National Research University Higher School of Economics
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Experimental Study of the Accuracy of Face Recognition Software in Noisy Environment

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Relevance of the Research

The growth of popularity of automatic identification systems generates the need to make their work more qualitative

Research objective:

To evaluate face recognition accuracy depending on preliminary image filtering

Tasks:

- to study opportunities of modern face identification systems;
- to consider methods of image filtering;
- to develop algorithm of image conversions;
- to study the format of file .picasa.ini;
- to evaluate face recognition accuracy depending on preliminary image filtering;
- to analyze results.

Methodological Basis

- **Google Picasa editor**
- **format of .picasa.ini**

  9a127fe0ba36f28d=Person_1;;
  [image.jpg]
  faces=rect64(16c07aeec16ffff), 9a127fe0ba36f28d
  backuphash=11354

- **face database AT&T**

a training set – 5 photos * 40 people

a test part – 5 photos * 40 people

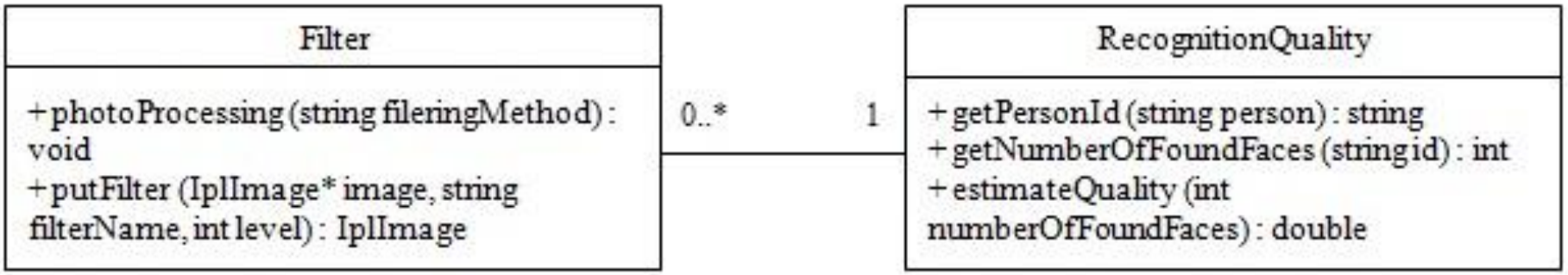
- **computer vision library OpenCV**

Program Structure

- **object-oriented approach:**

  class for image filtering

  class for evaluation of recognition quality



The Algorithm of Experimental Study

- adding filters on test images;
- face recognition in Google Picasa;
- search of the identifier in .picasa.ini;
- count of recognized persons' number with the definite identifier;
- comparison this number with the total people's quantity in the database;
- analysis of results.

Results of Experiments (1)

