

TELECOM PARISTECH - 2019

RECONNAISSANCE MULTIMODALE D'ÉMOTIONS



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'entraînement 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

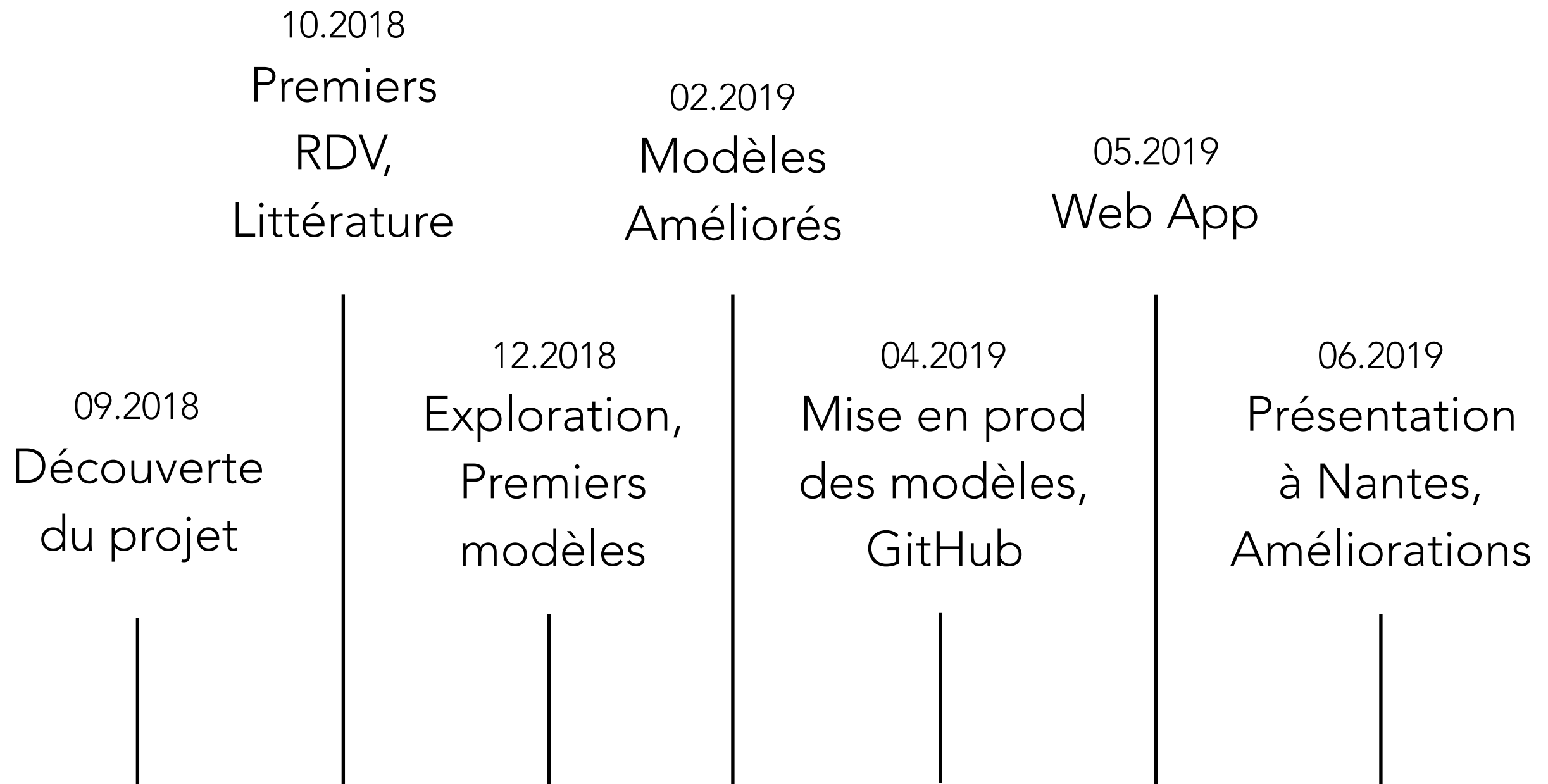
Text Interview

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DÉROULEMENT

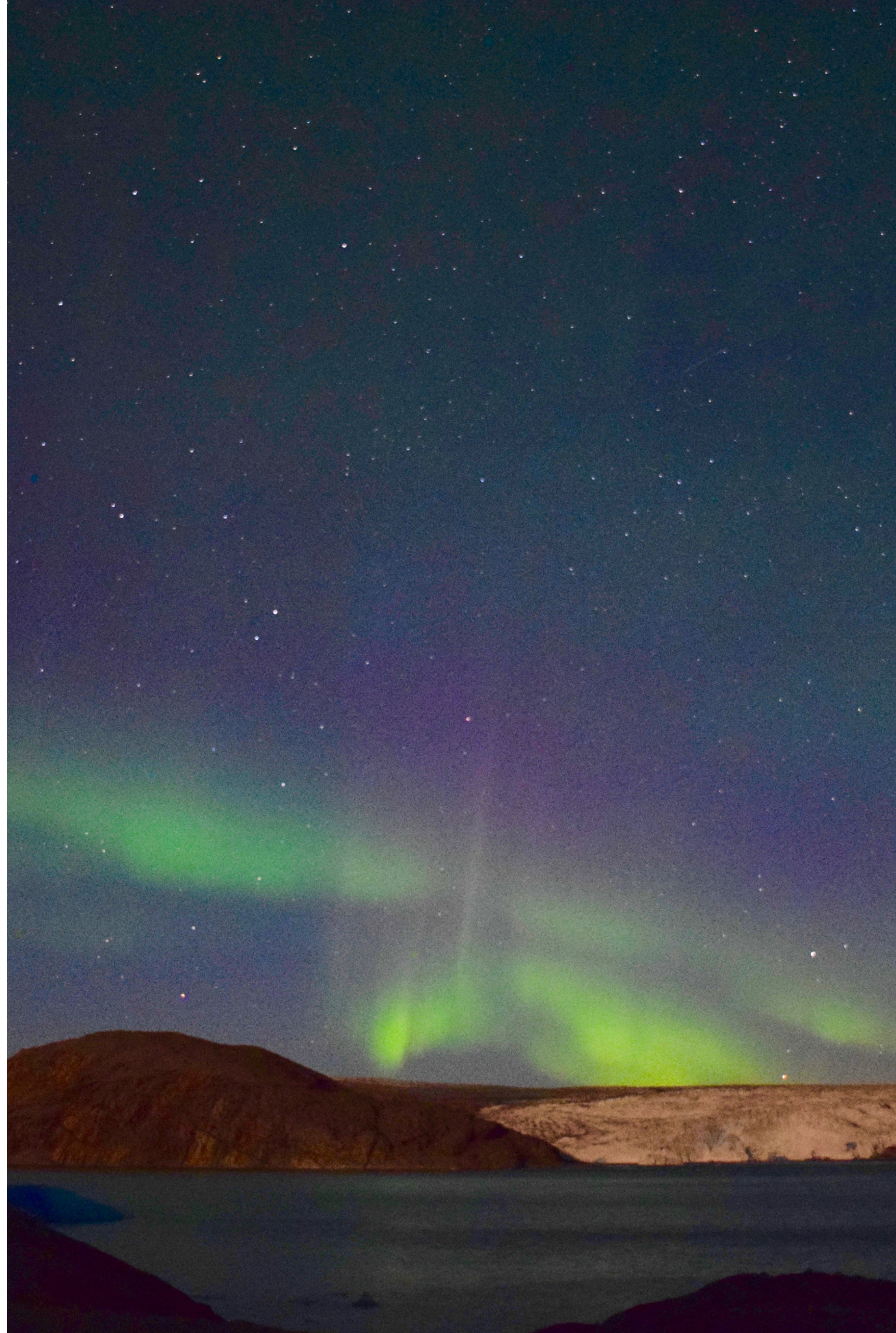


DÉROULEMENT



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RESULTATS



QUELQUES CHIFFRES

1

WebApp

1

Présentation
à Nantes

9

Technologies

6'000

Lignes de code

TECHNOLOGIES



Flask



UN PROJET OPEN-SOURCE



GitHub

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

328 commits1 branch0 releases2 contributors

Branch: masterNew pull requestCreate new fileUpload filesFind FileClone or download

maelfabien Update README.mdLatest 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

Followers25 contributors4commit activityinvalidpython 3.2 | 3.3 | 3.4

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

In a nutshell

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

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

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Text Interview

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

53%

Audio

75%

Video

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.

