Emotion Classification for Banijay

Enhancing Media Analysis with NLP

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Project objective

Client goals

- Understand what engages the audience
- Content classification tool
- Analyze shows by the minute

Banijay

RIVERS
media consultants

Banijay & Expeditie Robinson

Solution

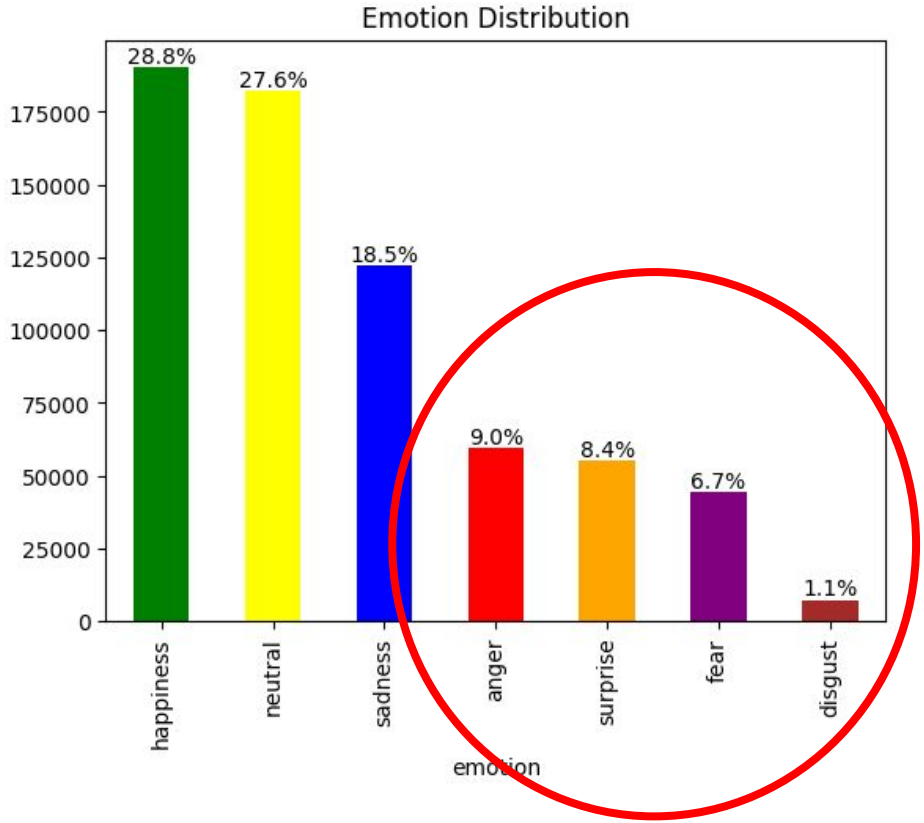
- Build an emotion classification pipeline
  - Speech-to-Text
  - Emotion classification
- Apply to Expeditie Robinson data

Project Overview

Collecting Data

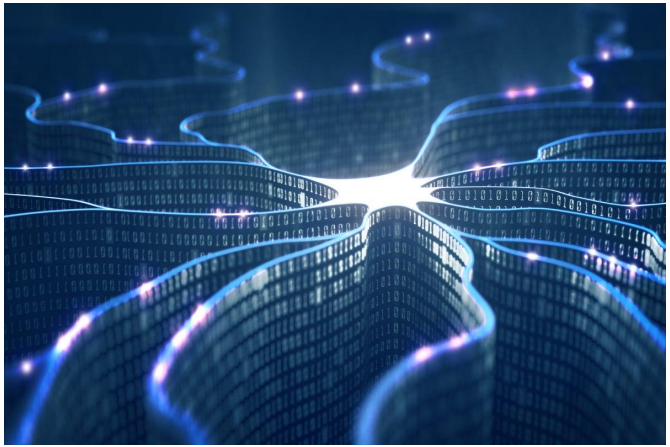
Internet

- GoEmotions
- SMILE Twitter Emotion Dataset
- Friends emotion-labeled dialogues
- MELD
- CARER
- Affective Text
- Daily Dialogue
- EmoBank
- Affect Data
- Google dataset search