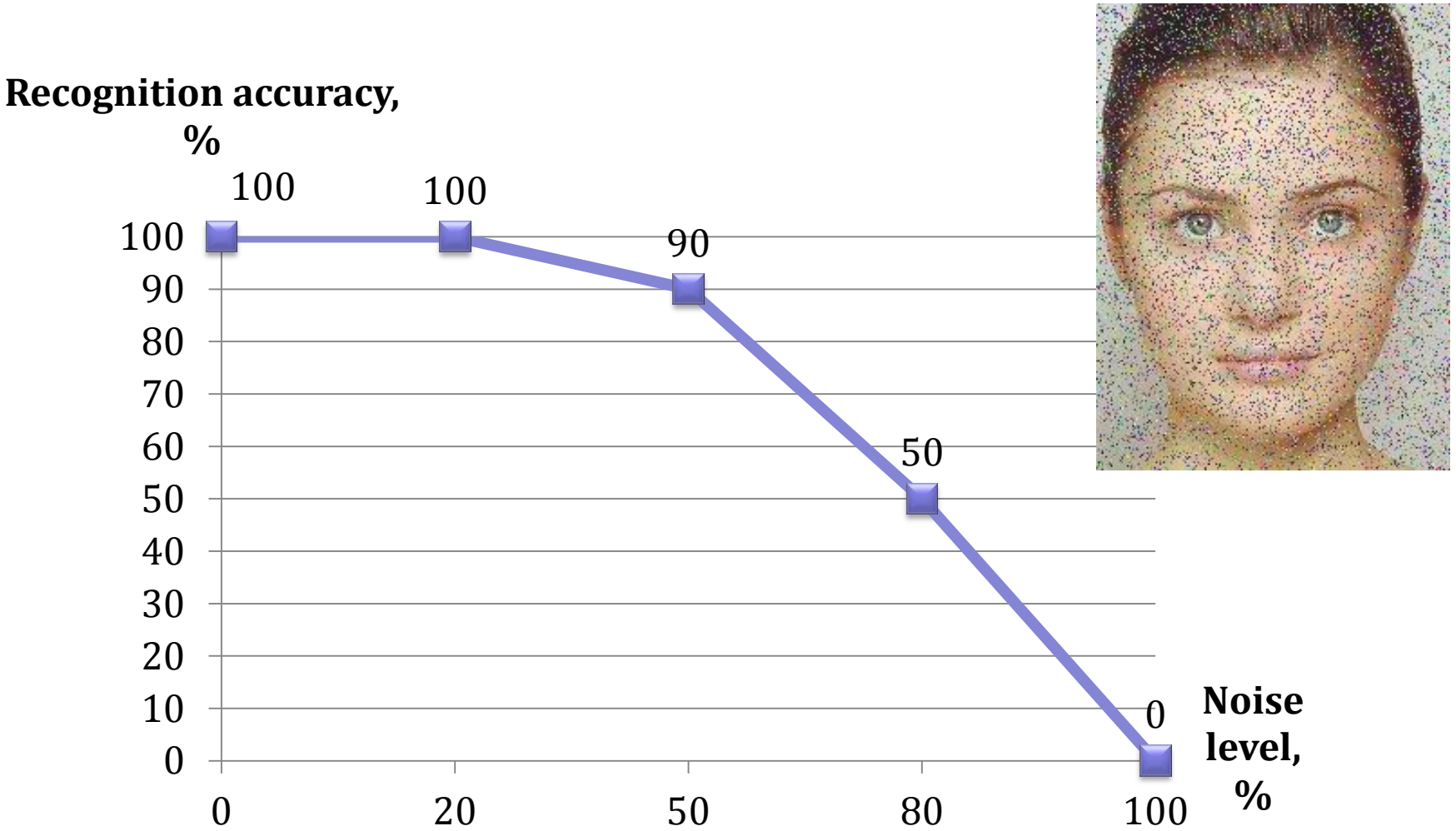


Fig 1. Dependence of face recognition quality on noise level

Results of Experiments (2)

