

Status Report

Biometrics Project



Agenda



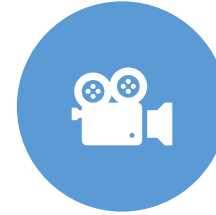
TECHNICAL
BACKGROUND



IDENTITY
VERIFICATION
FEATURE



OCR PASSPORT
EXTRACTION



VIDEO FACE
RECOGNITION
FEATURE



WALLET
INTEGRATION



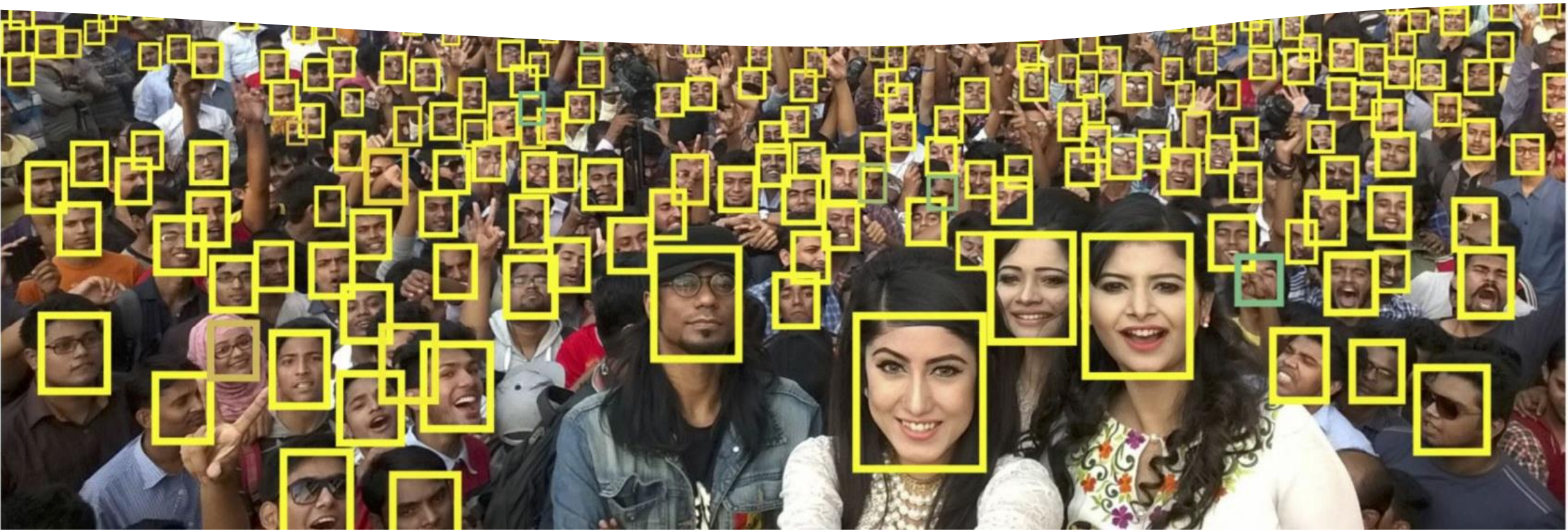
NEXT STEPS



Q & A

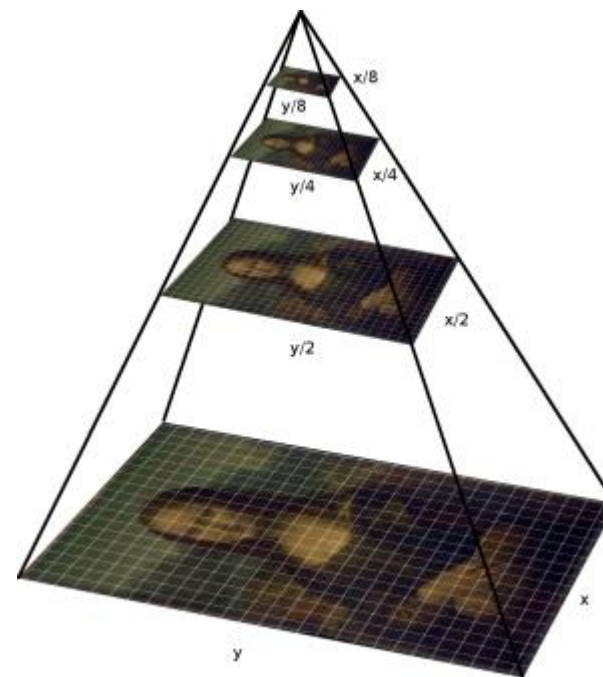
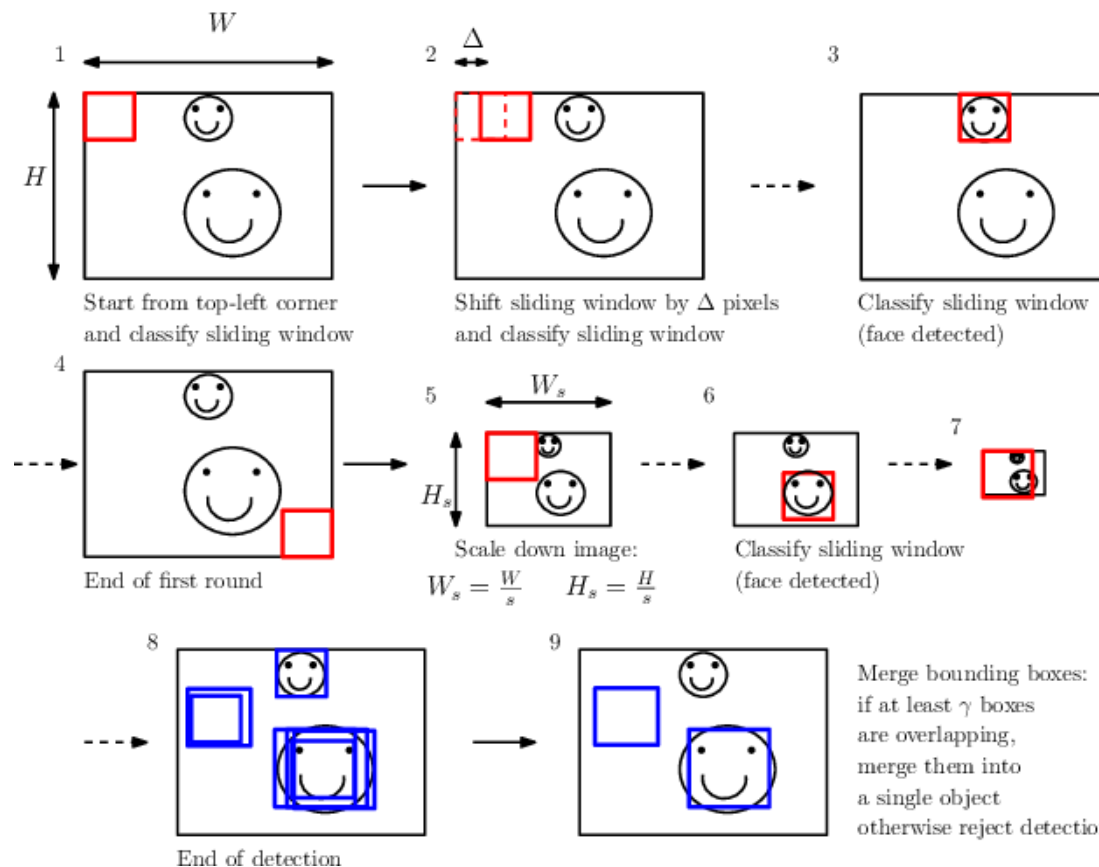
Technical Background