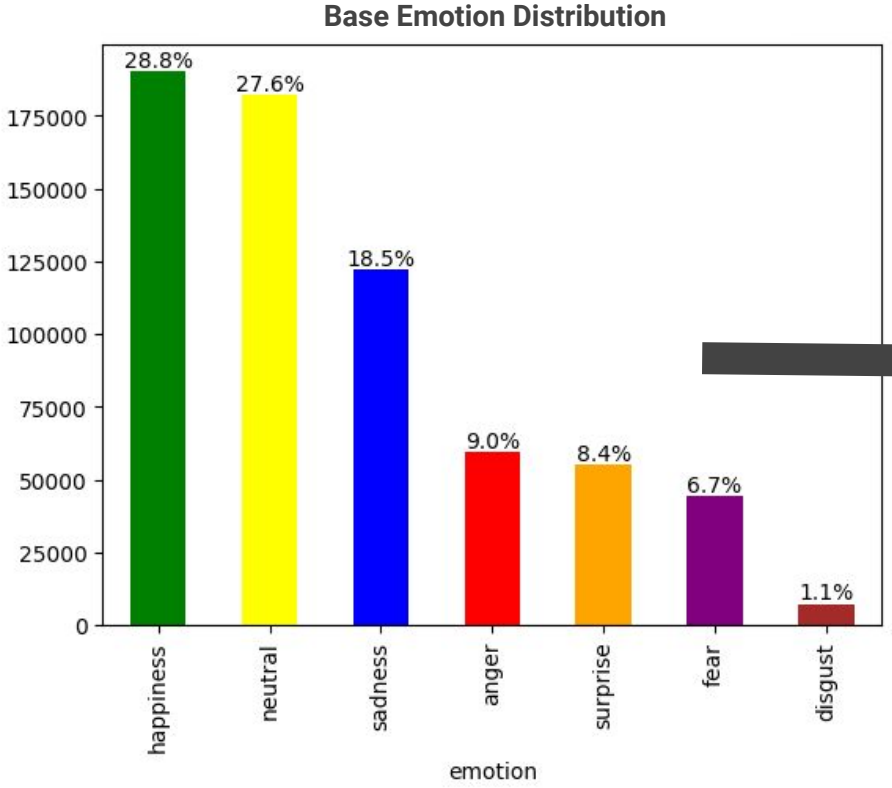


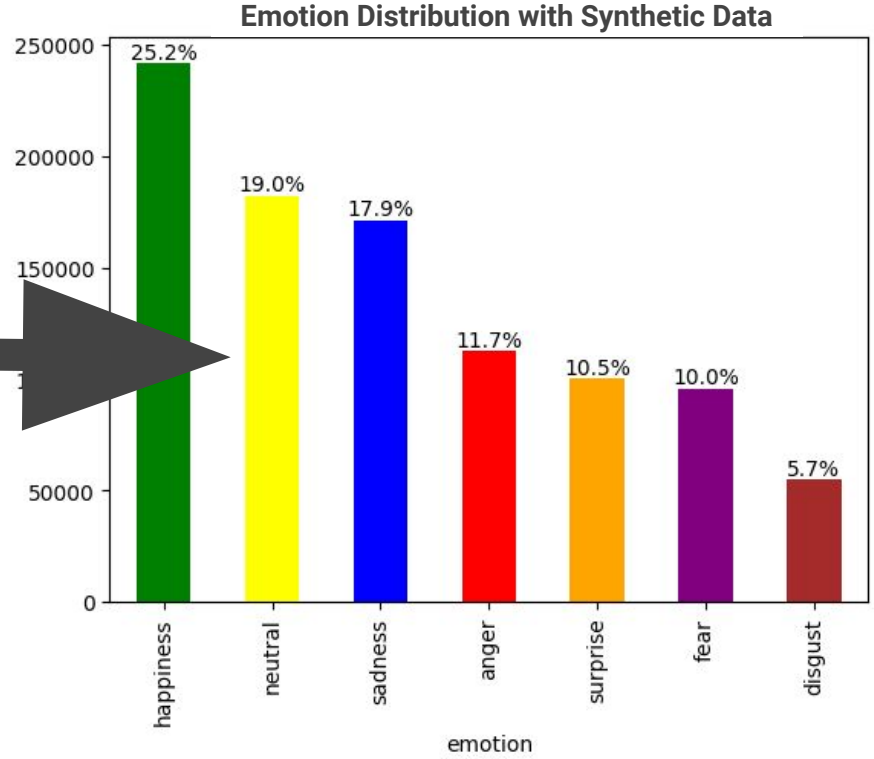
Synthetic Data Generation

- OpenAI API
  - 200 topics *("The burning anger when someone belittles your dreams")*
  - 100 sentences per topic
  - 30k sentences per emotion generated
- Synonym replacement
- Google Translate API (costly)

