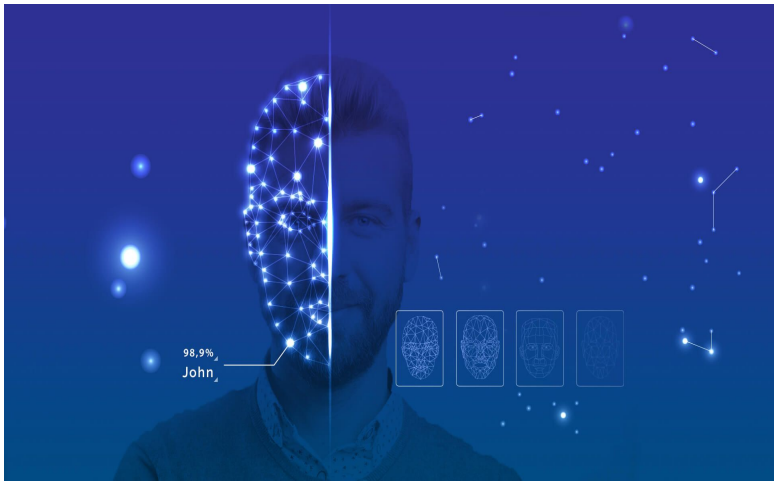
# Authentication based on face recognition for preschoolers

# Outline

- Introduction
- Problem definition
- State of the art
- Proposed approach
- The application
- Numerical results
- Conclusions and future work

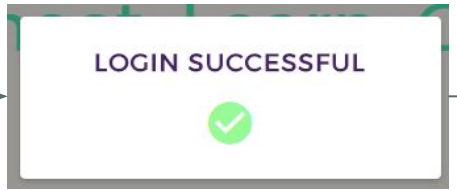
# Introduction

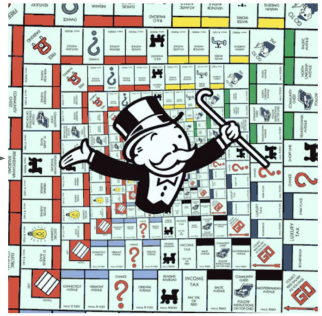
- Face recognition is one of the most important application of image analysis
- Represents a software application able to identify a person from a digital image/video
- Different applications in:
  - identity verification
  - security
  - multimedia data management
  - computer entertainment



# Problem definition

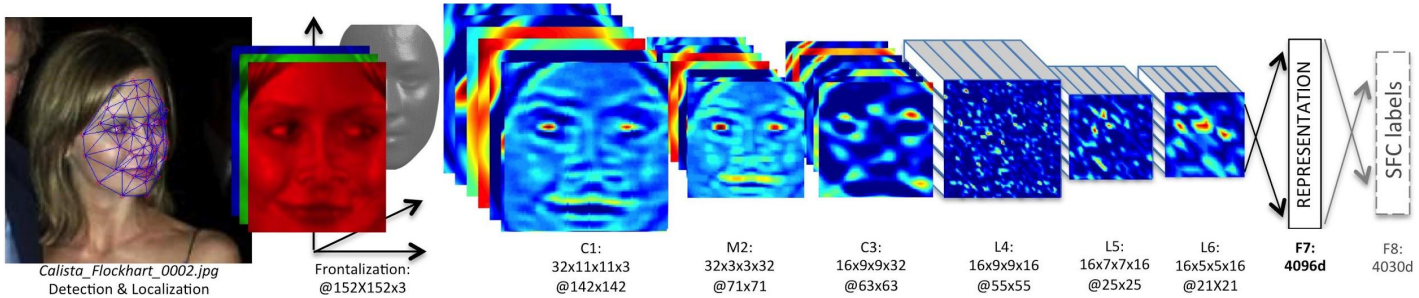
- The necessity of this application came from the fact that preschoolers cannot read or write in order to get authenticated in an application
- Nowadays preschoolers have access to many applications that require authentication so face recognition can be a good candidate for this problem



