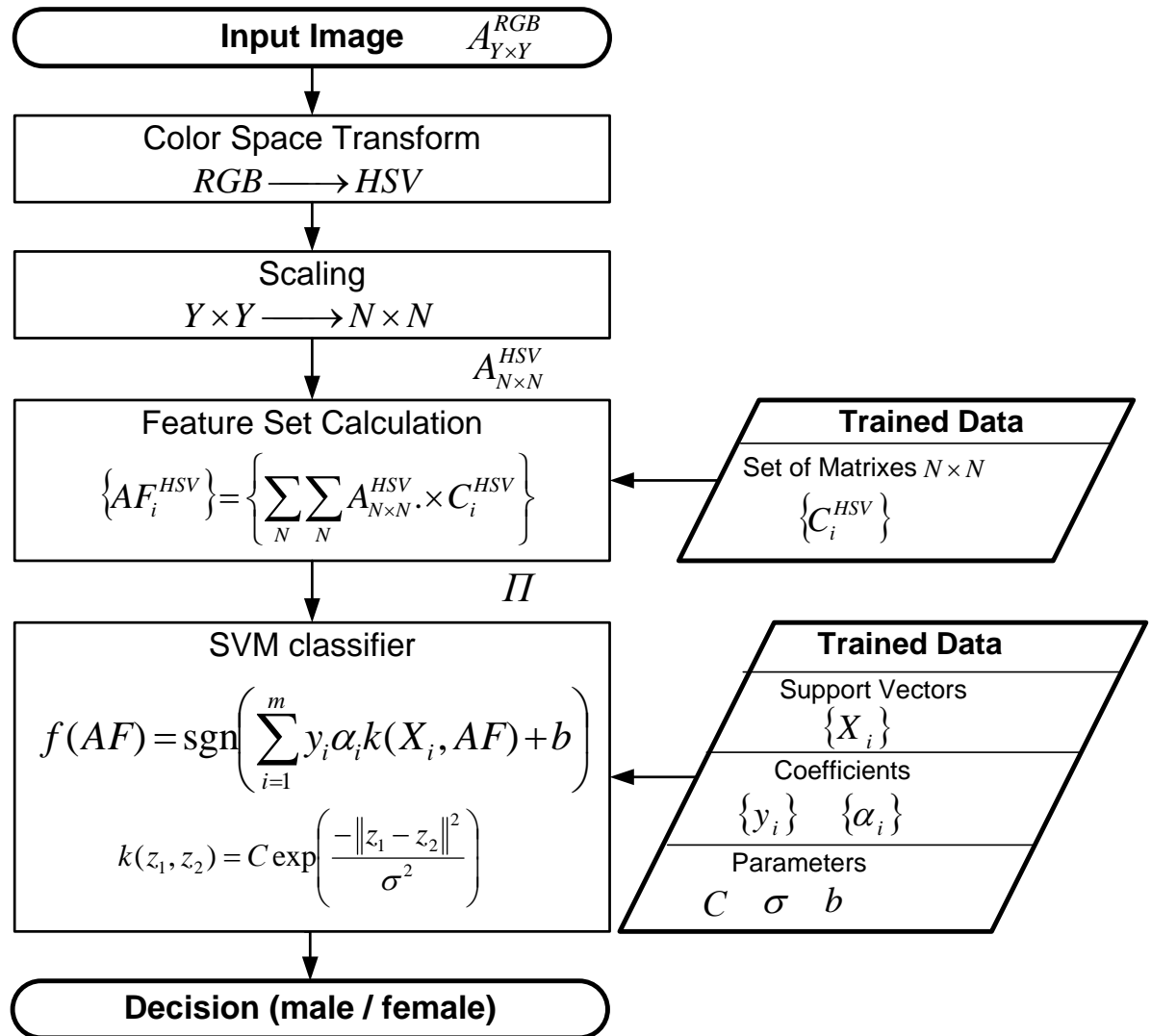


Face tracking algorithms comparison



Gender Classification