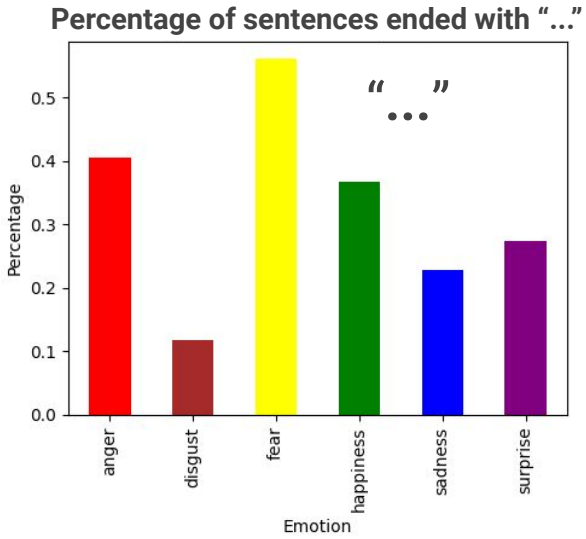


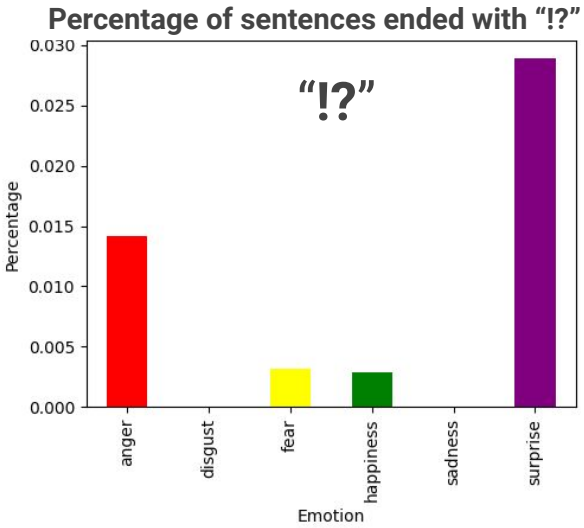
Synthetic Data Generation results

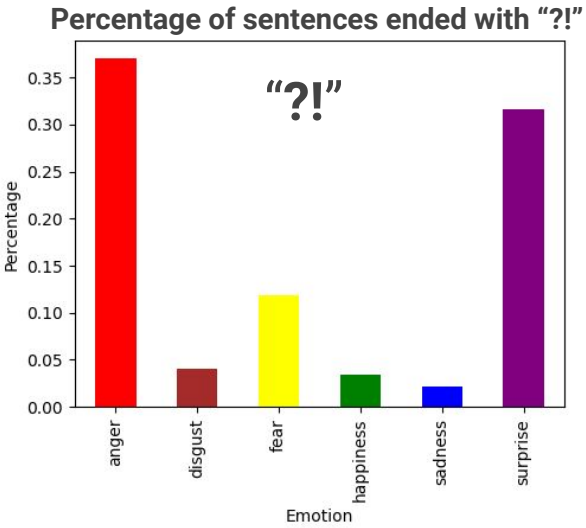




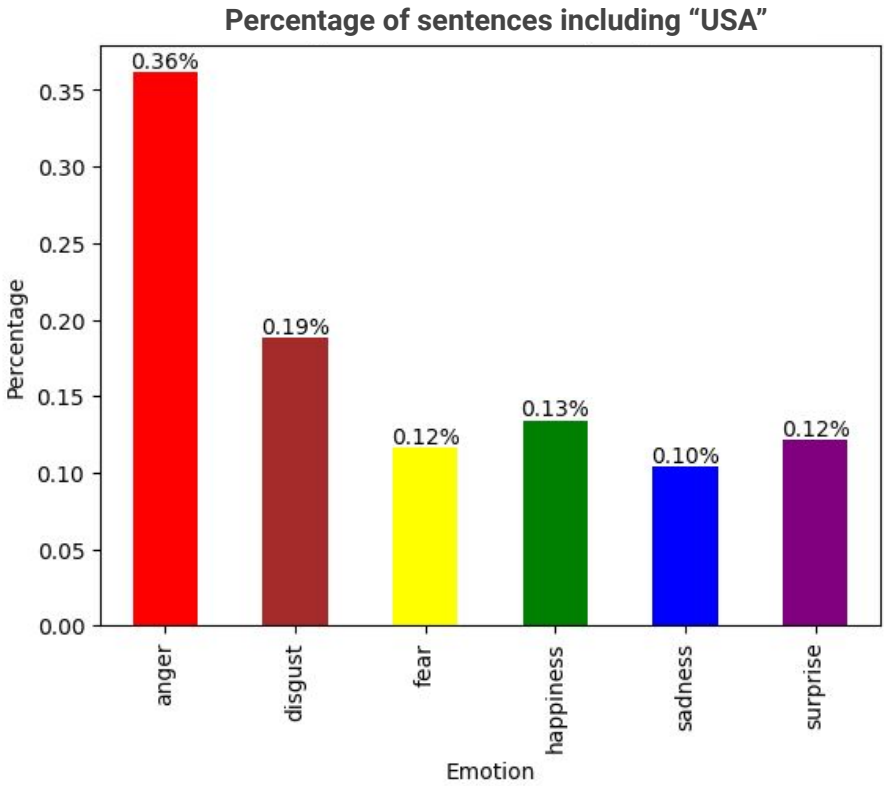
Punctuation’s role in conveying emotions