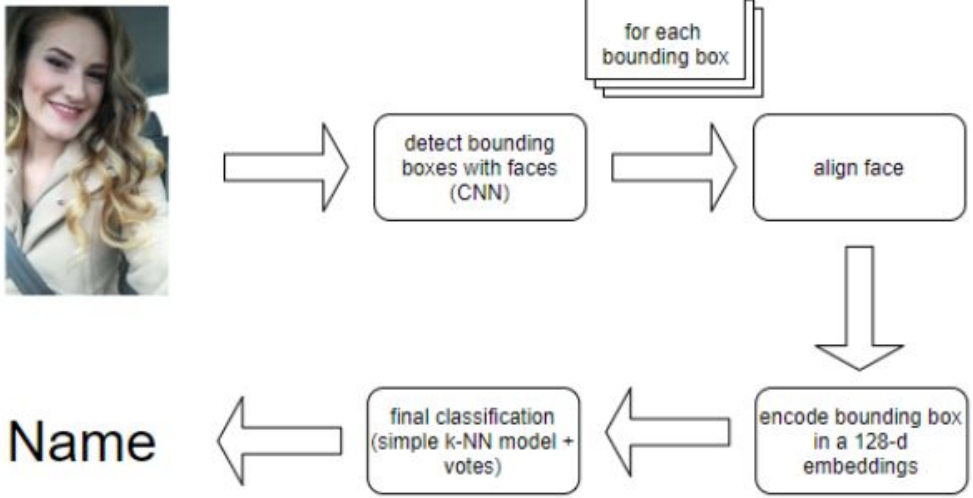
# State of the art

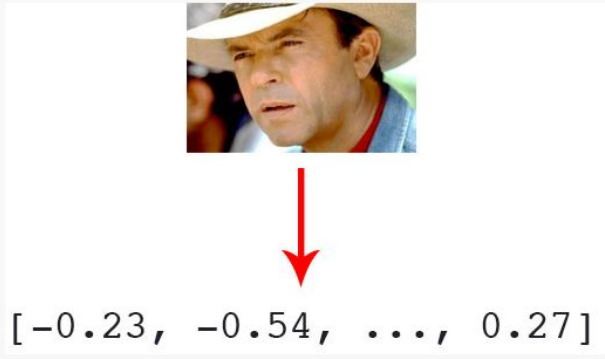
- CNN- S,M,L
- Fusion algorithm
- RF classifiers
- Histogram of Oriented Gradients (HOG)
- Local geometric feature and shape matching
- Detect => align => represent => classify