- What is **Face Detection**?
 - Given an image, tell whether there is any human face, if there is, where is it
 - It's the first step for any automatic face recognition system



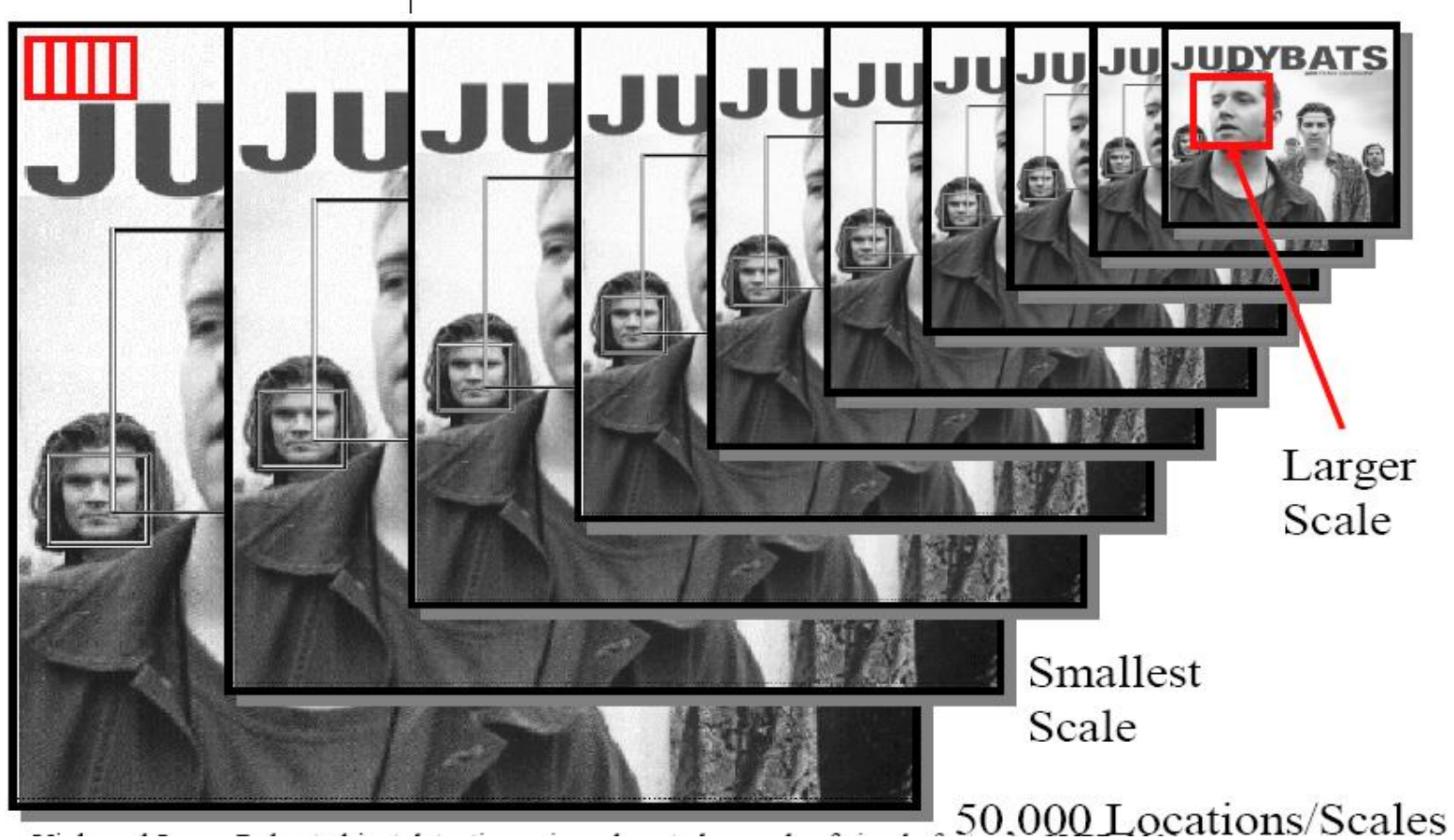
Technical Background