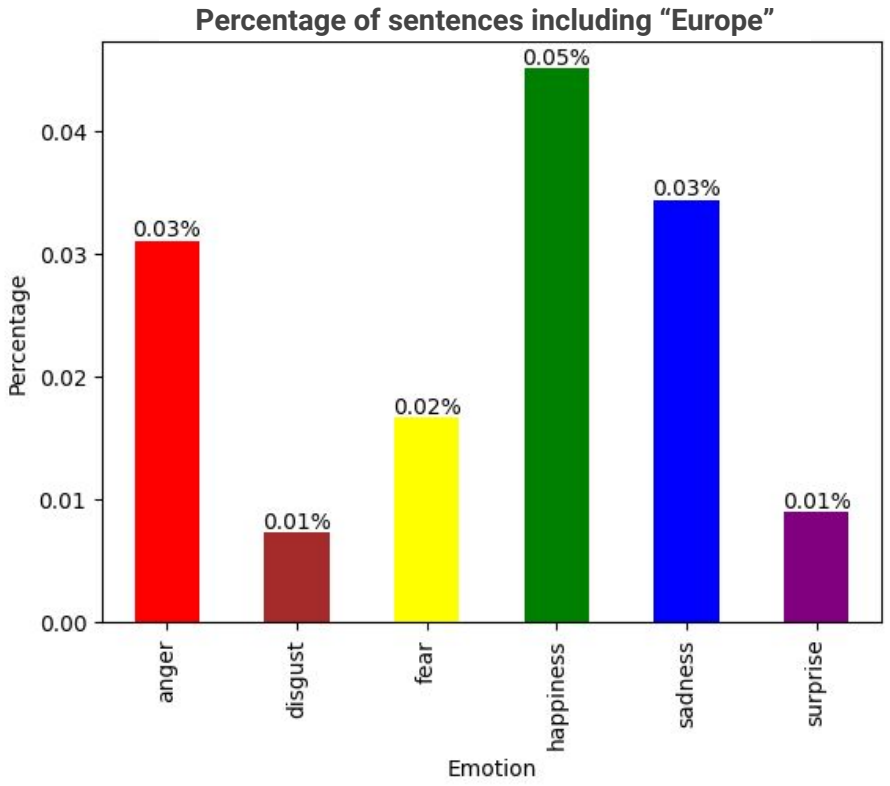






Potential bias in data - **region**





Processing Data

Cleaning

- Dropping missing values
- Dropping neutral emotions
- Ensure label consistency & cleanup
- Dataset shuffling

Emotion Classification Algorithm

Models

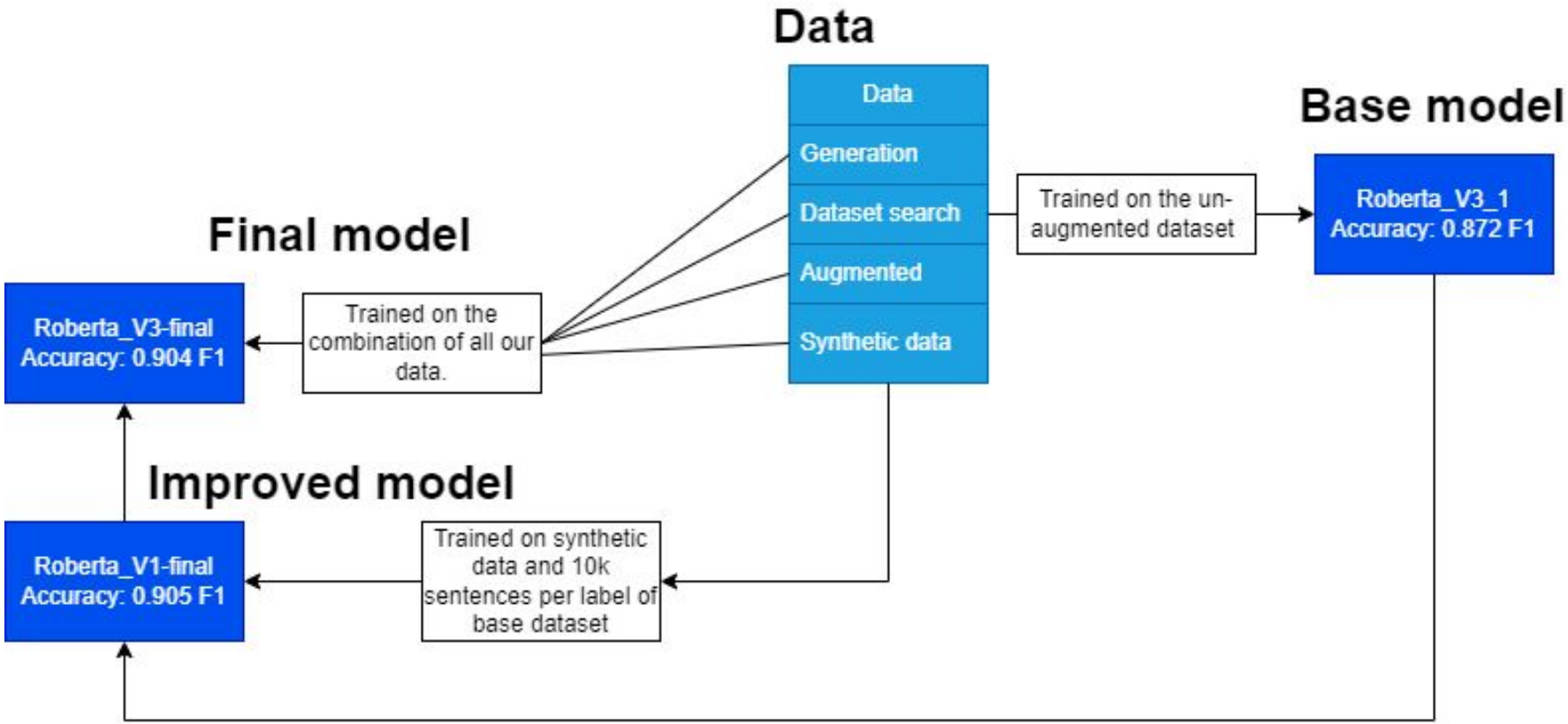
- Ensemble learning
- Traditional ML(Logistic regression NB)
- Neural networks(RNNs, LSTMs and GRUs)
- Transformers(Bert, XLnet etc.)