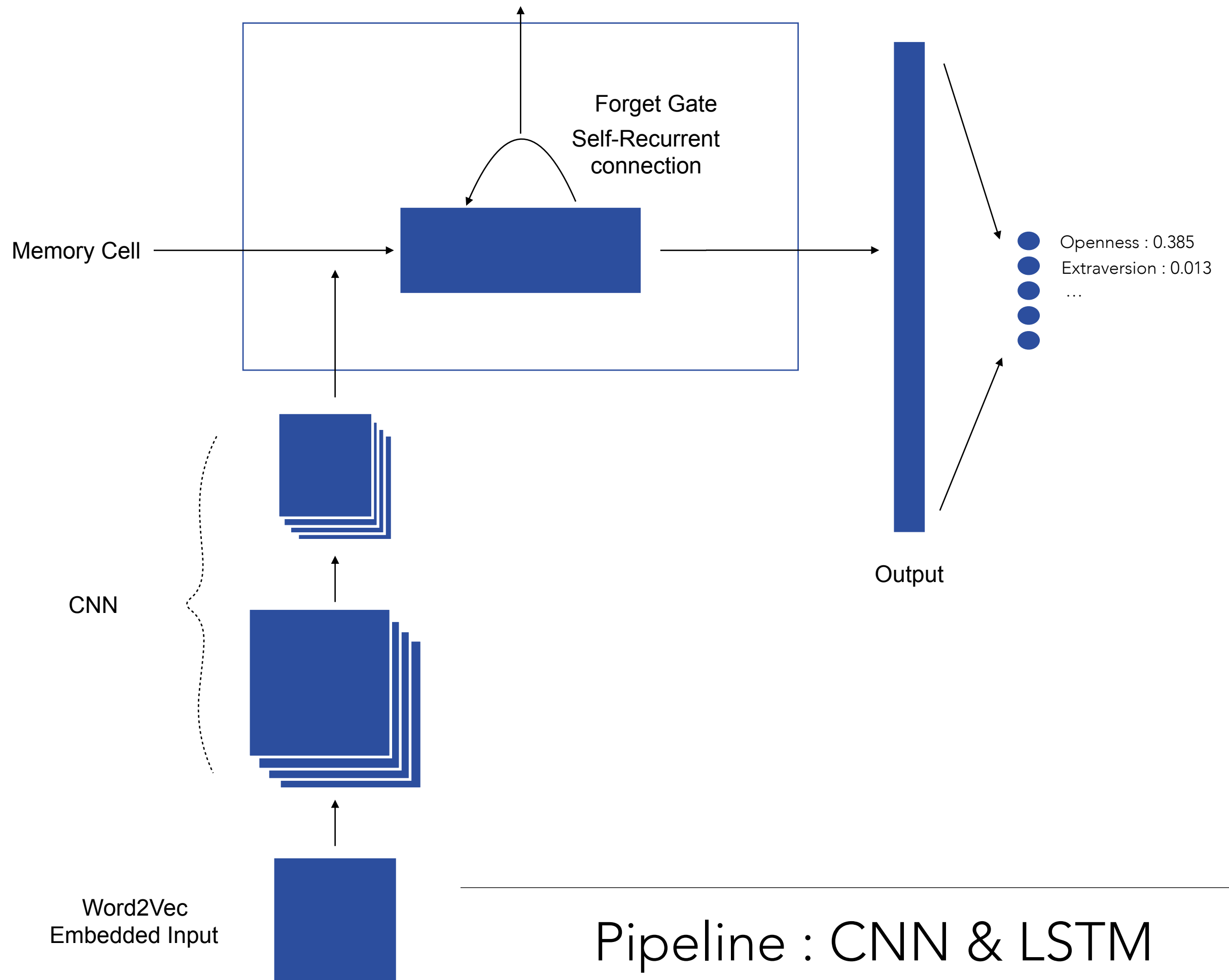
Start Analysis

Or upload your Cover Letter :

Choisir un fichier

Aucun fichier choisi

Start Analysis



TEXTE

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

HISTORIQUE

BoW + SVM

38%

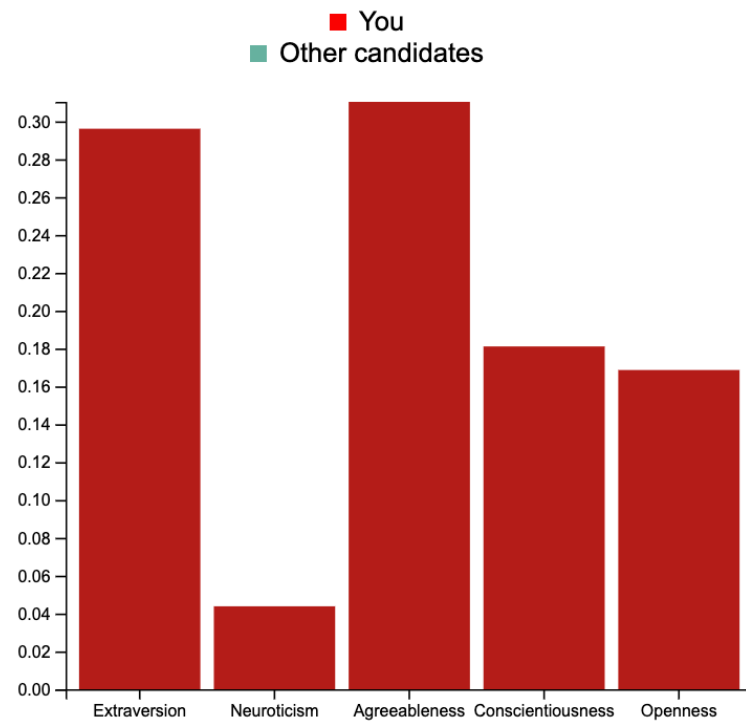
LSTM

45%

CNN & LSTM

53%

Perceived Psychological Traits



Your most visible trait is :