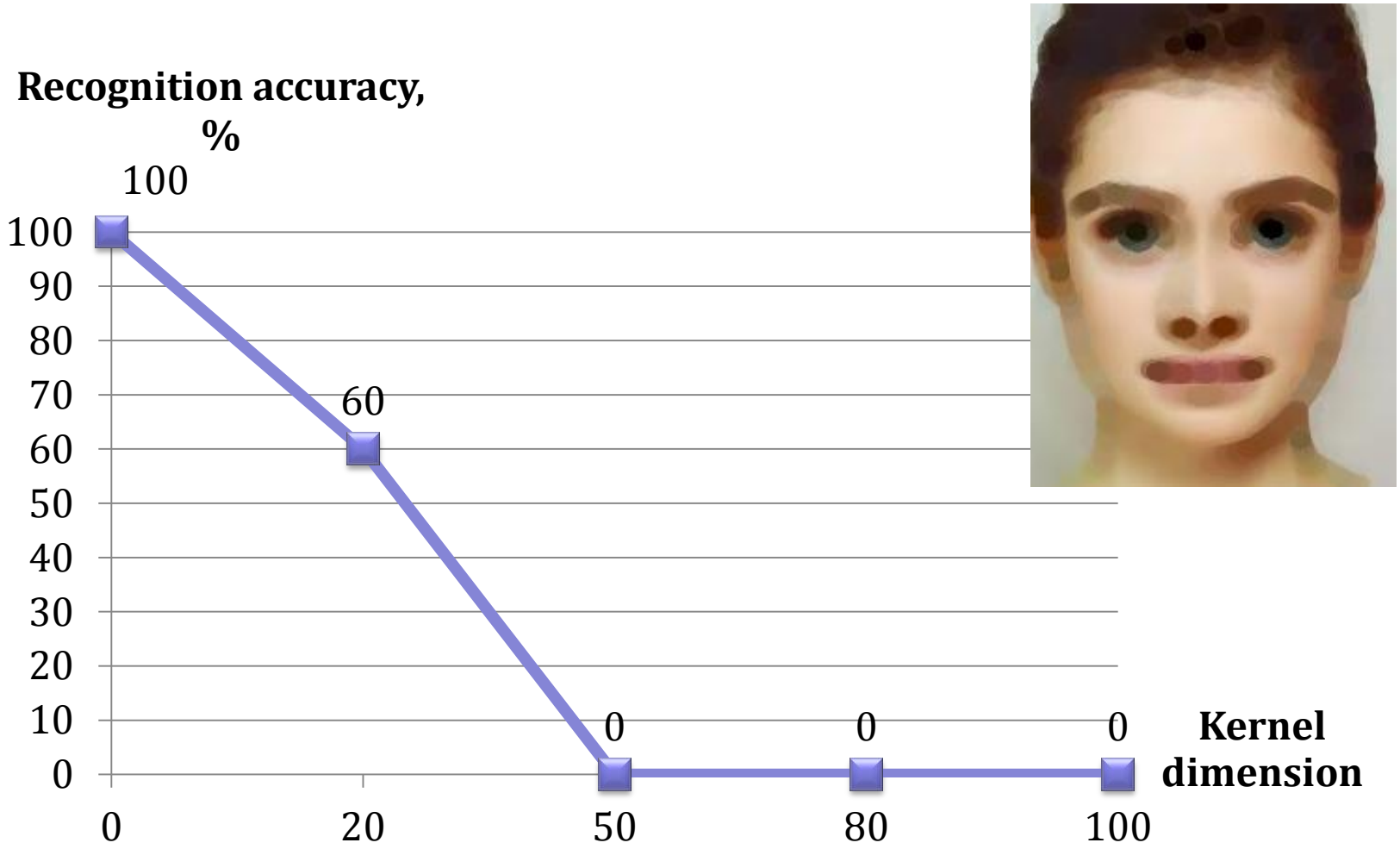


Fig 2. Dependence of face recognition quality on kernel dimension (erosion)

Results of Experiments (3)