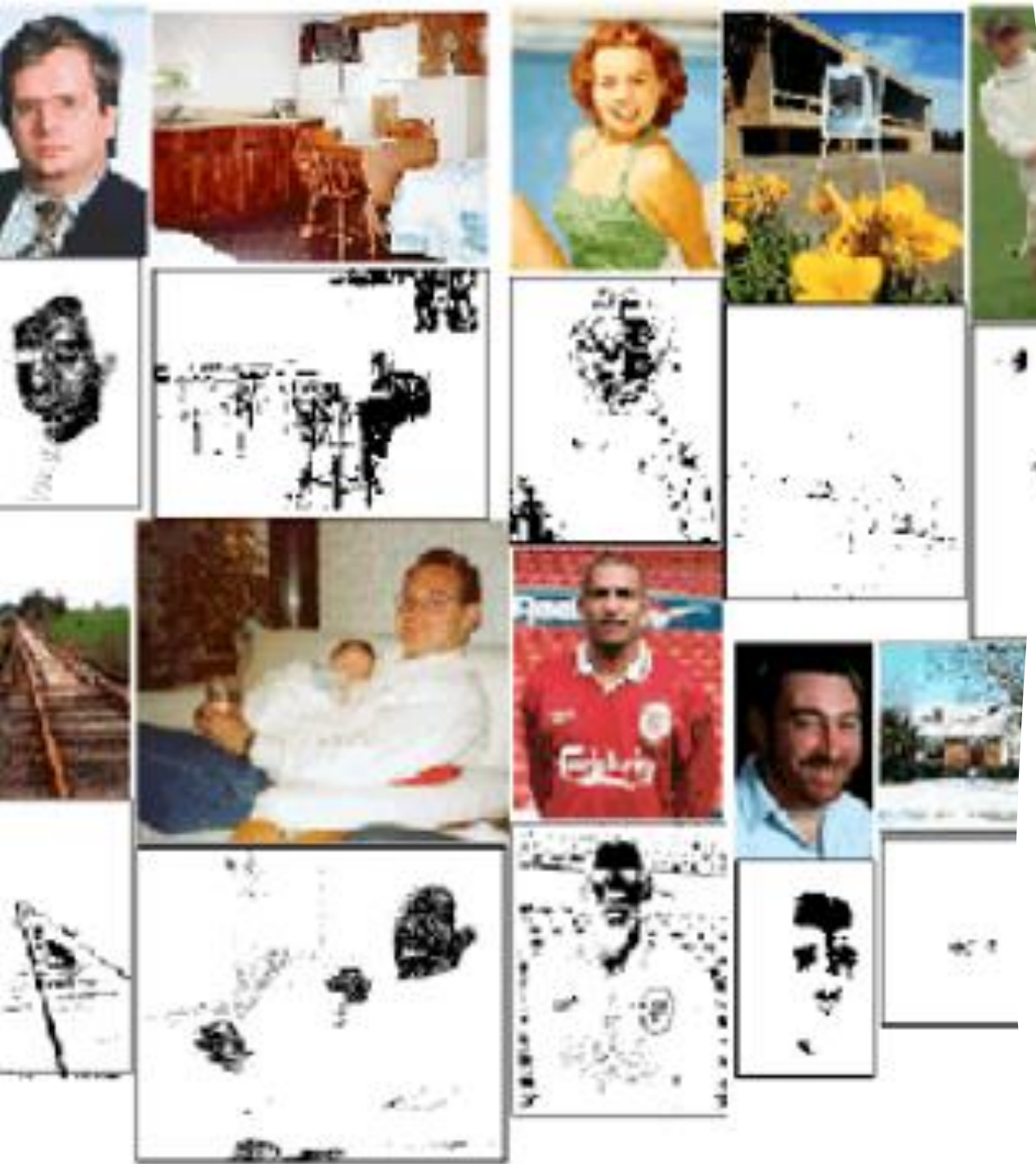
- How does it work?
 - Basically, it can be performed using a **sliding window** approach



Technical Background

- How **does it work?**
 - Basically, it can be performed using a **sliding window** approach