Agreeableness

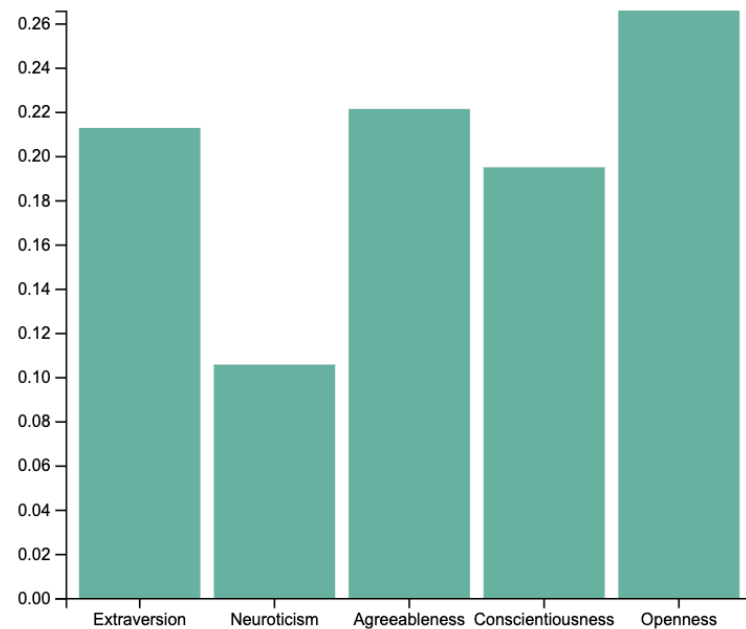
Psychological Traits :

- 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

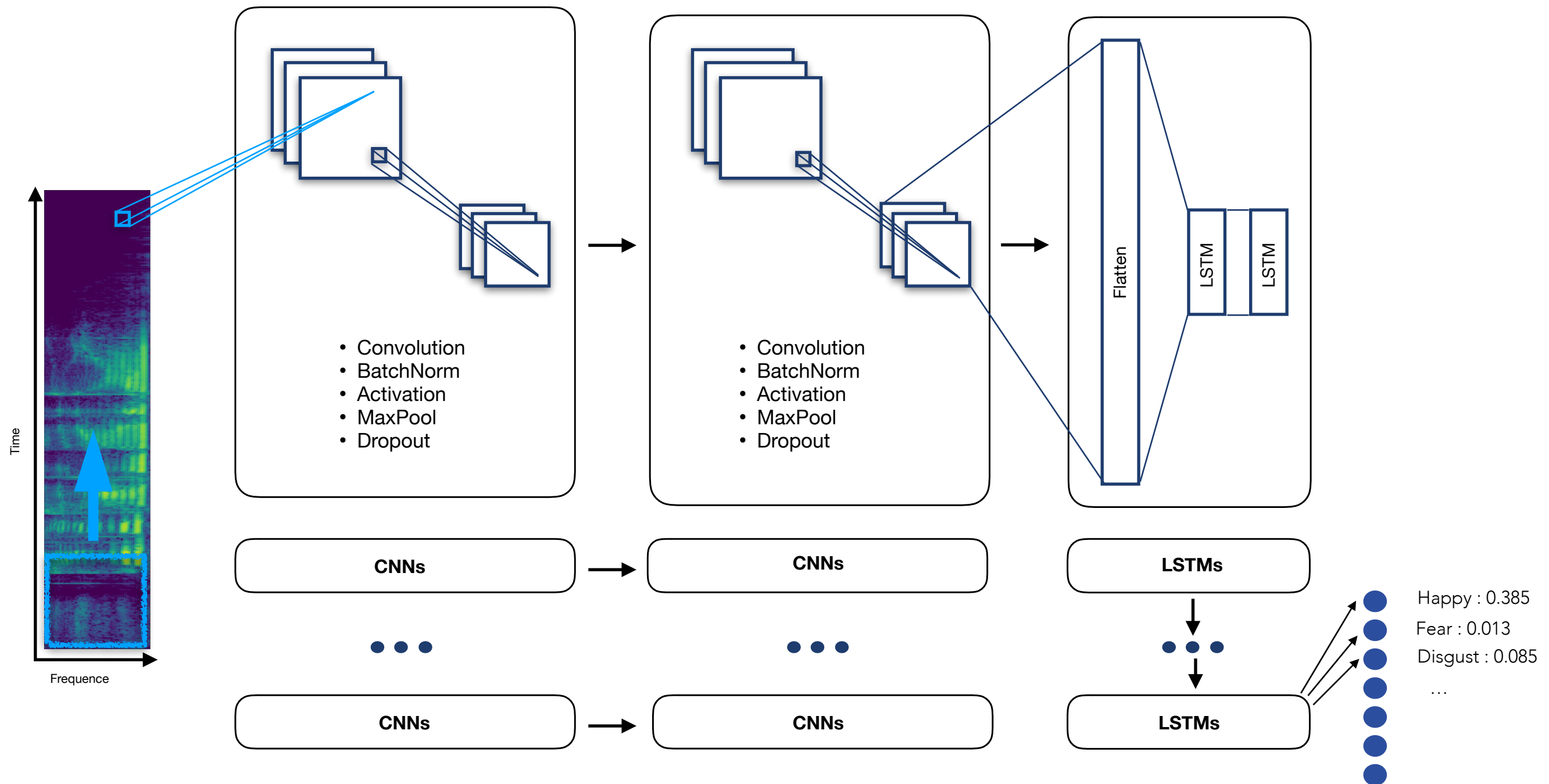
Tell us about the last time you showed leadership.