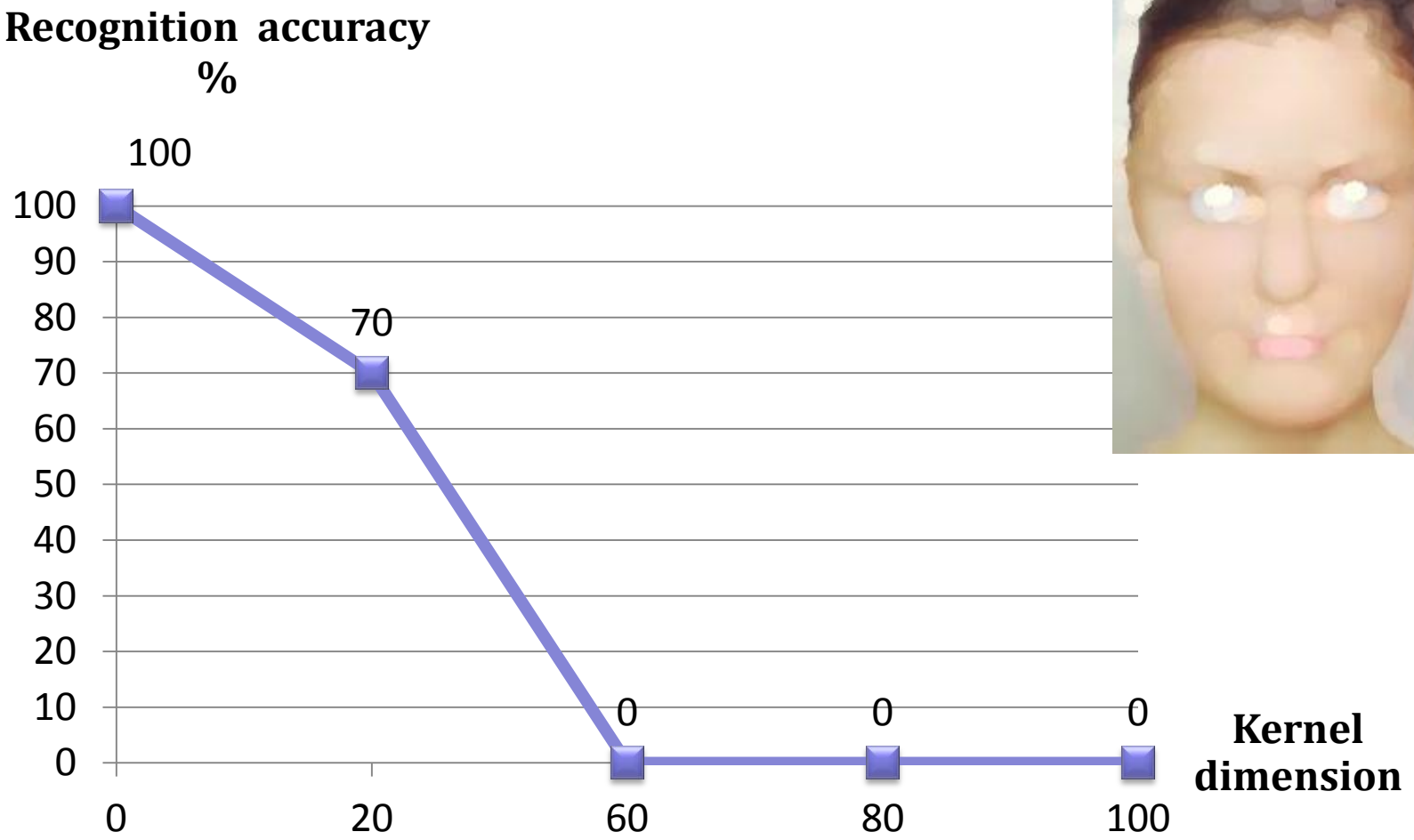


Fig 3. Dependence of face recognition quality on kernel dimension (dilation)

Results of Experiments (4)