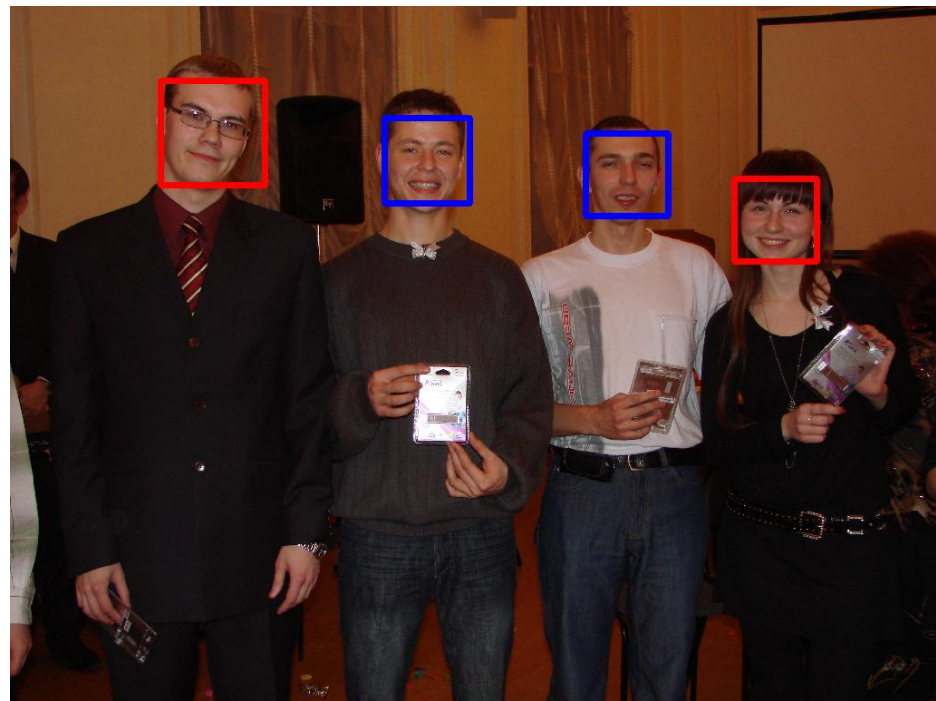
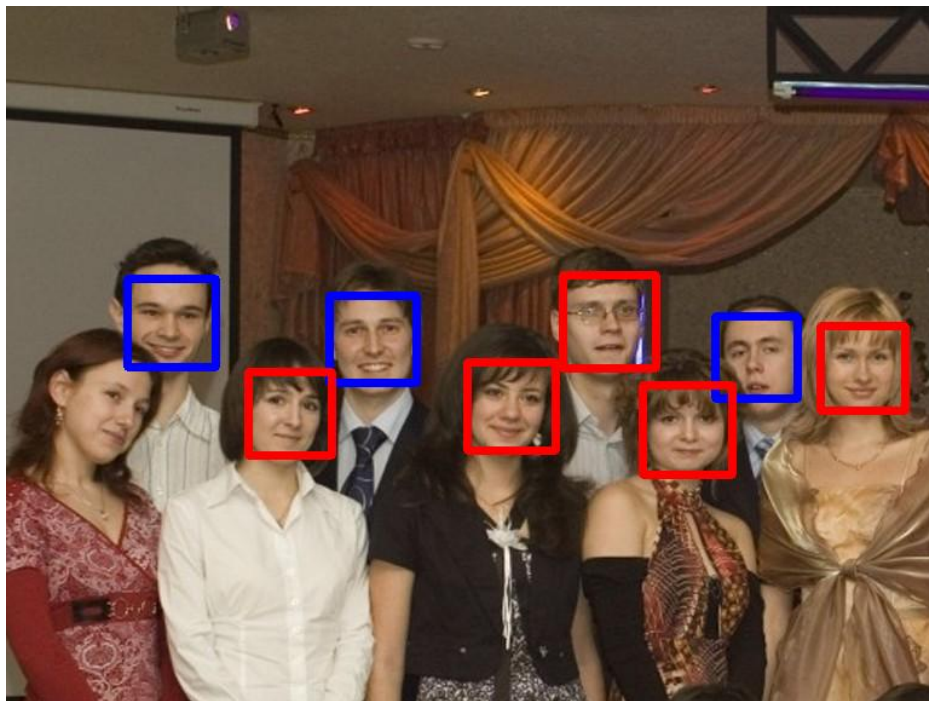
General Scheme



