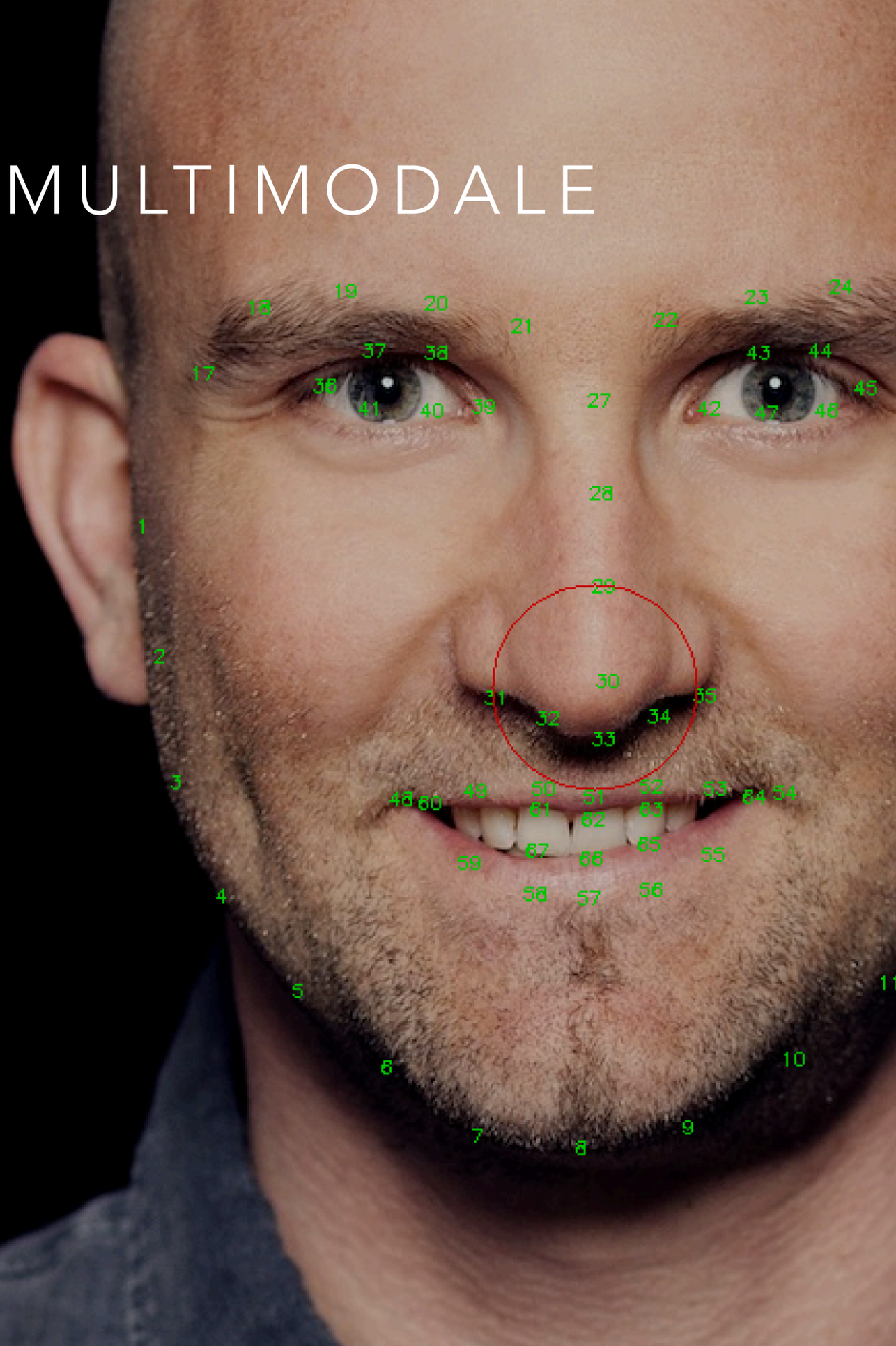
TELECOM PARISTECH - 2019

RECONNAISSANCE MULTIMODALE D'ÉMOTIONS



TELECOM ParisTech

X

pôle emploi

FIL ROUGE

CONTEXTE ET ENJEUX

CONTEXTE

- Informatique affective : *Etude et développement de systèmes ayant les capacités de reconnaître, d'exprimer, de synthétiser et modéliser les émotions humaines.*

- Notre approche
  - Plateforme d’entrainement aux entretiens pour les demandeurs d’emploi
  - Rapport de performance et analyse des traits de personnalité et des émotions du candidat

Interview Simulator

Video Interview

Use the video interview simulator and get a feedback on how our algorithm interprets your facial emotions compared to other candidates.

You will be provided a feedback on your facial emotions such as :

- Anger
- Happiness
- Fear
- Sadness
- Surprise
- Disgust

Video Interview

Audio Interview

Use the audio interview simulator and get a feedback on how our algorithm interprets your vocal emotions compared to other candidates.

You will be provided a feedback on your vocal emotions such as :

- Anger
- Happiness
- Fear
- Sadness
- Surprise
- Disgust

Audio Interview

Text Interview

Use the text interview simulator and get a feedback on how our algorithm interprets your psychological traits through compared to other candidates.

You will be provided a feedback on your Big Five Psychological traits, which include :

- Openness
- Conscientiousness
- Extraversion
- Agreeableness
- Neuroticism

Text Interview

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DÉROULEMENT

DÉROULEMENT

09.2018
Découverte du projet

10.2018
Premiers RDV, Littérature

12.2018
Exploration, Premiers modèles

02.2019
Modèles Améliorés

04.2019
Mise en prod des modèles, GitHub

05.2019
Web App

06.2019
Présentation à Nantes, Améliorations

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RESULTATS

QUELQUES CHIFFRES

1

WebApp

4

Contributeurs

25

Stars

6’000

Lignes de code

TECHNOLOGIES

TensorFlow

Keras

Flask

CSS

HTML

UN PROJET OPEN-SOURCE

GitHub

https://github.com/maelfabien/Multimodal-Emotion-Recognition

328 commits | 1 branch | 0 releases | 2 contributors

Branch: master | New pull request | Create new file | Upload files | Find File | Clone or download

maelfabien Update README.md — Latest commit e4ef760 14 minutes ago

Audio	Update README.md	5 hours ago
Models	New	2 months ago
Presentation	Add files via upload	5 hours ago
Text	Update README.md	5 hours ago
Video	Update README.md	5 hours ago
WebApp	Update README.md	14 minutes ago
README.md	Update README.md	5 hours ago
requirements.txt	j	10 days ago