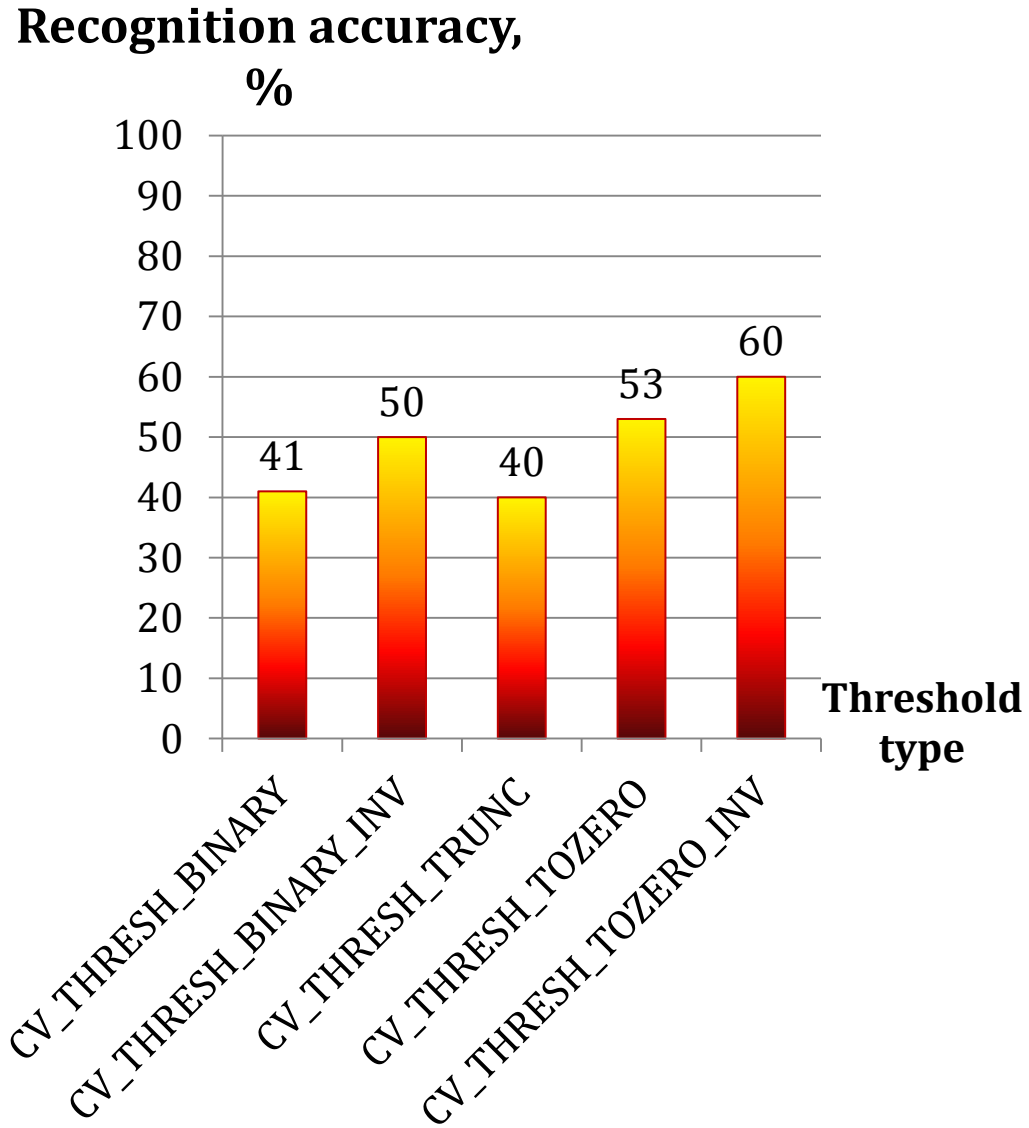


Fig 4. Dependence of face recognition quality on threshold type

Results of Experiments (5)