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

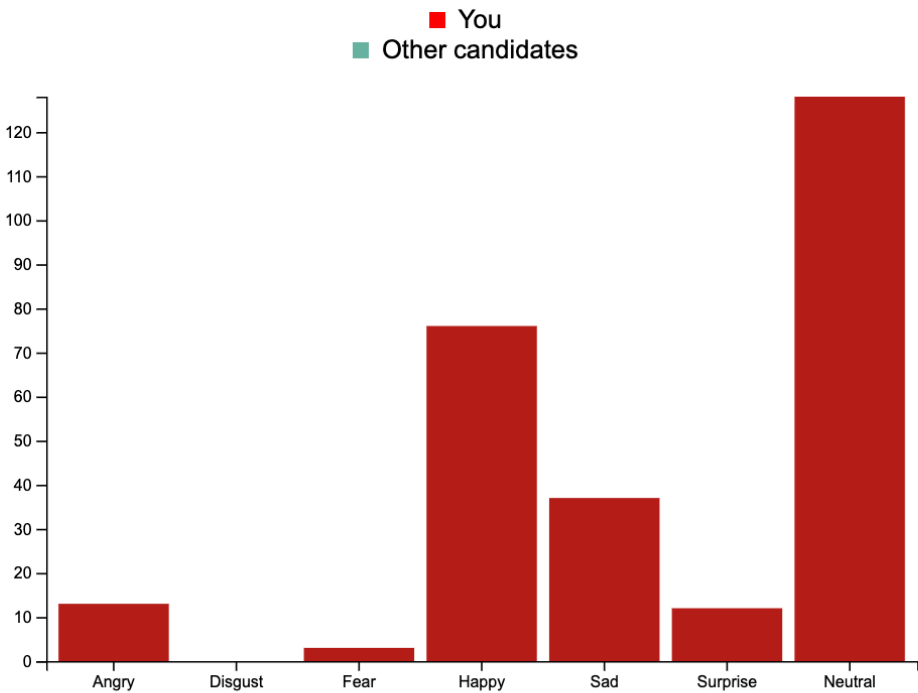
SVM

71%

CNN & LSTM

75%

Perceived emotions



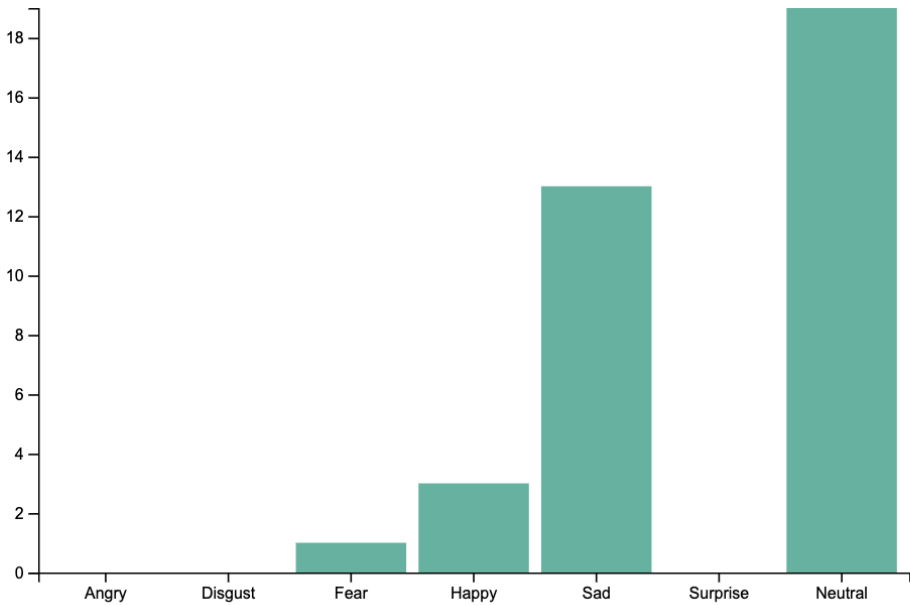
Facial Emotions

Your most frequent emotion is :

Neutral

- Angry : 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, XCception

Video Interview

Tell us about the last time you showed leadership.