README.md

Real-Time Multimodal Emotion Recognition

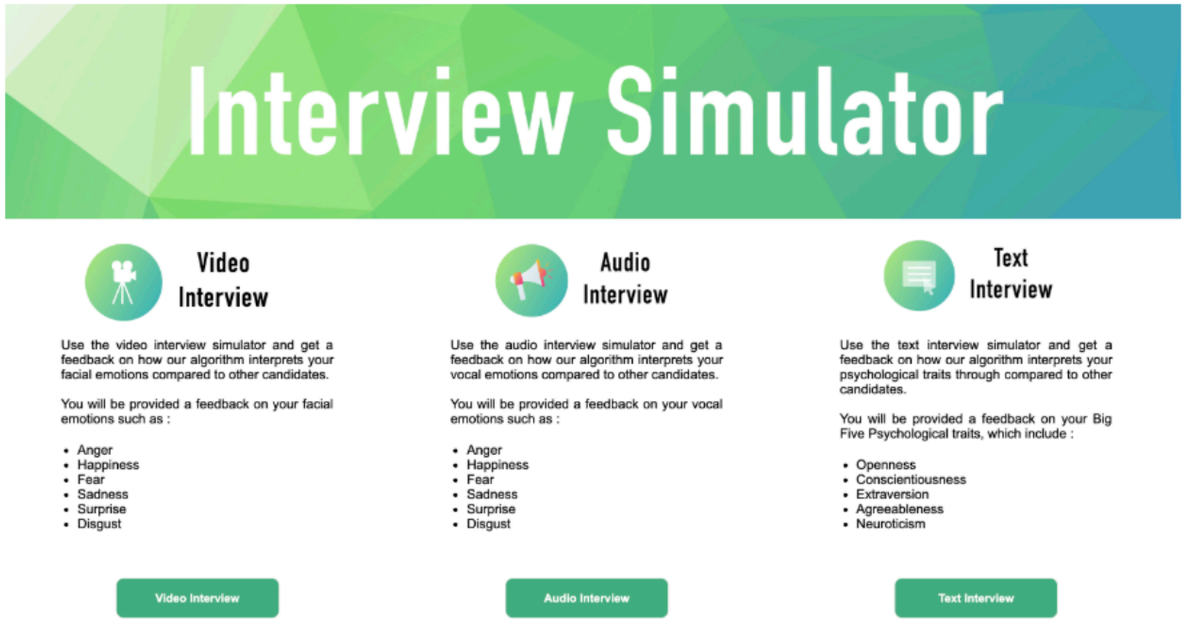
Followers 25 | contributors 4 | commit activity invalid | python 3.2 | 3.3 | 3.4

Don't hesitate to ⭐ the repo if you enjoy our work !

In a nutshell

We developped a multimodal emotion recognition platform to analyze the emotions of job candidates, in partnership with the French Employment Agency.

We analye facial, vocal and textual emotions, using mostly deep learning based approaches. We deployed a web app using Flask :



The tool can be accessed from the WebApp repository, by installing the requirements and launching `main.py`.

We have also written a paper on our work : https://www.overleaf.com/read/xvtrrfpvzwhf

RÉSULTATS

Texte	Audio	Video
53%	**75%**	**65%**

TEXTE

- Identifier des traits de personnalité (Big5) à partir de réponses à des questions spécifiques
- Natural Language Processing :
  - Pré-Traitement
  - Embedding
  - Classification

Text Interview

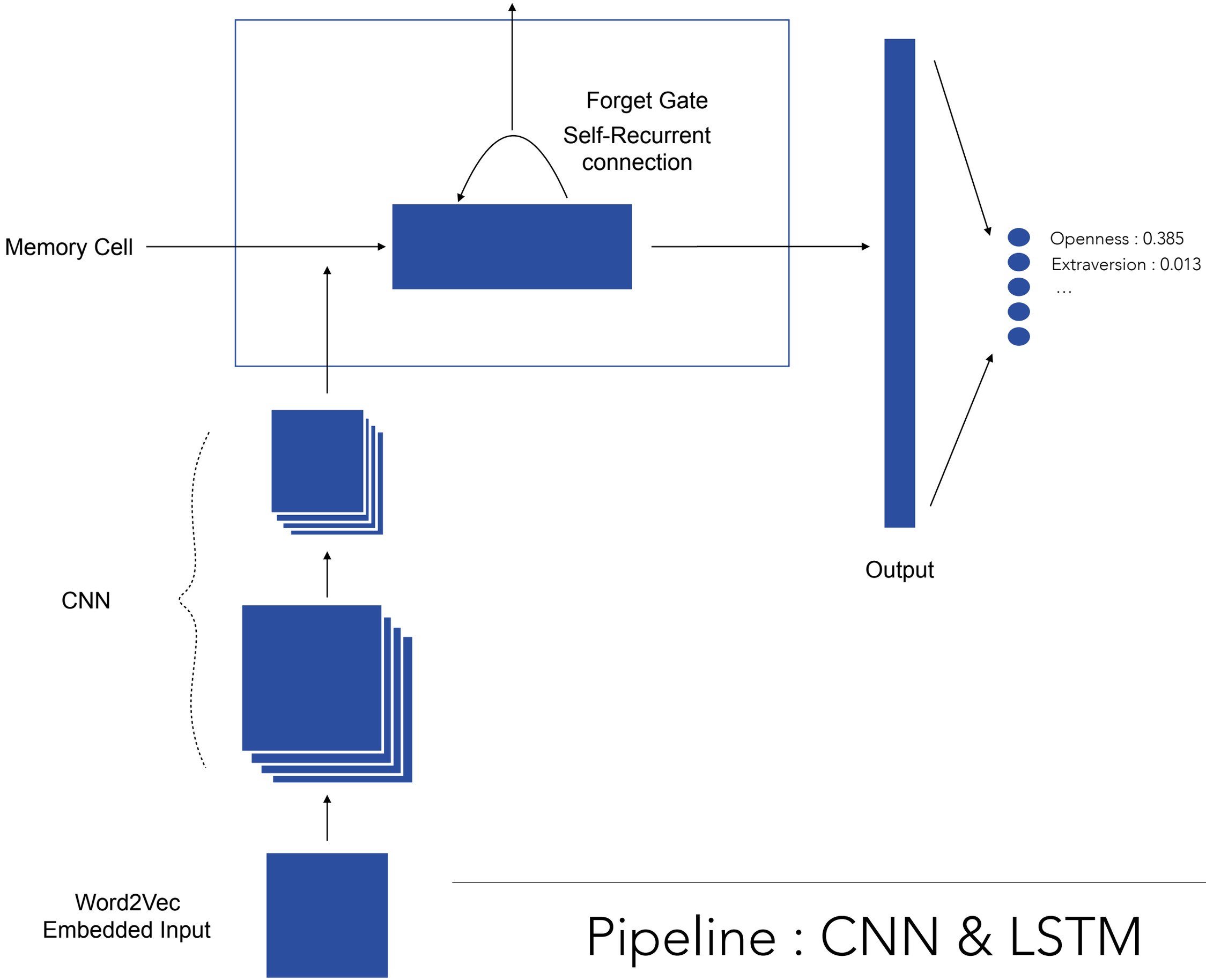
Tell us about the last time you showed leadership.