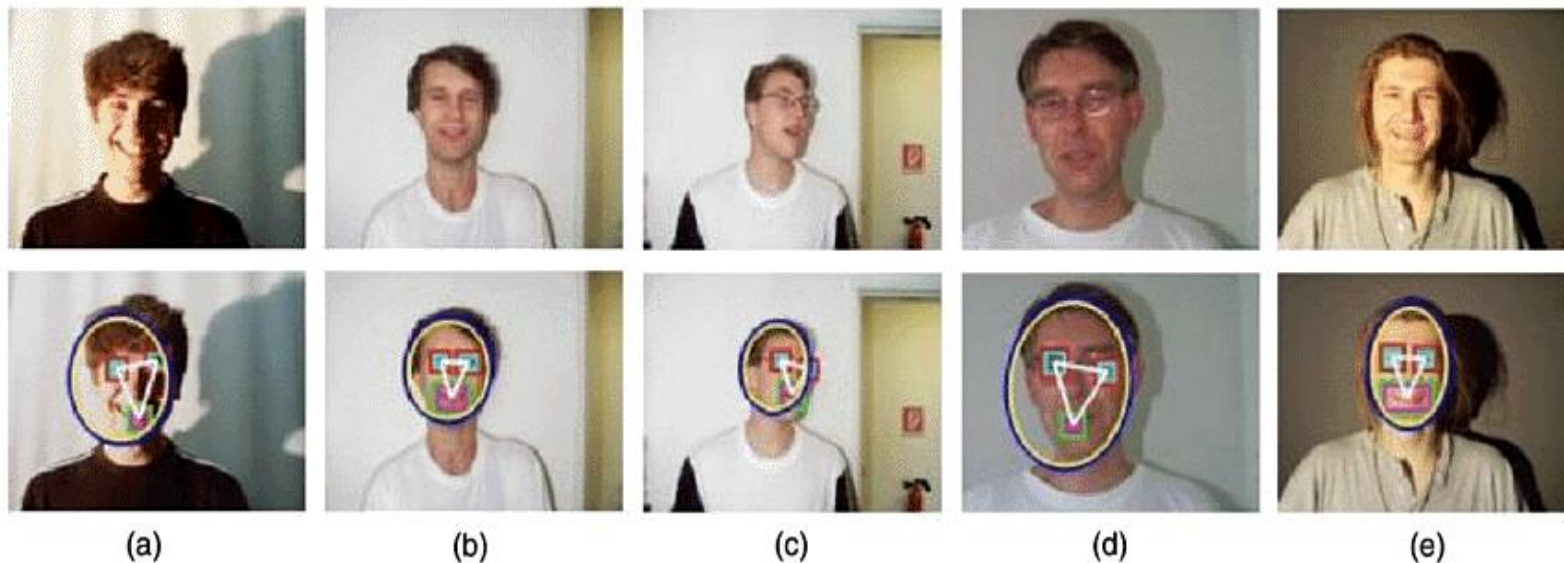
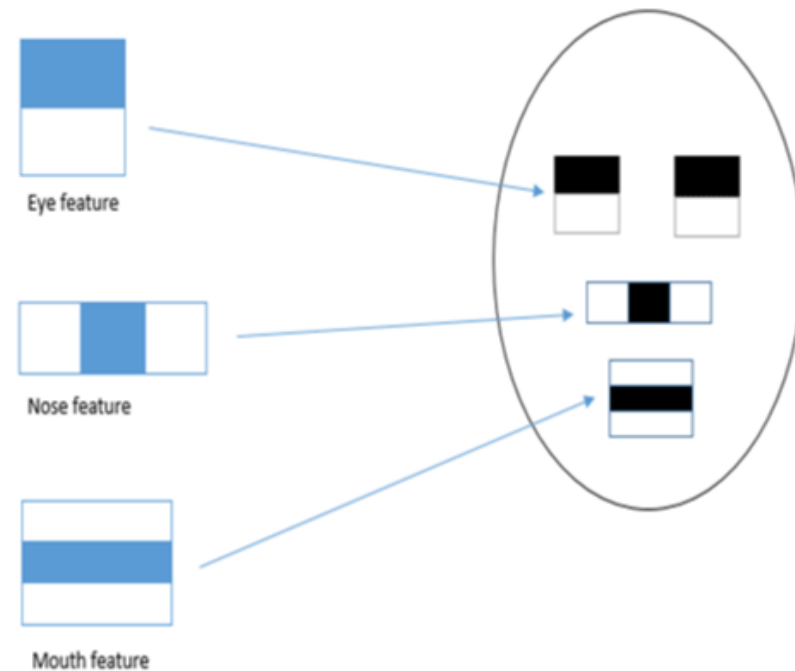


Technical Background

- How to **classify** it?
 - Feature-based methods:
 - Skin color
 - Shape
 - Texture

Technical Background

- How to **classify** it?
 - Template matching methods:
 - Edges and regions
 - Facial features (eyes, nose, mouth, etc.)



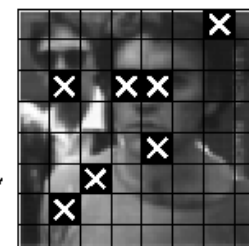
Technical Background

- How to **classify** it?
 - Appearance-based methods:
 - Trained model such as NN, PCA, SVM