Feature engineering

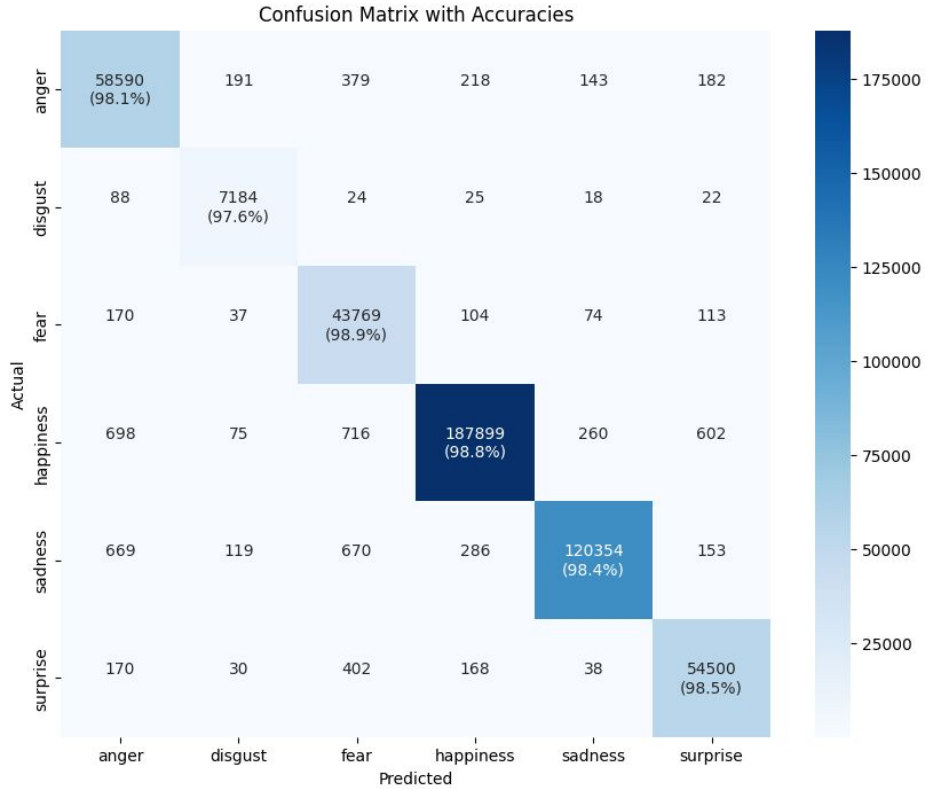
Feature engineering

- Sentiment Intensity (NLTK)
- Part of Speech (Word classes)
- End of sentence punctuation

Emotion Classification Algorithm



Base model



		precision	recall	f1-score
anger	0	0.97	0.98	0.98
disgust	1	0.94	0.98	0.96
fear	2	0.95	0.99	0.97
happiness	3	1.00	0.99	0.99
sadness	4	1.00	0.98	0.99
surprise	5	0.98	0.99	0.98
accuracy				0.99
macro avg		0.97	0.98	0.98
weighted avg		0.99	0.99	0.99