Start Analysis

Or upload your Cover Letter :

Choisir un fichier Aucun fichier choisi

Start Analysis



Pipeline : CNN & LSTM

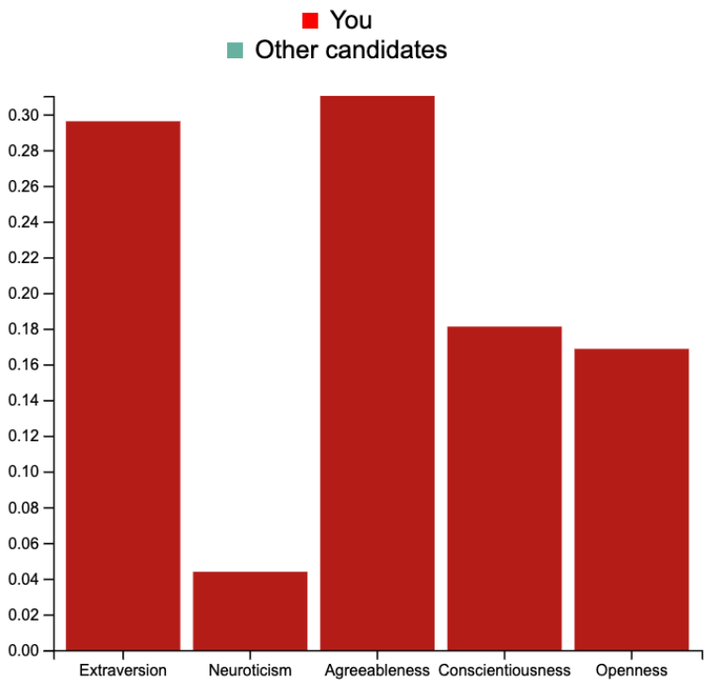
TEXTE

- Difficultés:
  - Très nombreuses options de **pré-traitement des données textuelles**
  - Corpus d’entrainement de relativement petite taille, en anglais

HISTORIQUE

BoW + SVM	LSTM	CNN & LSTM
38%	**45**%	**53**%

Perceived Psychological Traits



Your most visible trait is :

Agreeableness

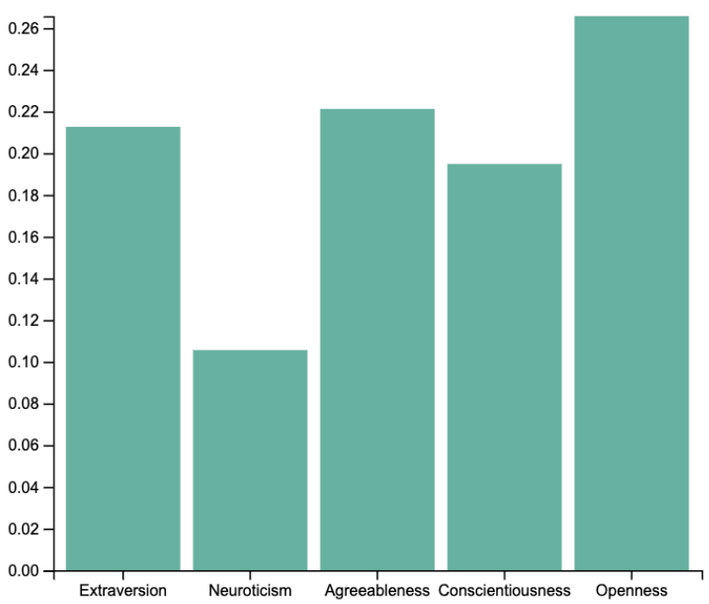
Psychological Traits :

- Extraversion : 29%
- Neuroticism : 4%
- Agreeableness : 31%
- Conscientiousness : 18%
- Openness : 16%

Most common words :

- project
- game
- team
- developer
- work
- individually
- apps
- downloaded
- top
- since
- outcome
- happy
- part
- progress
- monitor

Other candidates



Their most visible trait is :

Openness

Psychological Traits :

- Extraversion : 21%
- Neuroticism : 10%
- Agreeableness : 22%
- Conscientiousness : 19%
- Openness : 26%

Most common words :

- project
- deutsche
- bank
- work
- market
- team
- study
- cover
- also
- letter
- learning
- internship
- class
- student
- take

AUDIO

- Idée: identifier des émotions dans la voix.

- Méthode:
  - **Extraction** et **discrétisation** du signal audio
  - **Pré-traitement** du signal
  - **Classification** des émotions

- Modèle:
  - Variable: *Spectrogram*
  - Classifieur: *CNN+LSTM*

Audio Interview

Tell us about the last time you showed leadership.

Start Recording

After pressing the button above, you will have 15sec to answer the question. ✖

How does it work ?

Back

Audio Interview

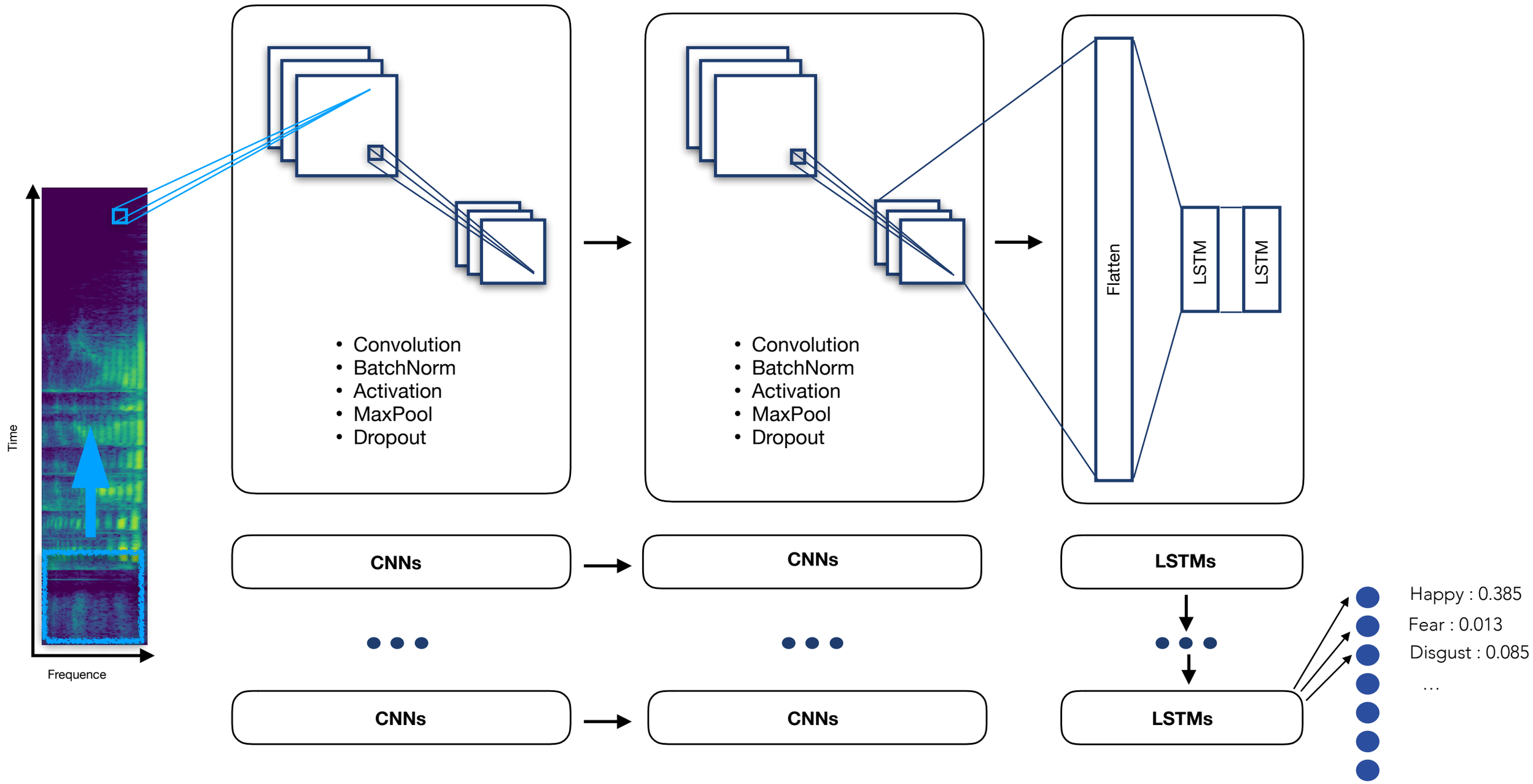
Tell us about the last time you showed leadership.