Gender Classification

Visual example:

■ — male ■ — female

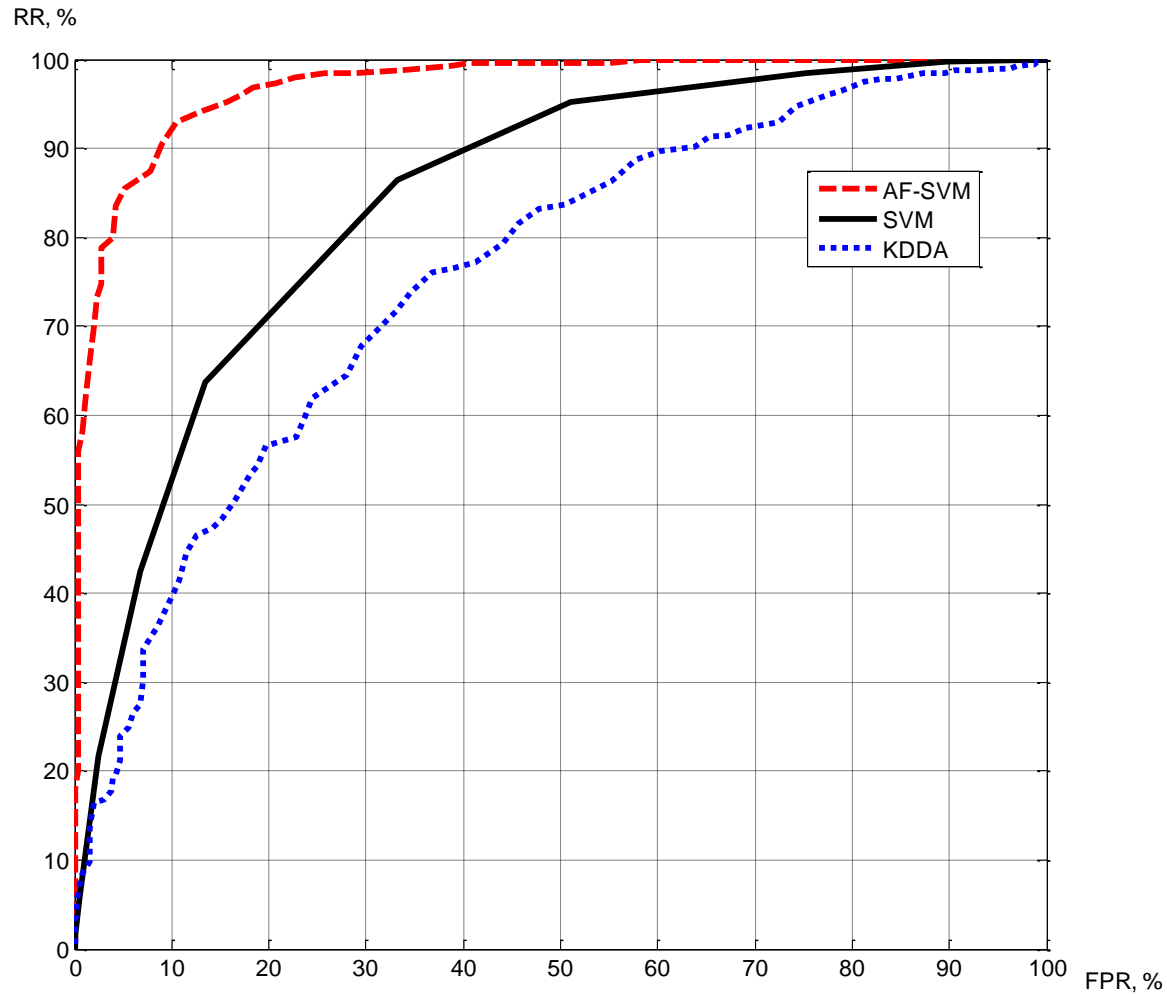


Gender Classification

The Proposed Training and Testing Database Parameters

Parameter	Value
The total number of images	8 654
The total number of male faces	5 250
The total number of female faces	5 250