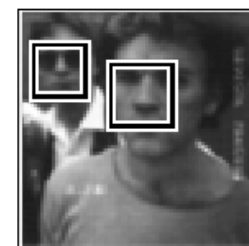
Input image pyramid



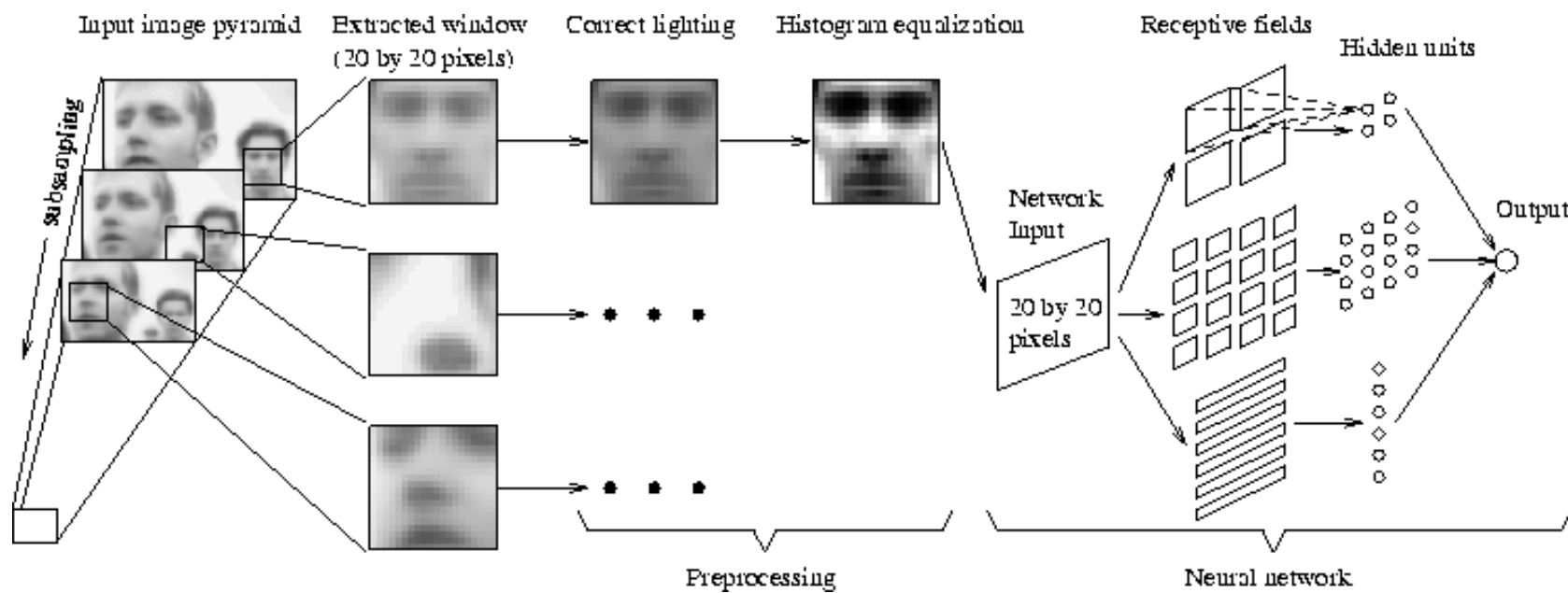
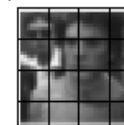
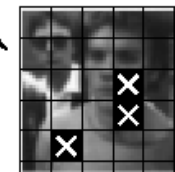
Candidate locations



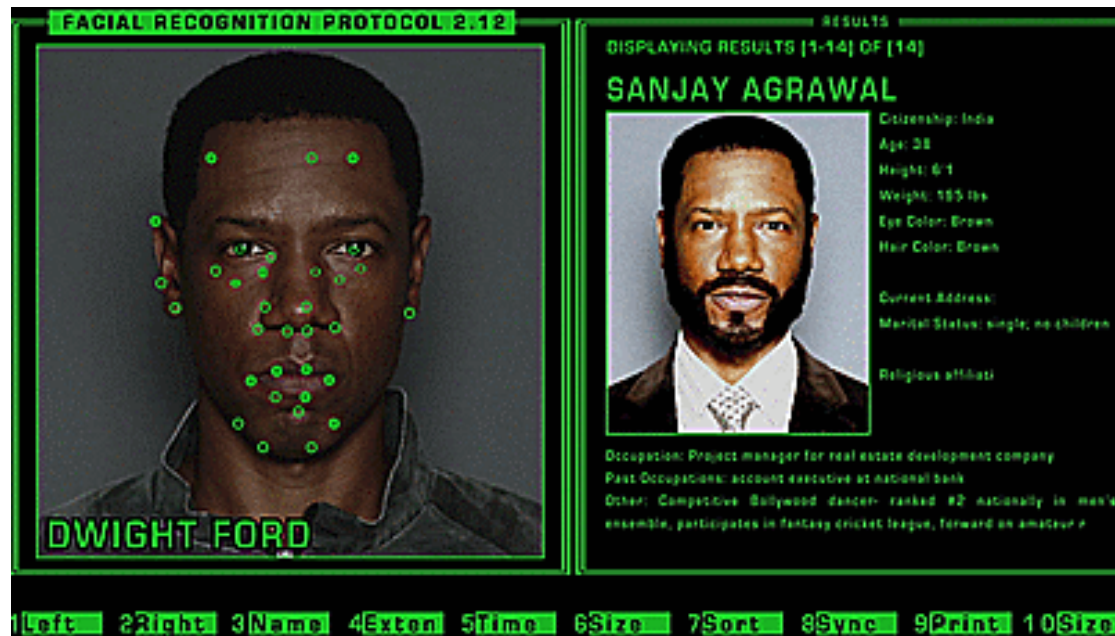
Verified face locations



10x10 pixel grid



Technical Background



- What is **Face Recognition**?
 - Given a face image that belongs to a person in a database, tell whose image it is
 - Two main tasks
 - **Verification**
 - **Identification**