Start Recording

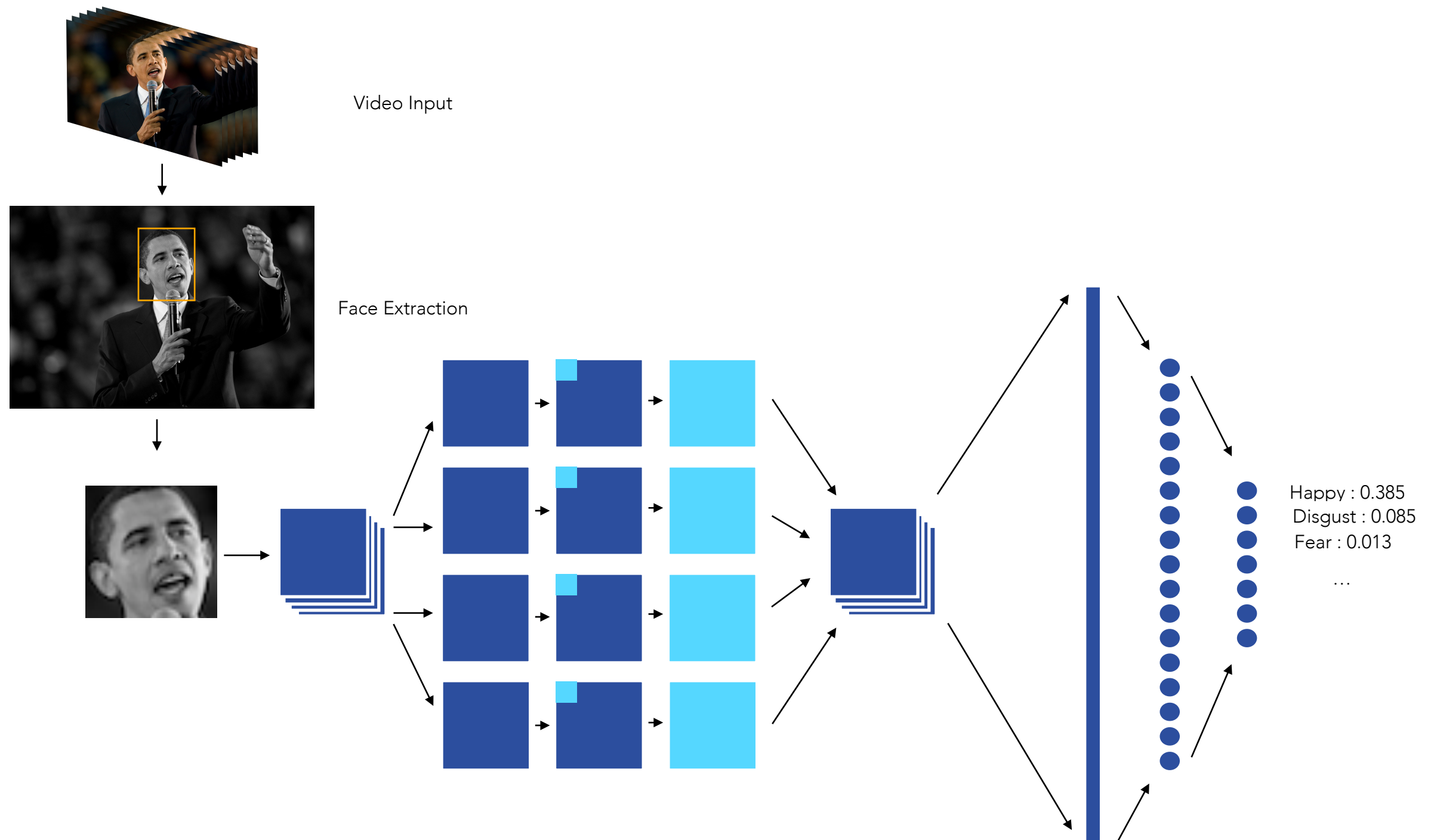
You will have 45 seconds to discuss the topic mentioned above. Due to restrictions, we are not able to redirect you once the video is over. Please move your URL to /video_dash instead of /video_1 once over. You will be able to see your results then. ✕

[How does it work ?](#)

Back

VIDEO

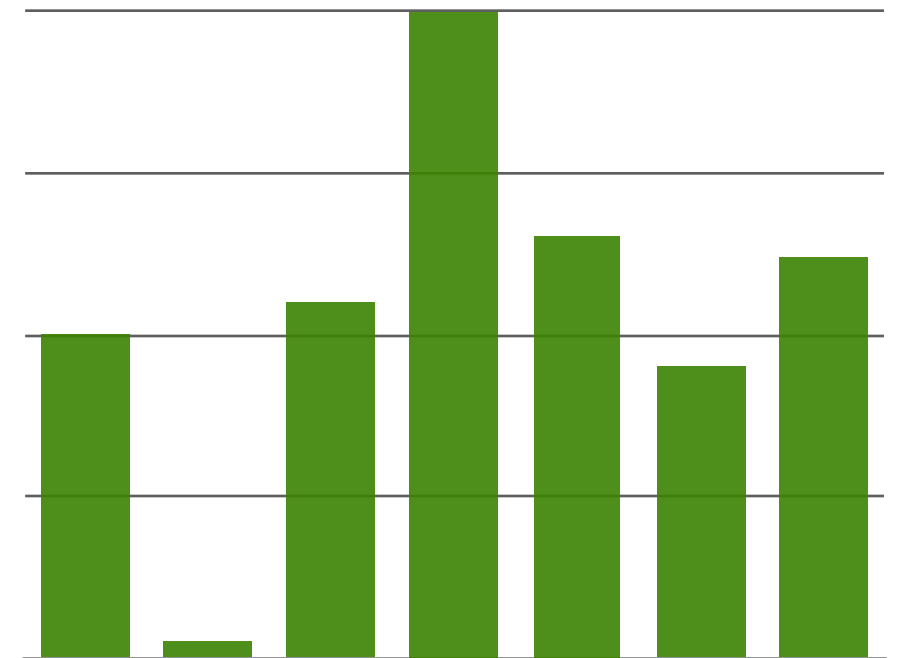
- Identifier des émotions à partir d'une vidéo
- Traitement de l'image :
 - Pré-Traitement de l'image : Identification, extraction du visage
 - Filtres manuels + SVM
 - CNN, XCception