Start Recording

The recording is over! You now have the opportunity to do an analysis of your emotions. If you wish, you can also choose to record yourself again. ✖

Get Emotion Analysis

How does it work ?



Pipeline : CNNs & LSTMs

AUDIO

- Difficultés:
  - **Spectrogramme** le plus « propre » possible
  - **Architecture** la plus performante
- Solutions:
  - Suppression des fréquences **> 4k Hz**
  - **Augmentation** des données d'apprentissage
  - Distinction de **genre**

HISTORIQUE

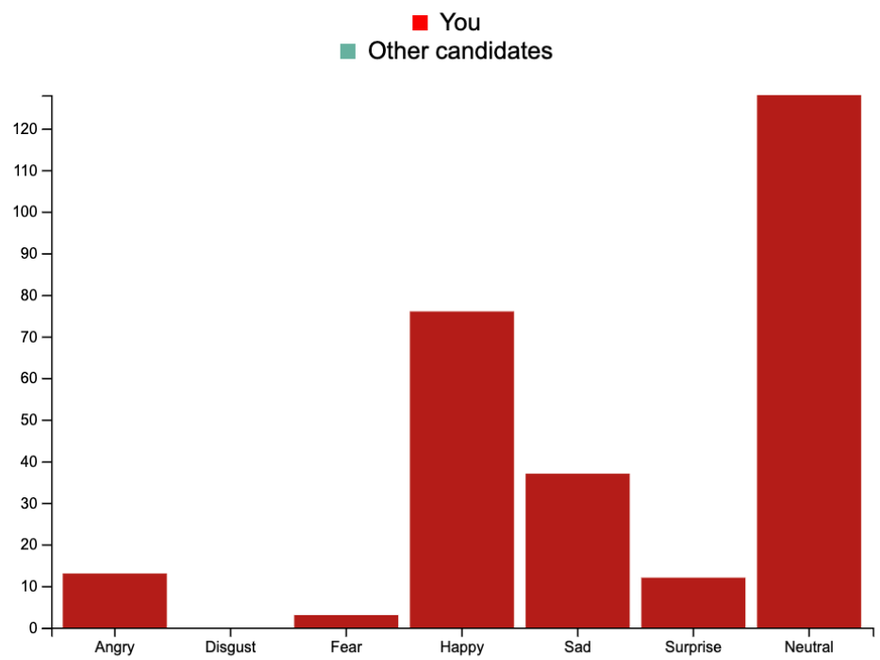
SVM

71%

CNN & LSTM

75%

Perceived emotions



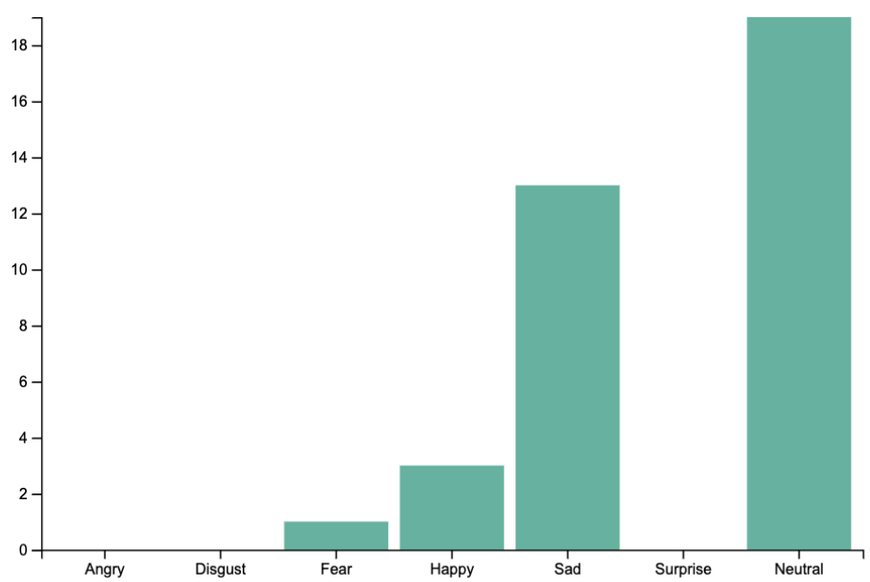
Facial Emotions

Your most frequent emotion is :

Neutral

- Anger : 0%
- Disgust : 0%
- Fear : 2%
- Happiness : 8%
- Sadness : 36%
- Surprise : 0%
- Neutrality : 52%

Other candidates



Other candidates most frequent emotion is :

Neutral

- Angry : 4%
- Disgust : 0%
- Fear : 1%
- Happy : 28%
- Neutral : 13%
- Sad : 4%
- Surprise : 47%

VIDEO

- Identifier des émotions à partir d'une vidéo
- Traitement de l'image :
  - Pré-Traitement de l'image : Identification, extraction du visage
  - Filtres manuels + SVM
  - CNN, XCeption