Minimum image resolution	640×480
Color space format	RGB
Face position	Frontal
Lighting conditions, background	No restrictions
People's age	From 18 to 65 years old

Gender Classification



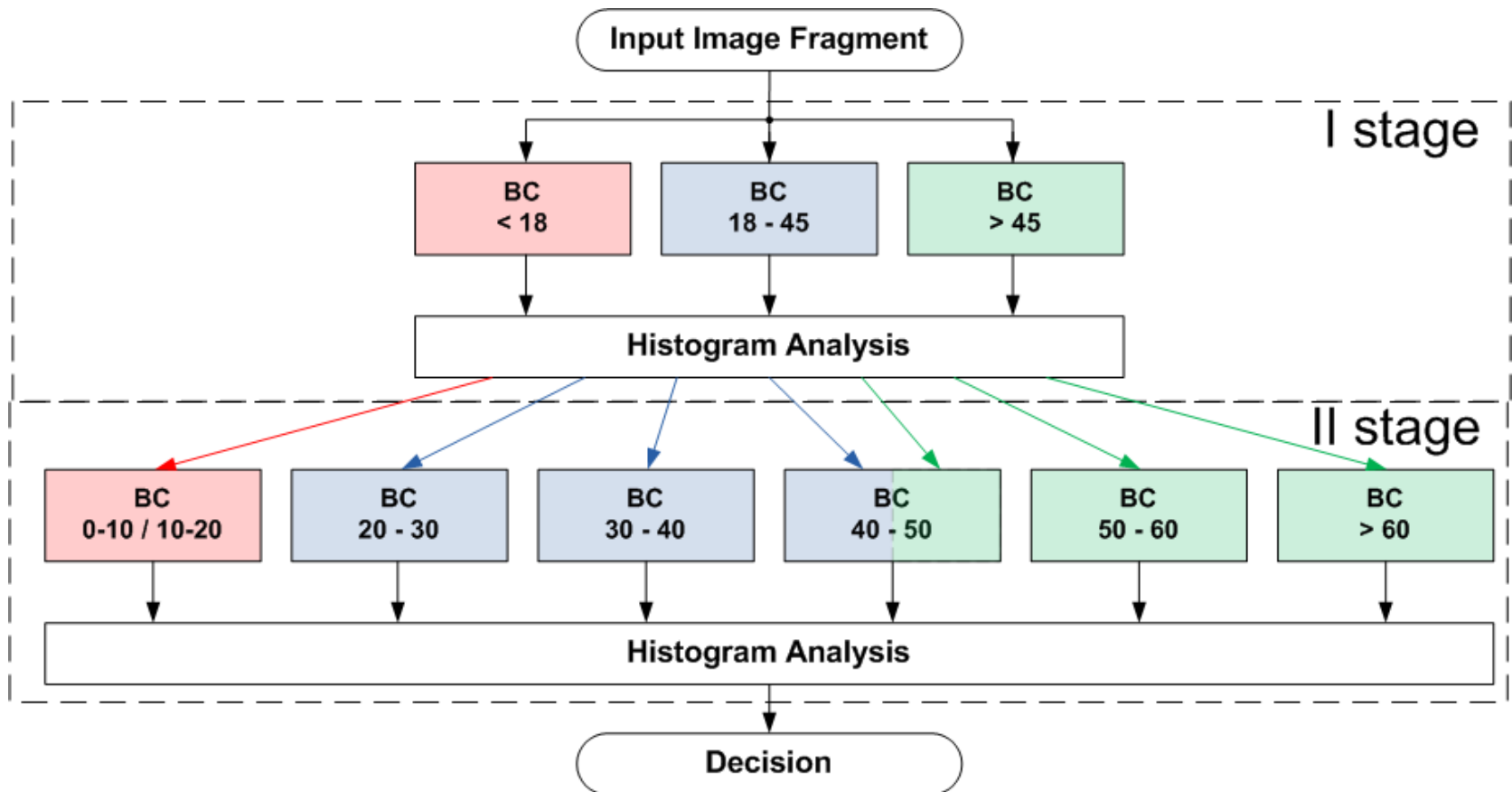
ROC-curves of tested gender recognition algorithms