Pipeline : HoG & XCeption

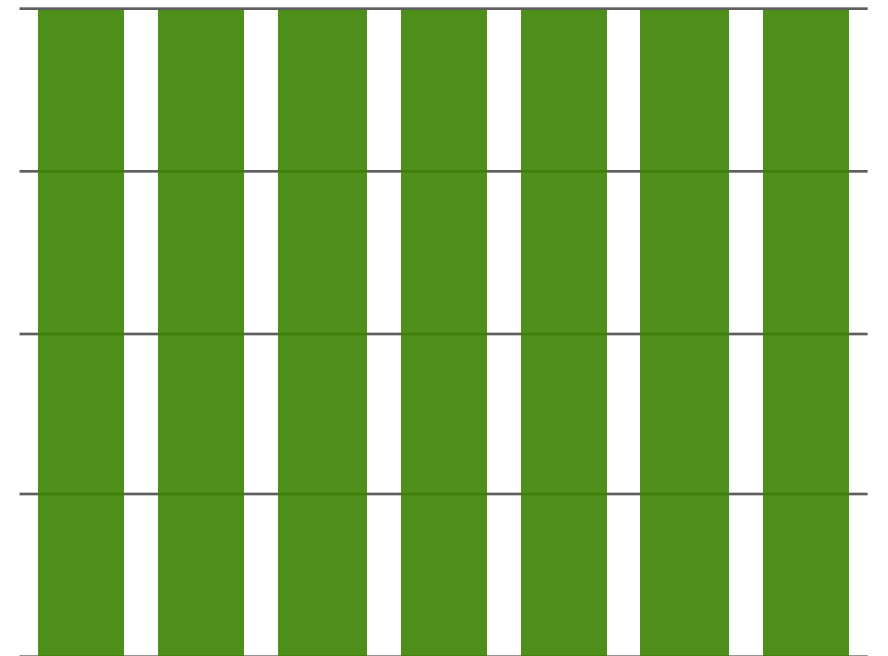
VIDEO

- Difficultés:
 - **Label des données** d'entraînement
 - **Passage à l'échelle** (images/secondes)
- Solutions:
 - Data Augmentation
 - Early Stopping
 - Réduction du « Learning Rate » sur plateau
 - L2-Regularization
 - Class Weight



VIDEO

- Difficultés:
 - **Label des données** d'entraînement
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HISTORIQUE