Video Interview

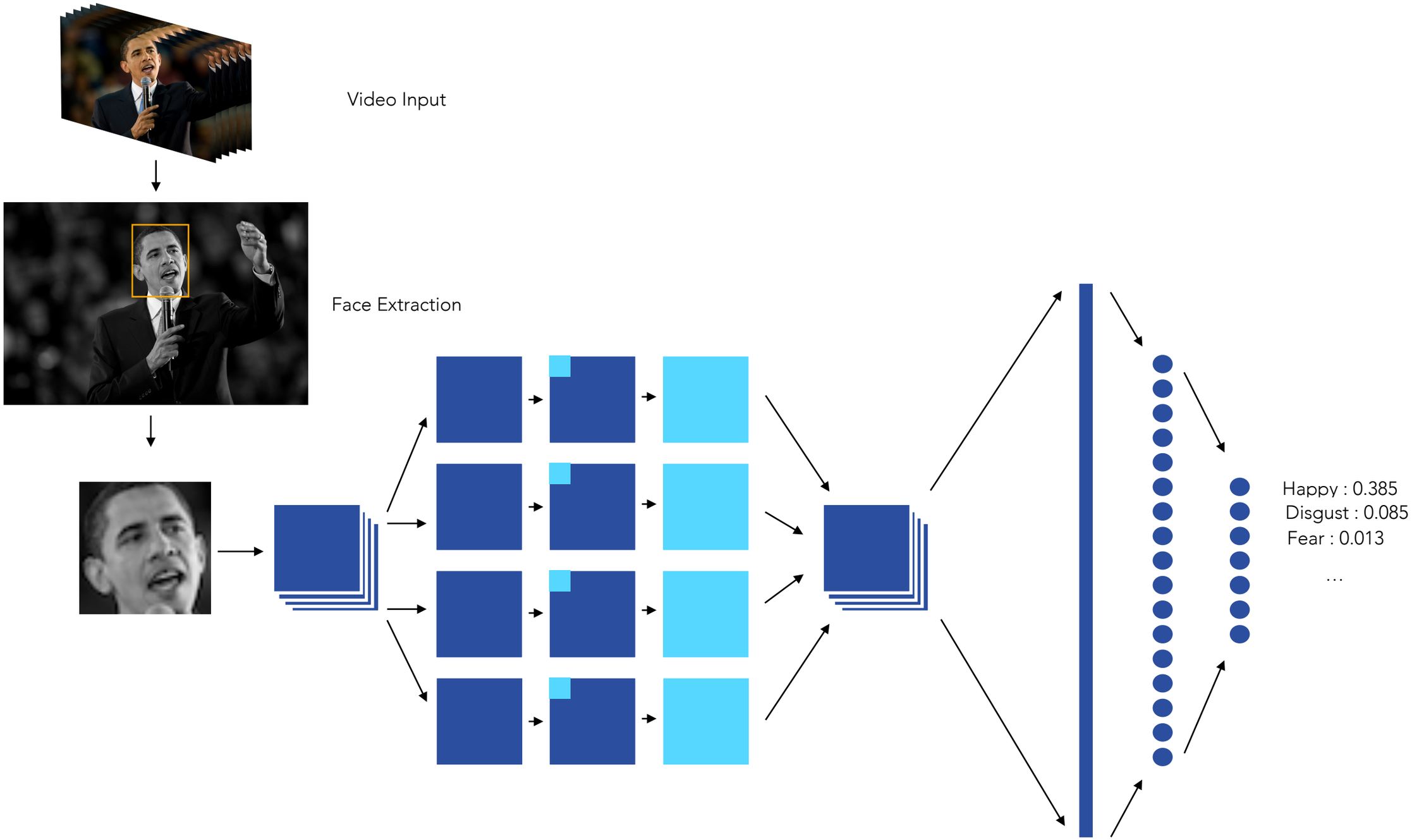
Tell us about the last time you showed leadership.

Start Recording

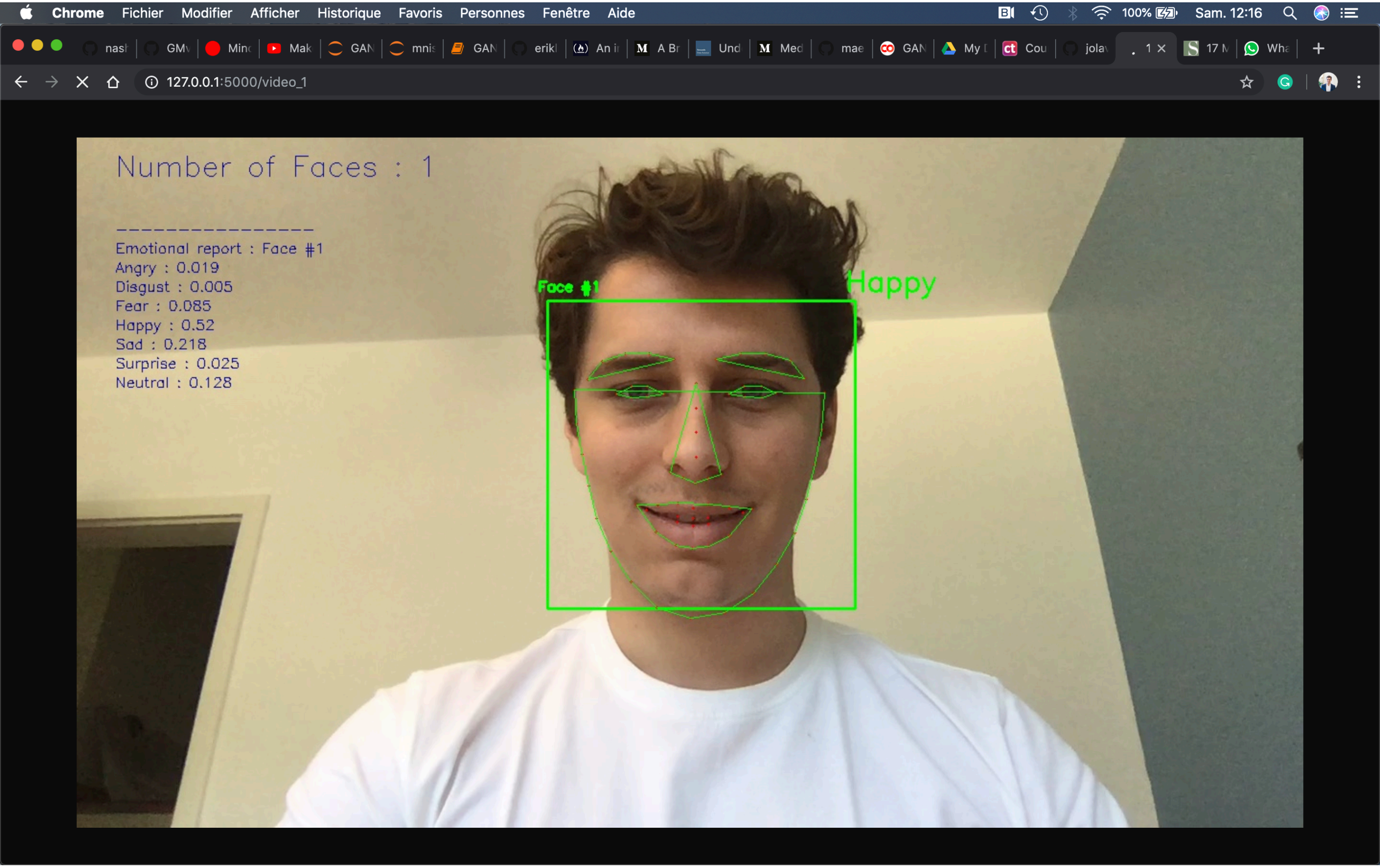
You will have 45 seconds to discuss the topic mentioned above. Due to restrictions, we are not able to redirect you once the video is over. Please move your URL to /video_dash instead of /video_1 once over. You will be able to see your results then. ✖

How does it work ?