Technical Background



sheldon 1



howard 1

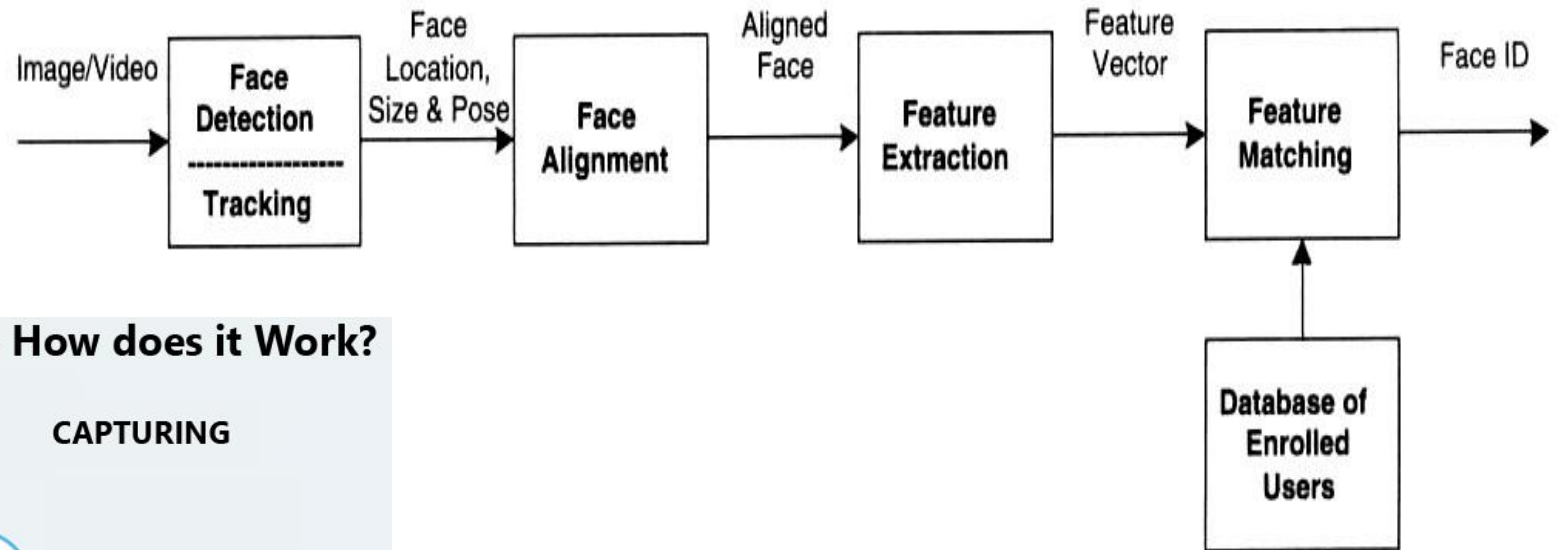
Distance:

0.89 (no match)

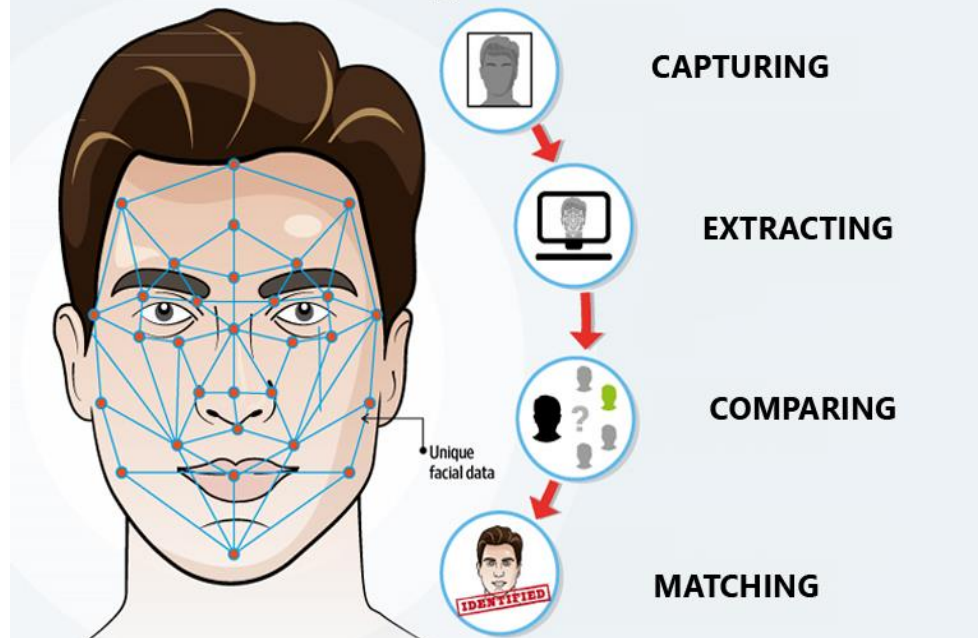
- **Face Verification** (or Authentication)
 - Involves a one-to-one match that compares a query face image against a template face image whose identity is being claimed
- **Face Identification** (or Recognition)
 - Involves one-to-many matches that compares a query face image against all the template images in the database to determine the identity of the query face

Technical Background

- How does it work?



Biometrics Face Recognition - How does it Work?



Identity Verification Feature

- **Face Verification** task
- Based on **face-api.js** (<https://justadudewhohacks.github.io/face-api.js/>)
 - Built on top of **Tensorflow** (<https://www.tensorflow.org>)
 - Open source ML platform



- **API** version based on **Sails.js** (<https://sailsjs.com/>)
 - MVC framework for Node.js



Identity Verification Feature

- Source code
 - <https://github.com/SelfKeyFoundation/face-rec>
- Live API
 - Google Cloud (<https://console.cloud.google.com/compute/instancesDetail/zones/us-east1-b/instances/face-rec-api-dev?project=selfkey2>)
- Request
 - Image encoded base64 string
- Response
 - Likelihood threshold

```
{  
  "document": "<BASE_64_ENCODED_STRING>",  
  "selfie": "<BASE_64_ENCODED_STRING>"  
}
```

```
{  
  "response":  
  {  
    "found_face":  
    {  
      "image1": true,  
      "image2": true  
    },  
    "verified": true  
  },  
  "status": 200  
}
```