Filtres & SVM

49%

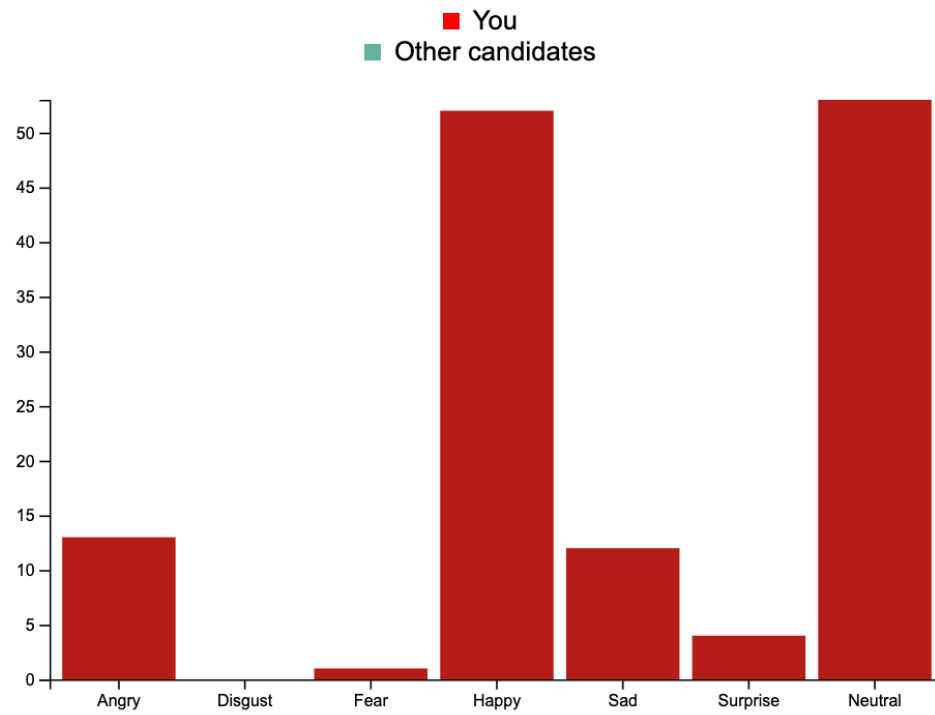
CNN

59%

XCeption

65%

Perceived emotions



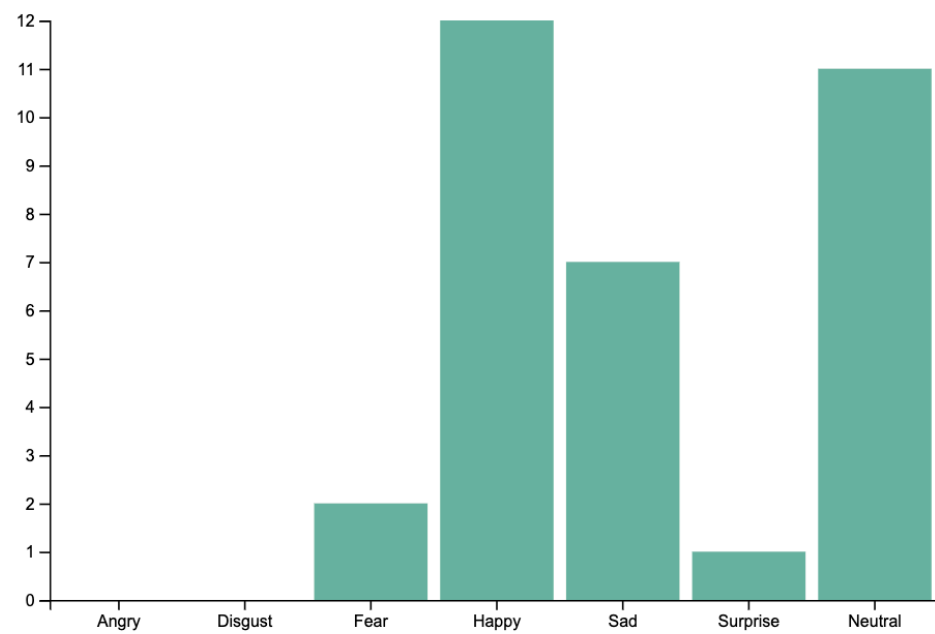
Facial Emotions

Your most frequent emotion is :

Neutral

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

Other candidates



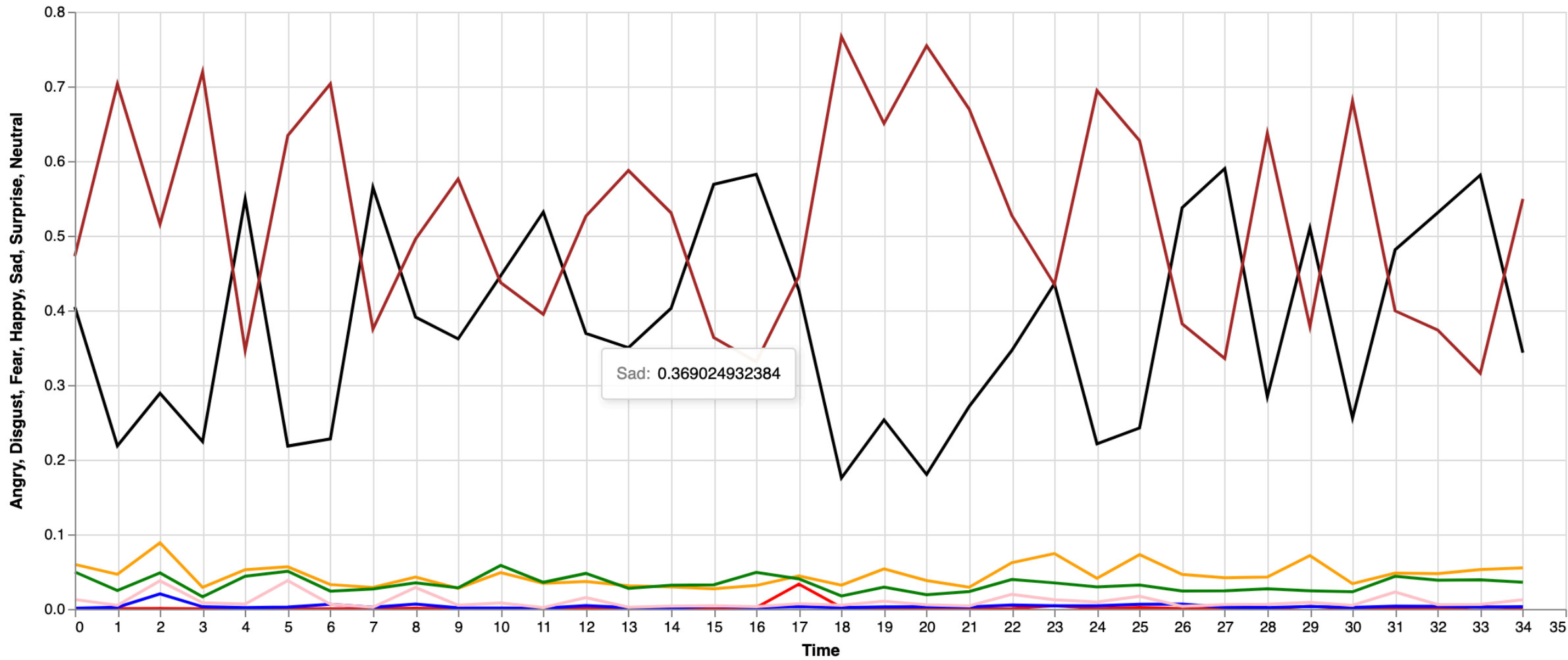
Other candidates most frequent emotion is :

Happy

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

Over time

Probability of each emotion over time



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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

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CONCLUSION



DONNÉES

- Entraînement 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