Disgust predicted as anger

```
Sentence: Dullard! they cried, "that is only an old wooden shoe, and the upper part is missing into the bargain; are you going to give that also to th
e Princess?"

Sentence: What- what were you- were you pleased to ob- stammered he- and all the clerks wrote down, "pleased to ob-" "He is of no use!" said the Princ
ess.

Sentence: 'You are talking too much,' said the tinder-box, and the steel struck against the flint till some sparks flew out, crying, 'We want a merry
evening, don't we?'
52:52   N:N     N:N     'Yes, of course,' said the matches, 'let us talk about those who are the highest born.'

Sentence: 'I think it highly improper,' said the tea-kettle, who was kitchen singer, and half-brother to the tea-urn, 'that a rich foreign bird should
be listened to here.
70:70   N:N     N:N     Is it patriotic?
71:71   N:N     N:N     Let the market-basket decide what is right.'
72:72   A:A     A:N     'I certainly am vexed,' said the basket; 'inwardly vexed, more than any one can imagine.

Sentence: You raise your naturally high notes so much, that you get covered over.
```

Sentences that contain '!', are predicted as 'surprise', but are not actually 'surprise'

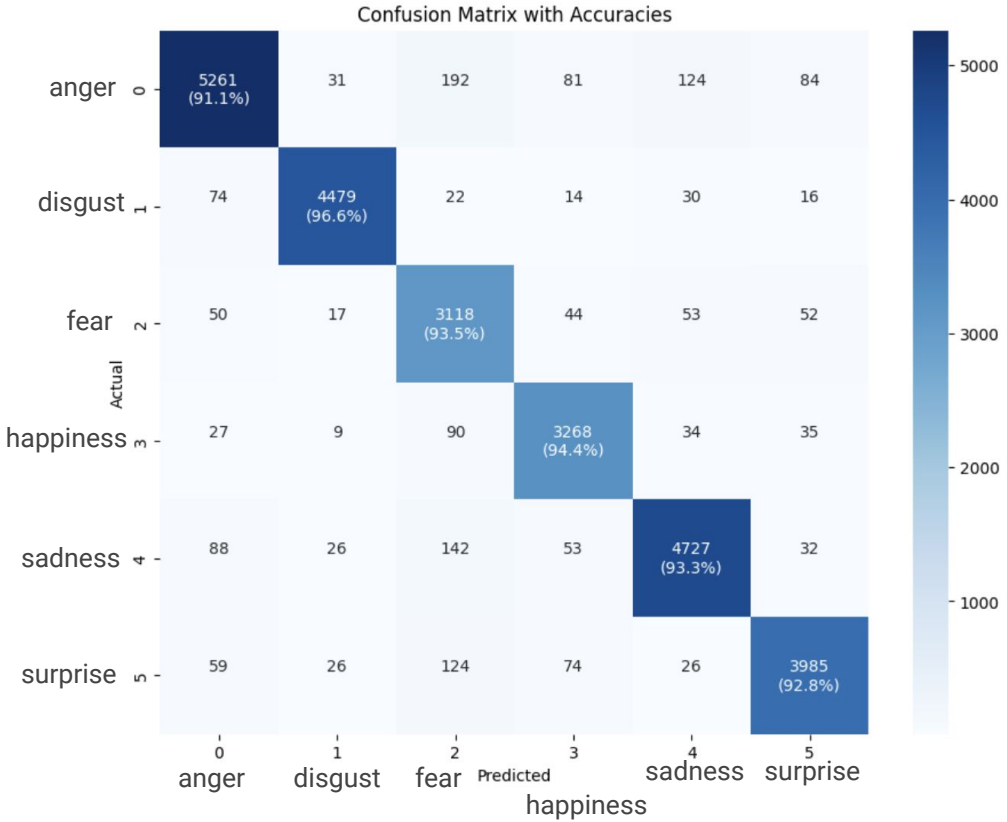
Number of sentences with '!' misclassified as 'surprise': 489

Sentence: There was meat in abundance, and the wolf attacked it instantly and thought, "There is plenty of time before I need leave off!" - **Actual Label:** happiness

Sentence: Our Lord then inquired if he had no wine, and he said, "Alack, sir, the casks are all empty!" - **Actual Label:** sadness

Sentence: Then said Hans to the little mannikin, "What! canst thou not pick up that piece thyself? - **Actual Label:** disgust

Improved model



Anger:
Precision: 94.6%
Recall: 91.1%

Disgust:
Precision: 97.6%
Recall: 96.6%

Fear:
Precision: 84.5%
Recall: 93.5%

Happiness:
Precision: 92.5%
Recall: 94.4%

Sadness:
Precision: 94.7%
Recall: 93.3%

Surprise:
Precision: 94.8%
Recall: 92.8%

Expeditie Robinson

Data

Video data:

- 17 episodes in .mov format of season 22

Tabular data:

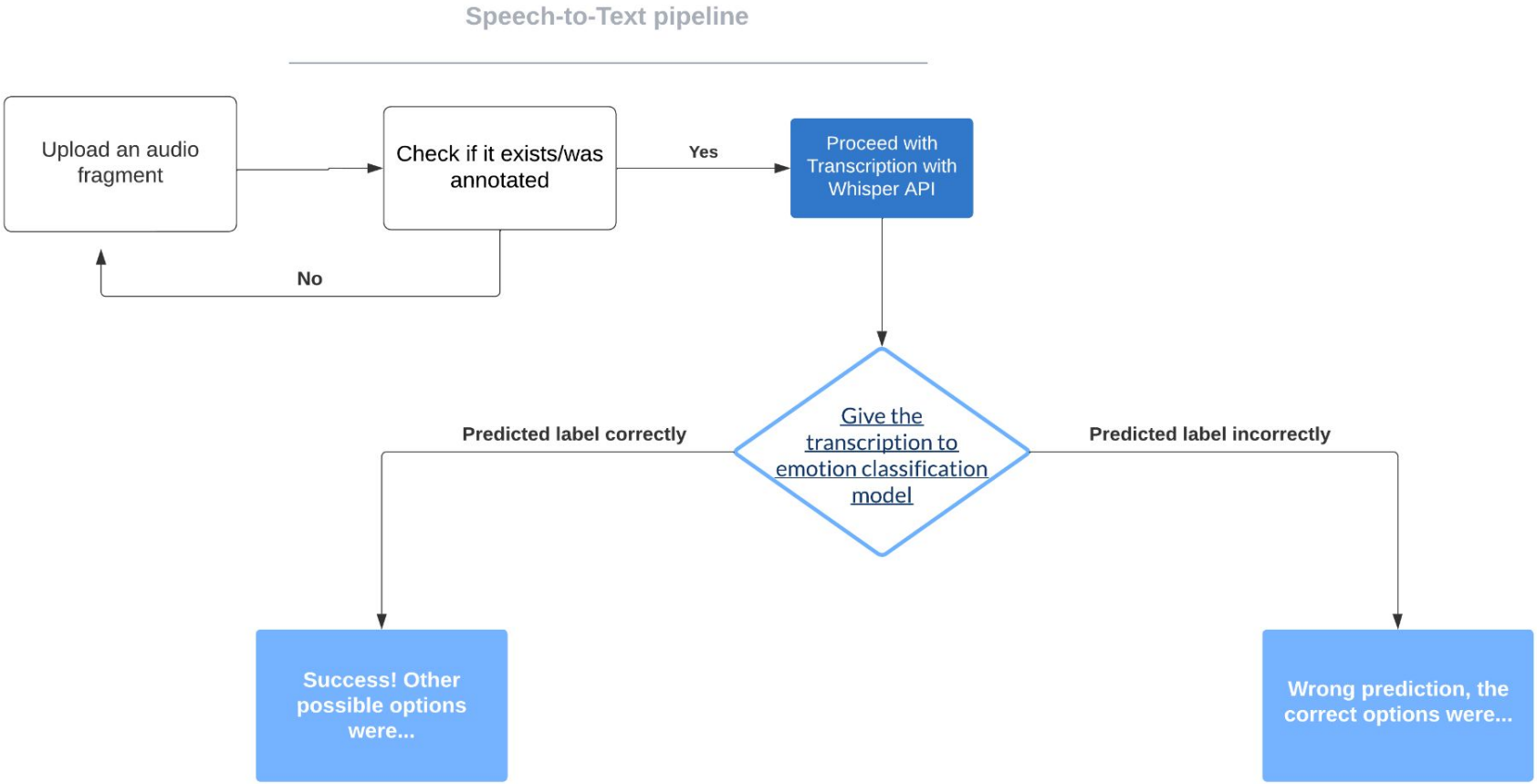
- Start and End time of episode fragments
- Emotion labels for fragments

Speech-to-Text

Preprocessing the data

- Converting video files to .mp3
- Segment episode audio into fragments
- Remapping / discarding emotion labels annotated by humans

Emotion	Mapped
Joy	happiness
Disgust	disgust
Fear	fear
Annoyance	anger
Hunger	no emotion
Confusion	no emotion
Gratitude	happiness


Speech-to-Text pipeline
Upload an audio fragment
Check if it exists/was annotated
Yes
No
Proceed with Transcription with Whisper API
Give the transcription to emotion classification model
Predicted label correctly
Predicted label incorrectly
Success! Other possible options were...
Wrong prediction, the correct options were...

Upload an audio fragment and predict emotion.

Upload MP3 File

Drop File Here

- or -

Click to Upload

Show Transcription

Yes

No

Clear

Submit

Output

Flag

Upload an audio fragment and predict emotion.