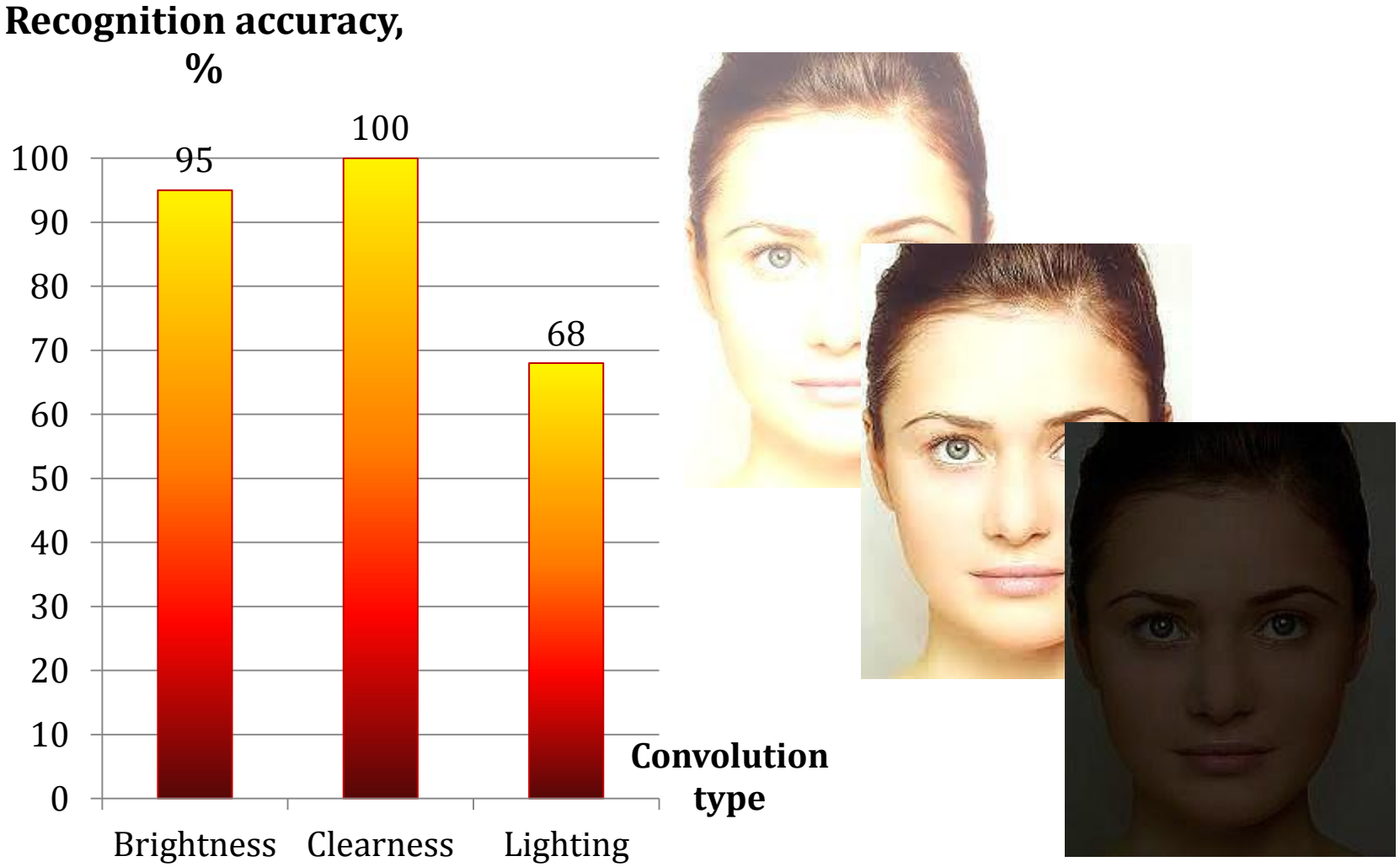
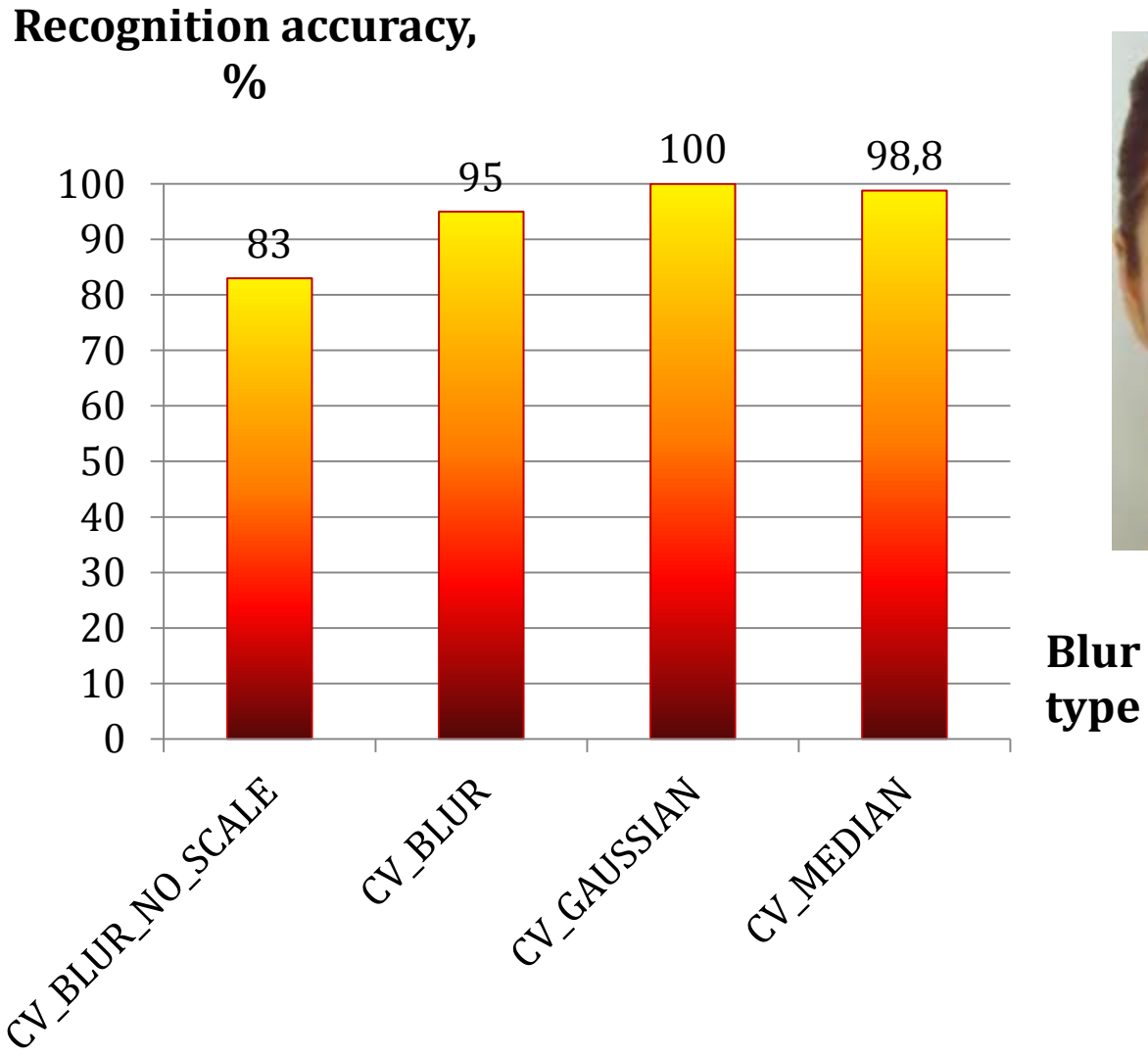