Gender Classification

Comparative Analysis of Tested Algorithms Performance

Parameter	AF-SVM (M=5000)		AF-SVM (M=400)	
	True	False	True	False
Recognition rate	90.6	9.4	80	20
Classified as "male", %	91	9	79.3	20.7
Classified as "female", %	90.8	9.2	79.6	20.4

Age Classification



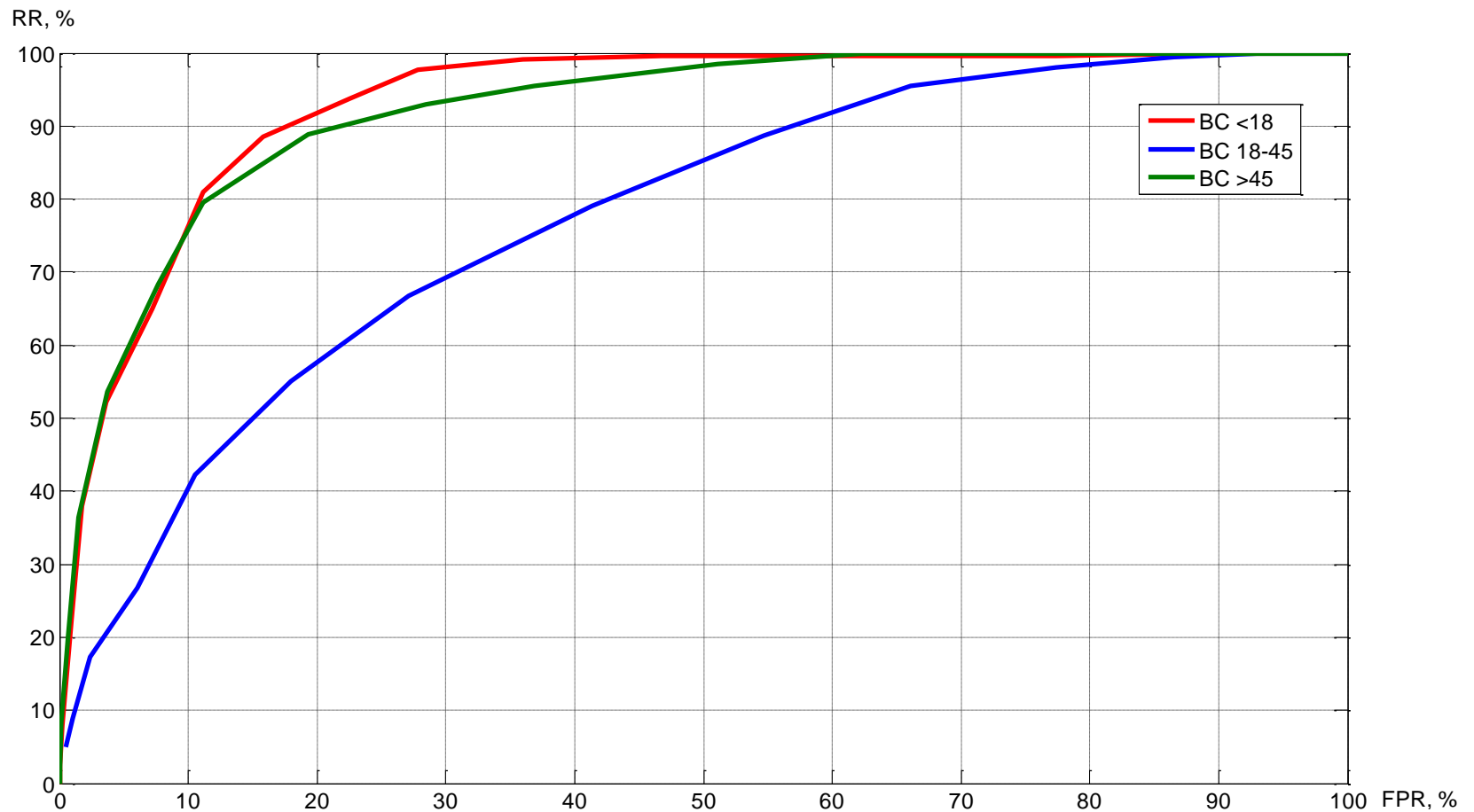
Age Classification

I Stage Image Database Parameters

Class Label	< 18	18-45	>45	Total
Database Capacity				
Training Images per Class	2000	2000	3000	7000
Testing Images per Class	226	400	531	1157
Total Number of Images Used	2226	2400	3531	8157