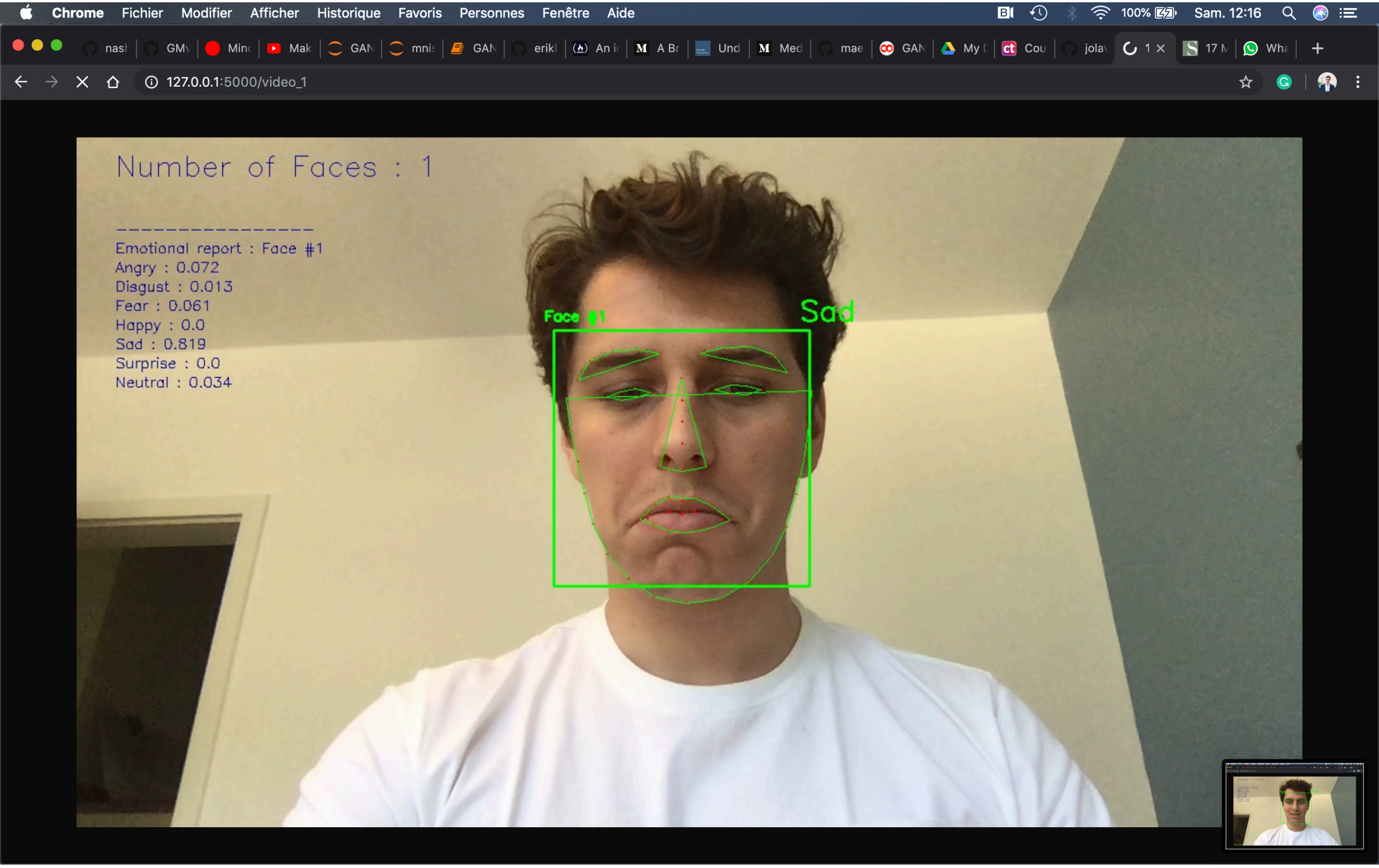
Back



Pipeline : HoG & XCeption


Chrome Fichier Modifier Afficher Historique Favoris Personnes Fenêtre Aide
100% Sam. 12:16
127.0.0.1:5000/video_1
Number of Faces : 1

Emotional report : Face #1
Angry : 0.019
Disgust : 0.005
Fear : 0.085
Happy : 0.52
Sad : 0.218
Surprise : 0.025
Neutral : 0.128
Face #1
Happy

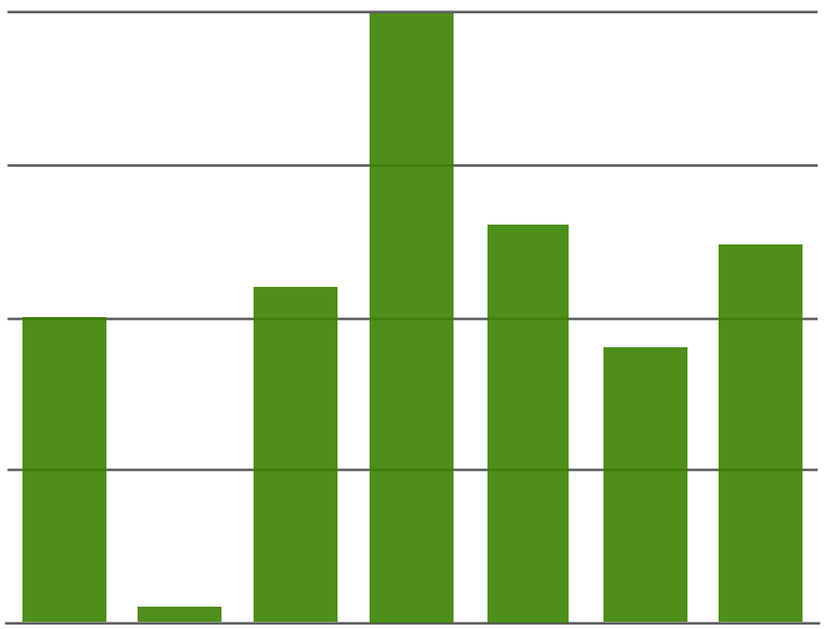

Chrome Fichier Modifier Afficher Historique Favoris Personnes Fenêtre Aide
100% Sam. 12:16
127.0.0.1:5000/video_1
Number of Faces : 1

Emotional report : Face #1
Angry : 0.072
Disgust : 0.013
Fear : 0.061
Happy : 0.0
Sad : 0.819
Surprise : 0.0
Neutral : 0.034
Face #1
Sad

VIDEO

- Difficultés:
  - **Label des données** d'entrainement
  - **Passage à l'échelle** (images/secondes)

- Solutions:
  - Data Augmentation
  - Early Stopping
  - Réduction du « Learning Rate » sur plateau
  - L2-Regularization
  - Class Weight