Fig 5. Dependence of face recognition quality on convolution type

Results of Experiments (6)



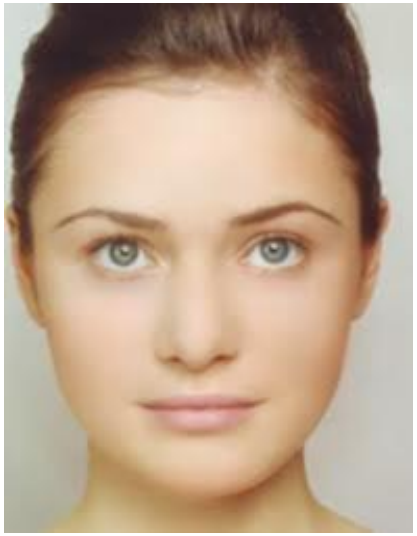
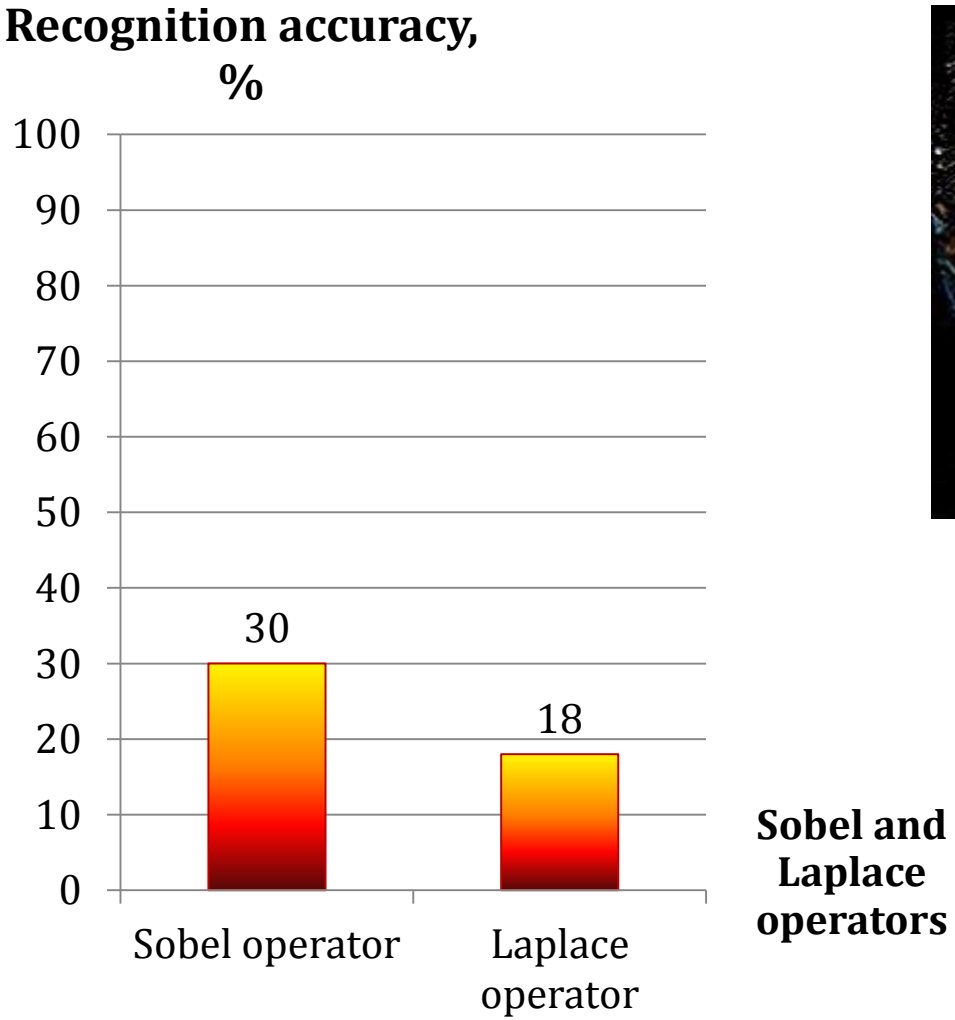