Age Classification

Binary Classifier's ROC Curves



Age Classification

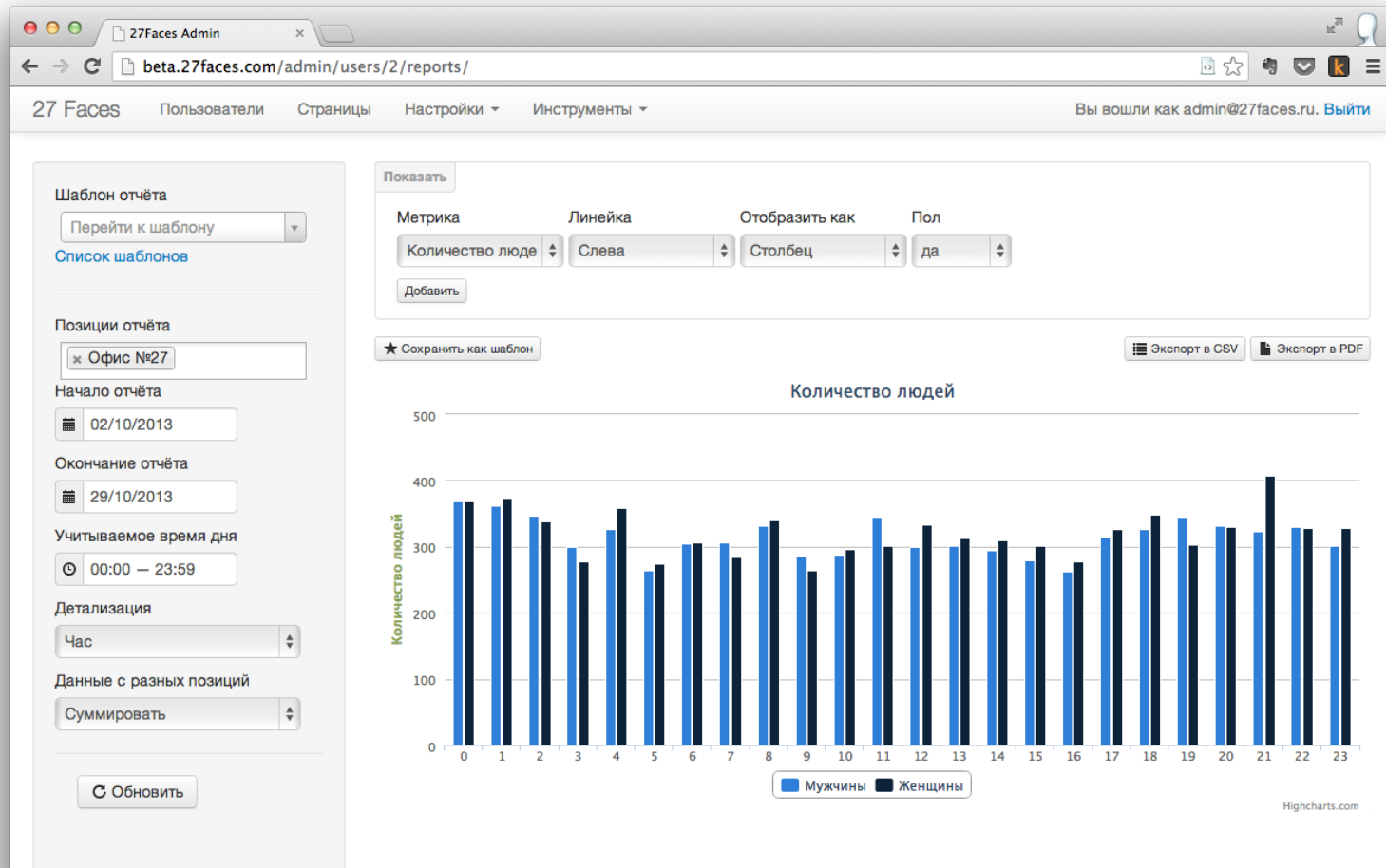
Classification Results

Decision \ Ground Truth	Decision		
	< 18	18-45	>45
< 18	82%	14%	4%
18-45	22%	58%	20%
>45	3%	5%	92%

Age Classification



Web-application 27faces.com



Web-application 27faces.com

Users

Подтвердили почту

Не подтвердили почту

Показать записей


ID	ФИО	Организация	Электронная почта
2	Тестовый		test@27faces.ru
5	Владимир Павлов		i@yajon.ru
6	Имя		bots@pavlov.tel
14	Павлов Евгений	Test	evgeny@pavlov.name
20	Га Алекс Ни	Дом	angnn@mail.ru

Записи с 1 до 5 из 5 записей

user management system

Web-application 27faces.com

Tokens:

Показать  записей

Ключ (токен)	 Действителен до
d97c0fafaf7d71489e91c4c18c2681db0	2014-07-14

Записи с 1 до 1 из 1 записей

[Добавить ключ](#)

Token auth-system

Conclusions

- **The 27faces system** provides collection and processing of information about the audience in real time.
- **The 27faces system** works in a cloud.
- A modern efficient classification algorithm allows to recognize viewer's gender with more than **90% accuracy**.

Welcome to 27faces.com



The screenshot shows a web browser window with two tabs: '27Faces Admin' and '27faces'. The address bar displays '27faces.com/en/'. The main content area features a large image of a digital signage advertisement in a modern building. The advertisement shows a woman's face and the text 'naturally colorful'. Below the image are three navigation links: 'About us', 'How Does It Work?', and 'Main Features'. To the right of the image is the 27Faces logo, which consists of the number '27' above the word 'Faces', and a bar chart with three bars in red, green, and blue. Below the logo are two language options: 'русский' and 'english'.

Online Audience Measurement for Digital Signage Networks

The popularity of digital signage networks is growing dramatically as they provide a unique opportunity to deliver live information to a huge audience with high accuracy and efficiency. However, the majority of Indoor-TV offers don't possess the functionality to interactively get customer feedback and thus are unable to measure the impact of advertising material on the audience.

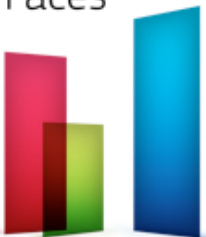
Let us introduce you the **27faces**, a product providing such functionality.

27faces allows measuring precisely the number of advertisement viewers and the level of their interest in video content demonstrated on digital displays or TV monitors. **27faces** instantly performs audience segmentation with its further analysis.

Given all completeness of the audience size and segmentation information at specific time and location, advertisers will be able to evaluate the return on investment from their advertising campaigns, to choose the optimum time and place for advertisement demonstration, to measure the effectiveness of advertising content.



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