Identity Verification Feature

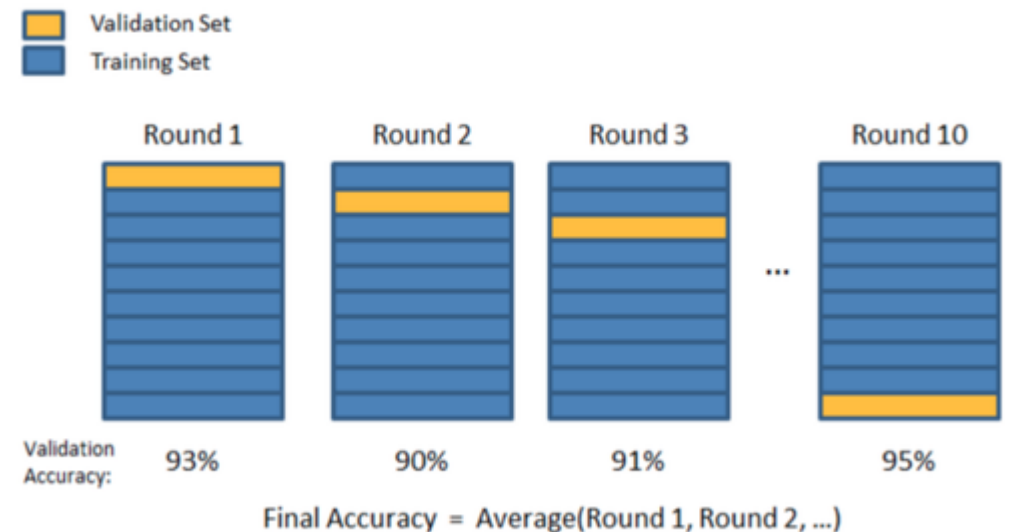
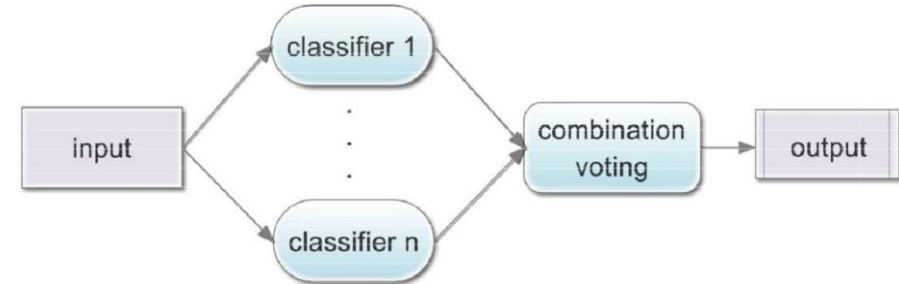
- Examples
 - Document
 - Selfie
- Result

Identity Verification Feature

- Examples
 - Document
 - Selfie
- Result

Identity Verification Feature

- Extended Trained Model
 - Tokensale Dataset
 - 39,860 different persons
 - 72,225 images
 - Built a passport specialist classifier
 - Strategy
 - Classifier combination
- Evaluation
 - 10 Fold Cross Validation
 - Final Accuracy: **96.57%**