VIDEO

- Difficultés:
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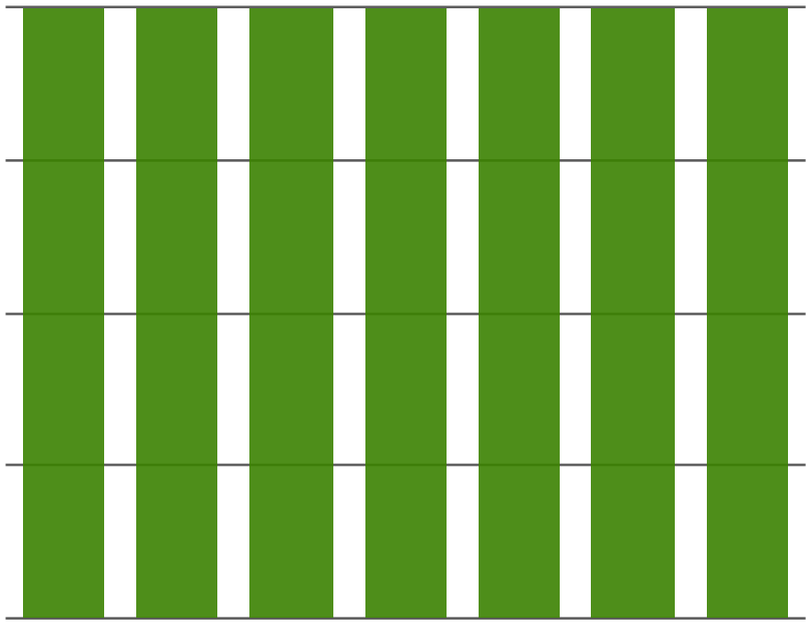
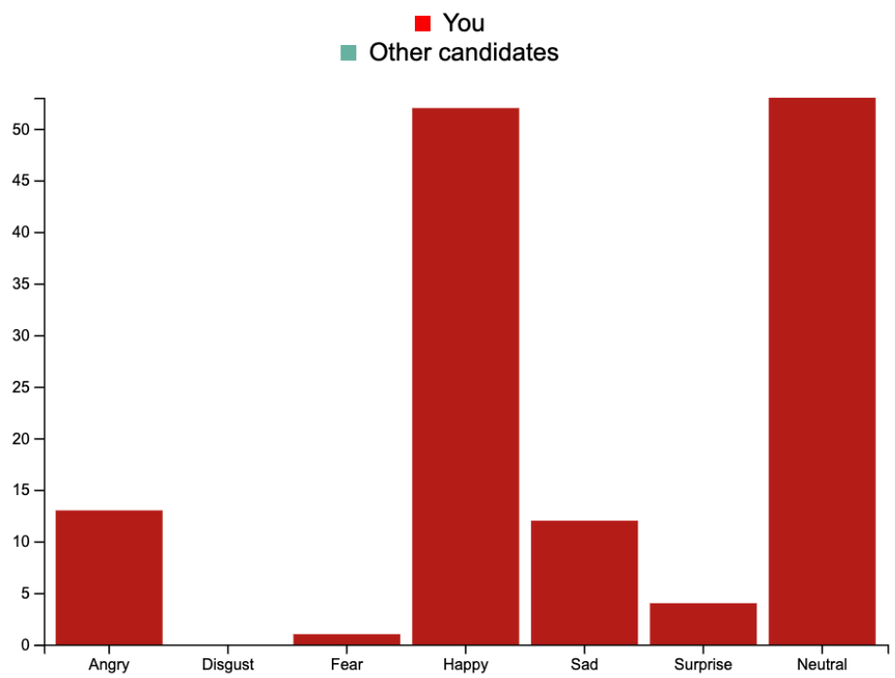


HISTORIQUE

Filtres & SVM	CNN	XCeption
49%	**59%**	**65%**

Perceived emotions



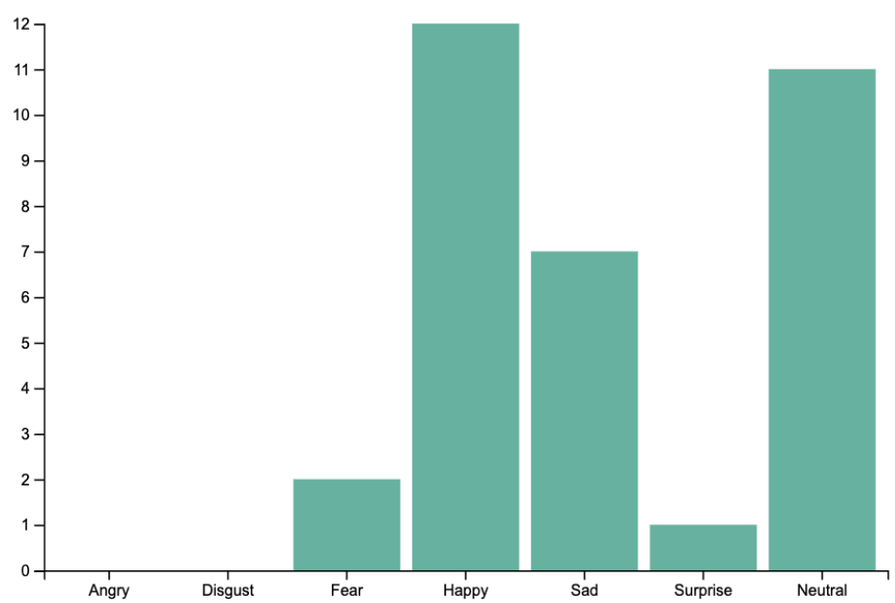
Facial Emotions

Your most frequent emotion is :

Neutral

- Anger : 0%
- Disgust : 0%
- Fear : 0%
- Happiness : 24%
- Sadness : 36%
- Surprise : 0%
- Neutrality : 39%

Other candidates



Other candidates most frequent emotion is :

Happy

- Angry : 7%
- Disgust : 0%
- Fear : 1%
- Happy : 38%
- Neutral : 11%
- Sad : 2%
- Surprise : 38%