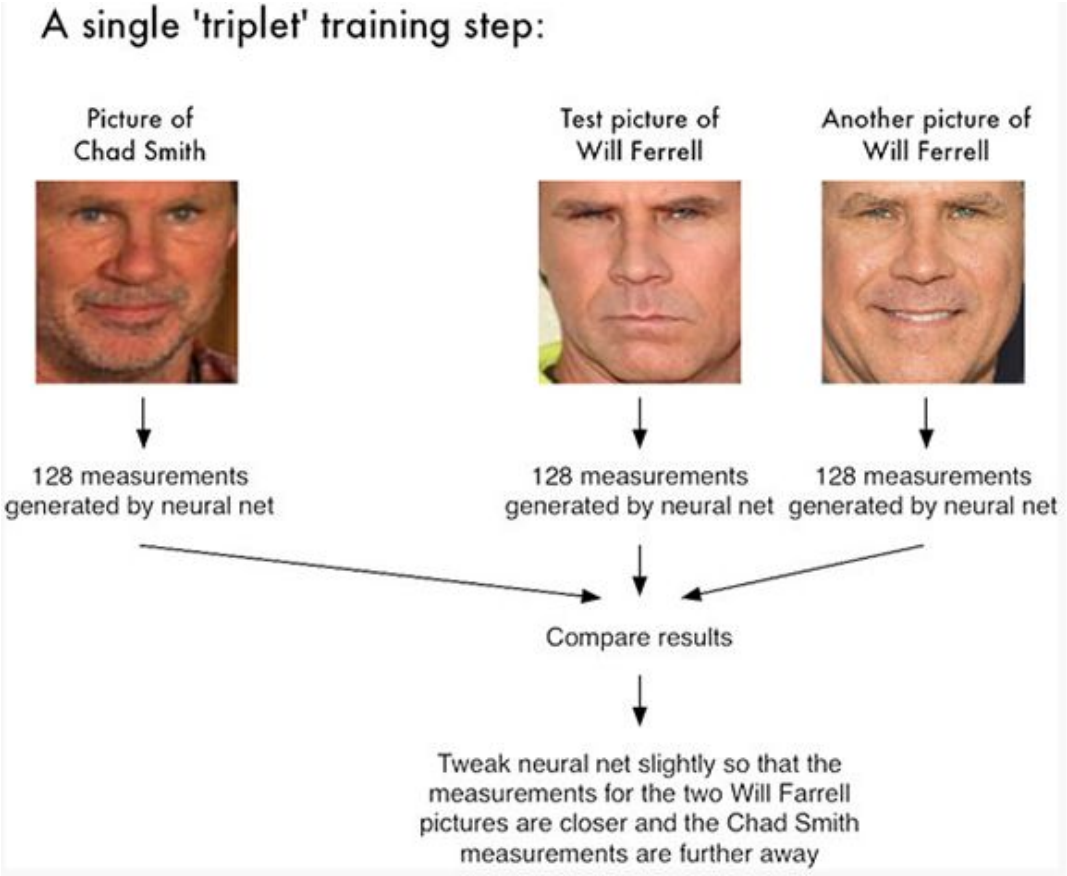


# Proposed approach

OpenCV



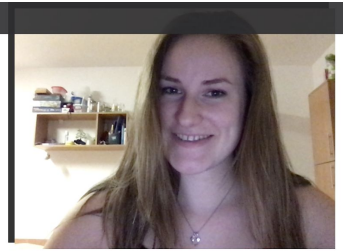




A single 'triplet' training step:
Picture of Chad Smith
Test picture of Will Ferrell
Another picture of Will Ferrell
128 measurements generated by neural net
128 measurements generated by neural net
128 measurements generated by neural net
Compare results
Tweak neural net slightly so that the measurements for the two Will Farrell pictures are closer and the Chad Smith measurements are further away

[-0.23, -0.54, ..., 0.27]

# Application

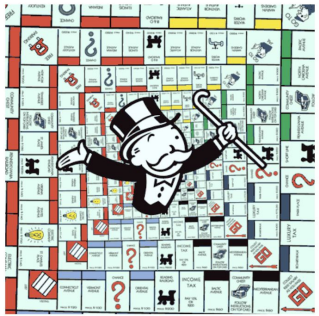
login page



child

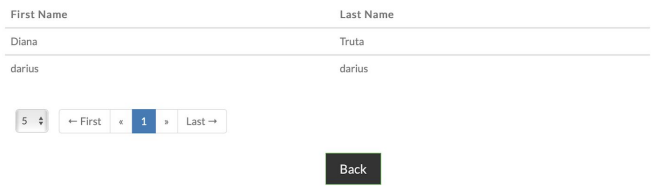
teacher

play game page

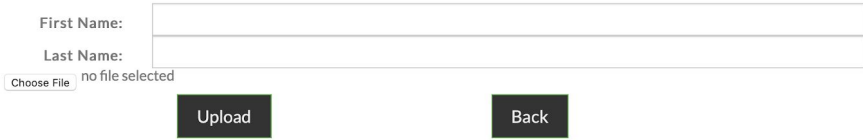


teacher's page


List of children




Add child



# Numerical results

| | Algorithm without alignment | | Algorithm with alignment | | Deep Residual Learning |
|---|---|---|---|---|---|
| | Kids | Adults | Kids | Adults | on ResNet-34 |
| Number of images | 50 | 4910 | 50 | 4910 | 3million |
| Number of people | 10 | 276 | 10 | 276 | |
| Matching tolerance | 0.6 | 0.6 | 0.5 | 0.5 | |
| Accuracy | 30% | 90% | 64.74% | 95.28% | 99.38% |

# Conclusions and future work

- our approach did not reach a better accuracy than the state-of-the-art
- it has showed us that maybe we can tune more the parameters or use a different approach such as deep learning to make it more performant
- as future work, besides trying to use deep learning or Local Binary Patterns Histograms (LPBH), we would like to invest some time in collecting images with children

# THANK YOU FOR YOUR ATTENTION!

## ANY QUESTIONS?