Fig 6. Dependence of face recognition quality on blur type

Results of Experiments (7)



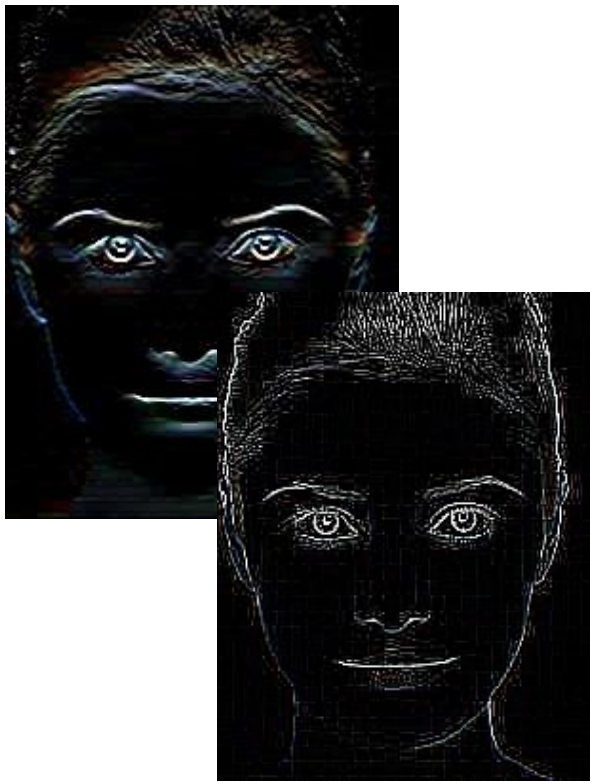


Fig 7. Dependence of face recognition quality on applying of Sobel and Laplace operators

Conclusion

- Google Picasa editor has been chosen as a research object;
- filters have been taken from library OpenCV;
- face database AT&T has been used for training and testing Google Picasa;
- count of recognized people has been made in file .picasa.ini;
- for image filtering and evaluation of recognition quality, computer program has been created;
- analysis of results has been made.

Future Work

- application of classifier fusion;
- integration of results from different classifiers;
- evaluation of face recognition quality depending on preliminary image filtering.

Thank you for your attention!