FIL ROUGE

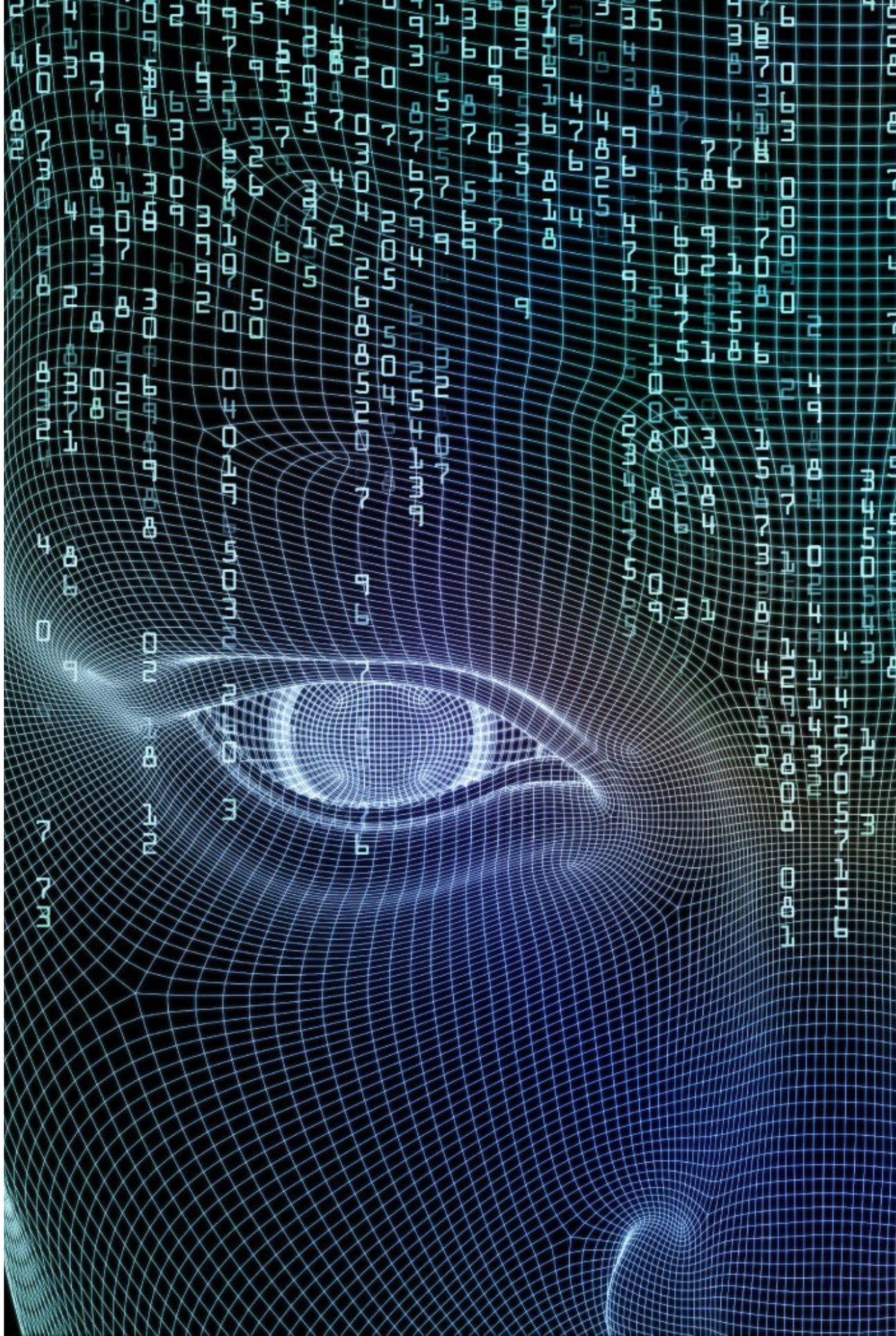
PERSPECTIVES

AMÉLIORATIONS

- Déploiement de la Web App en ligne
- Meilleure visualisation avec D3.js
- Mise en place de bases de données SQL pour les scores des candidats
- Fluidifier l’app Flask

FIL ROUGE

CONCLUSION



DONNÉES

- Entrainement des modèles à partir d'Open Data :
  - *Texte : Pennebaker and King daily essays (1999)*
  - *Audio : The Ryerson Audio-Visual Database of Emotional Speech and Song (RAVDESS)*
  - *Video : Facial Emotion Recognition 2013, Kaggle*

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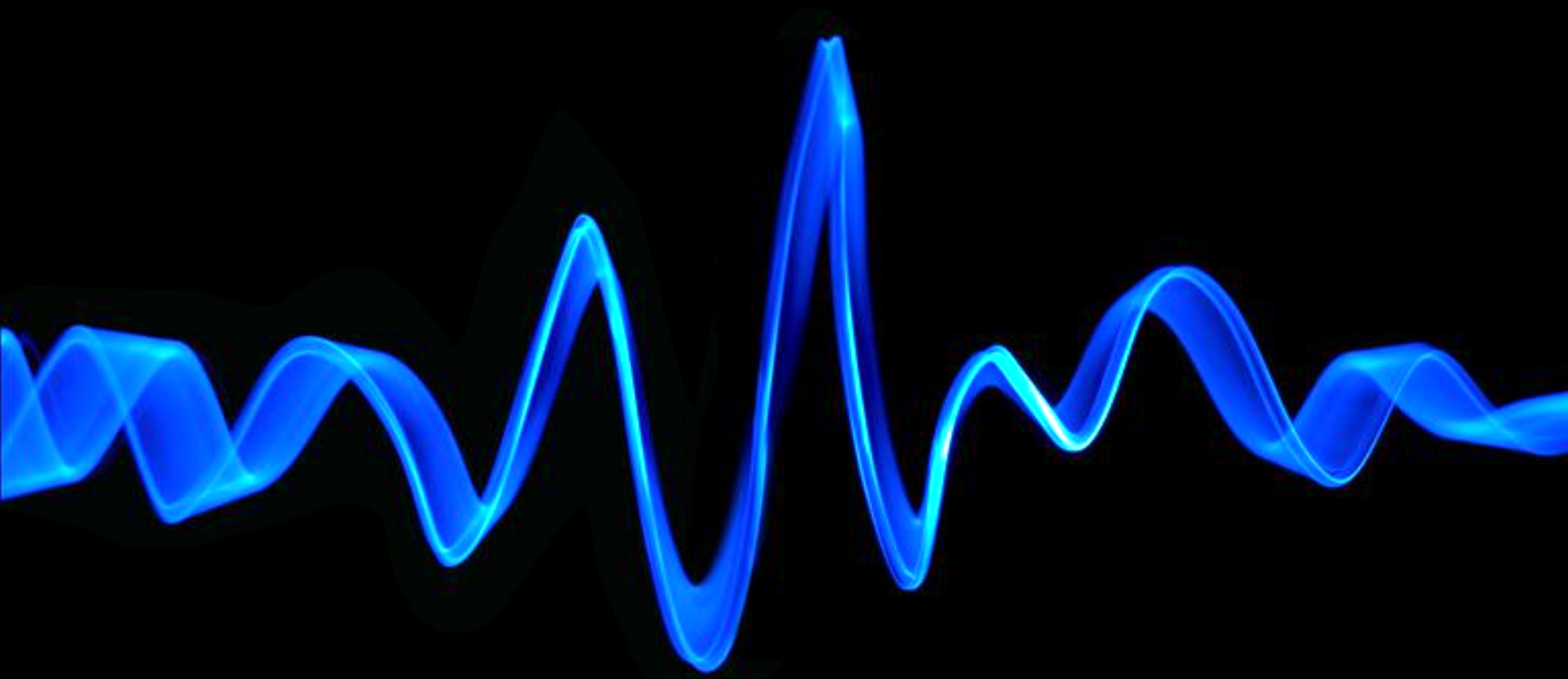
MULTIMODAL EMOTION RECOGNITION