Identity Verification Feature

- Examples

OCR Passport Extraction

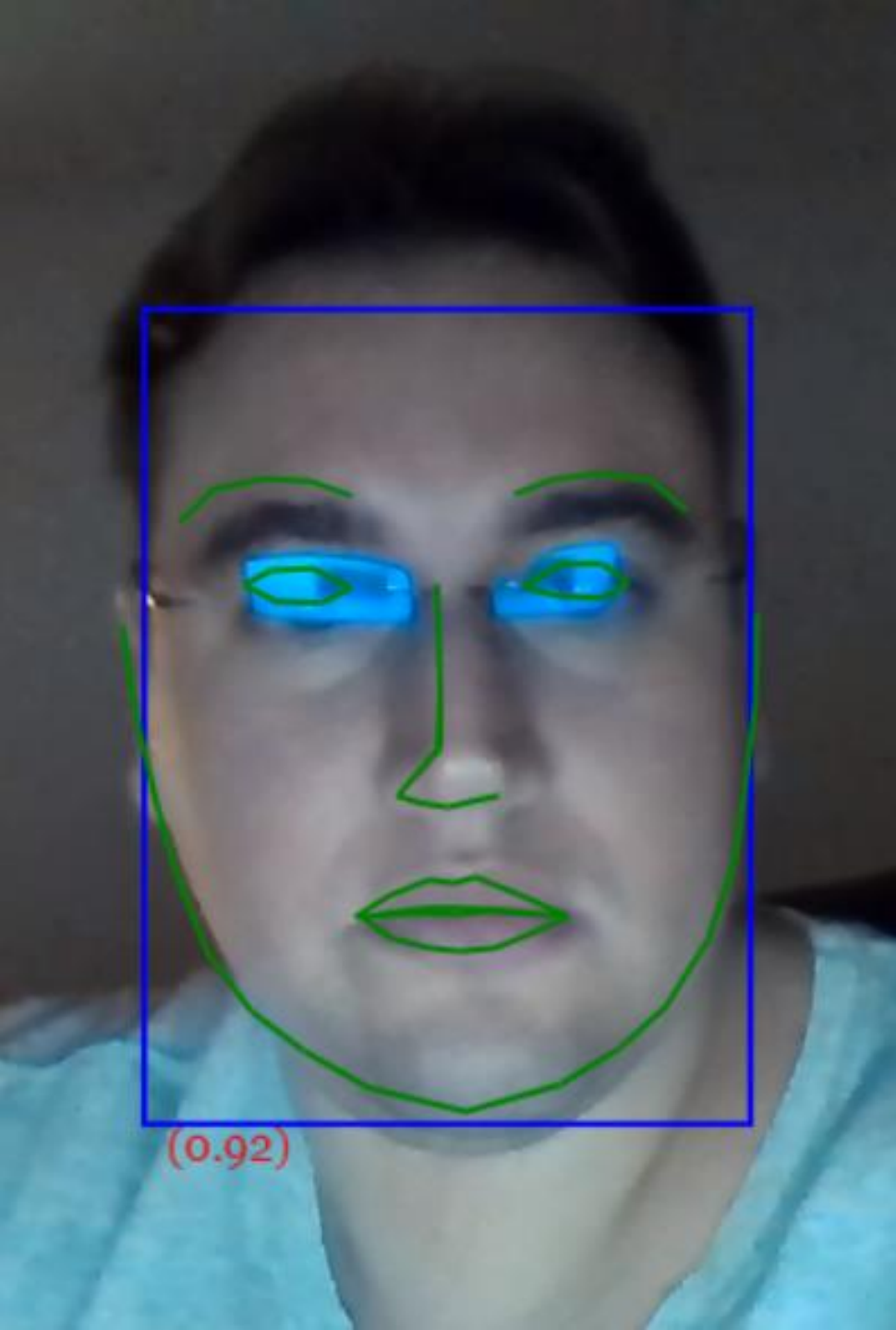
- Based on **Tesseract.js** (<https://tesseract.projectnaptha.com/>)
 - Supports more than 100 languages
- Examples

```
PAB256984 CORBE SN e PEREZ DT (2) Nombre/Given Names/Rénoms  
SUSANA (3} Nacionalded/NetionaltyNetionaito (1) Facha do nacimient/Dets of bt  
Dats de naesance ggsAfiOLA 08 06 1980 ( /Sex/Sexe (11yNo. e~ B  
A7109319800 {61 Lugar de nacimientoPlace of bith/List denajssivce  
SALAMANCA (SALAMANCA) ) {7)Focha de expedici6n Do o IssuaDate de  
tbiverance (8 Fechade caducdad Date . cxpry O dexpiraton (%)'lnm%m}mmms'  
stire/Sgnature d i M%\'Msmwfms oaa f : = DT~ 57507 h6P1 - 256960
```

OCR Passport Extraction

- Examples

LR Assinatura do titular / ighature du titulsire Lol = Bearer's signatuire / Fiuma:
del titular R N = & K e 1% 13 = 2 Este passaporte deve serassinado pelo fiuler,
!::' 2o == salvo em caso de incapacidade. i = > v' _ Ce posseport dott 2ire saré o
e titukare, : -l . sauf en cas ofi INCAPAGIHE, 3 o< u_ B This passport must be
signed, e T ——— exazpt where the bearer is inable to do s 5 - e Este pasaporte
debe sexfirmade porel tukr, -« s siver 5 salvo en caso de inéapacidad W A"
""ifi""%?f"" FEDERATIVA DO BRASIL e : PASSAPORTE P BRA FLat1S73 |
PASSPORT § .,.! m' T W.UGNQ\M»OURA VESGEIRL T vq,, S5 EDUARDO X i
NACIONALIDADE / NATIONALITY o BRASILEIRO(A) - B DATADE
NASCIMENTO / DATE OF BIRTH. DENTIDADE N * / PERSONAL Ne. R
29/Decl1984 ol — SEXO /86X % NATURALIDADE 7 PLACE OF BIRTH v N : . ™
RECIFE/PE i = T DATADE EXPEDICAQ / DATE OF ISSUE AUTORDADE {
AUTHORITY { Swwe o oricazpe BT anovi2ots S T b S e TR R MR A
ig'jfi; ,fi@%@gsfi&%fi:fifiga:fi:'g_fi-:;fi::;?-.-J.fi s v{" ".flqf@fl" T ;3-?4:"",1 LR i st R
A ey e N e bl N ç e



Video Face Recognition Feature

- Based on **face-api.js**
 - <https://justadudewhohacks.github.io/face-api.js/>
- Webcam required
- Passport as a lookup image
- Similarity of computed Euclidian distance
- Verification performed every second

Wallet Integration

- Import Face Models
 - Loading phase
 - Job Scheduler
- Unlock with your FaceID
 - Start webcam feed
 - Need to access passport image





SelfKey
@SelfKey

Identity theft is one of the fastest growing crimes in the world, affecting millions of people every year. Read on to learn how you can start protecting yourself against it and how blockchain technology will make a big impact. bit.ly/2ITPu2n



#selfkey #identitytheft
#crimes #blockchain
#technology #innovation

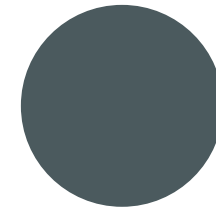
Wallet Integration

- Challenges
 - **Security** constraints?
 - How to access personal information without password or private key?
 - How to handle multiple wallets?
 - Identity theft?

- Possible Solutions

1. As an additional security option
 - Add face as pin code to unlock when wallet is idle
 - Similar to FingerID on mobile
2. Validate and increase security while updating identity attributes
3. Transaction confirmation feature

Next Steps



Questions & Answers

- Technical questions?
- New features proposal?
- Any additional thoughts?

Thank you!