Upload MP3 File

ER22_ep1_fra_52.mp3 1.6 MB

Show Transcription

Yes No

Clear Submit

processing | 7.8/49.8s

Flag

Upload MP3 File

ER22_ep1_fra_52.mp3 1.6 MB

Show Transcription

Yes No

Clear Submit

Output

Transcribed Text:
It's very beautiful. Yes. After a careful start, he has a few long-awaited things to do. We have a fire. The outside is very beautiful. Yes, it's really good. It's really, really heavy. It's so beautiful that we have a fire. It's very beautiful to get to the sun. Yes, but you have a very beautiful fire cone. Also, with the proof of nature. The first time you see that fire is very good. Because you know, I got this. You have a firemeister in your team. It's not worth it. It's a fire. The men of 10 pairs have started a bit of a choice project. Very good. I expect that we have a really great experience. But half of the time I see this. This is going to be a great guide. With bamboo. Yes, maybe we have to make the first half of it. And then look how far we come. Because that's really big. We have a very big fire. You know what it is. This is a lot of work. This is a lot of work. For now. We will do the other way. It will give us a little bit of a dark. And we have no enough time to build a roof. So hopefully the fire will help us. I was a filaboy. But you have to be careful. Sure. Down. Left, left, left. Can do something. Thank you.

Proceeding with emotion prediction

Predicted emotion: happiness

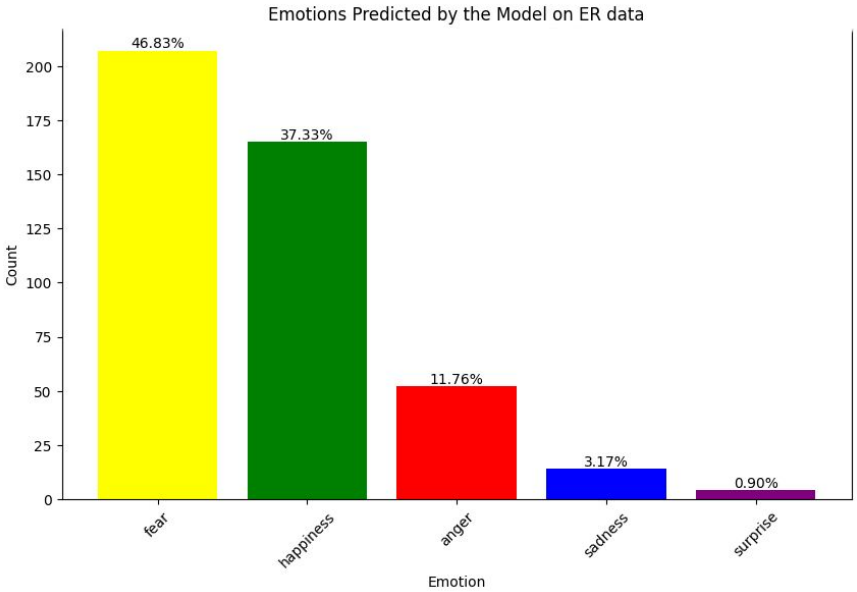
Success! The model correctly predicted that emotion label inside the fragment!
Other possible label options were: {'happiness'}

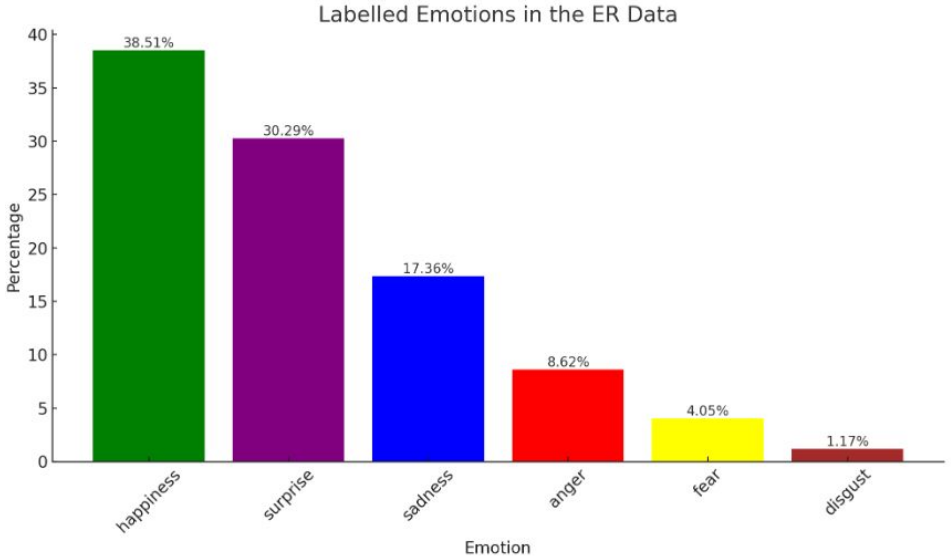
Errors on the Expedite Robinson dataset

Accuracy of 0.38 in a total of 442 fragments

Episode	Fragment	Predicted Emotion	Actual Emotions	Correct
17	14	sadness	['sadness', 'surprise']	True
17	15	happiness	['happiness', 'surprise']	True
17	16	fear	['sadness', 'anger', 'happiness', 'surprise']	False
17	17	happiness	['sadness', 'happiness']	True
17	18	fear	['happiness', 'surprise']	False

Errors on the Expedite Robinson dataset





Improvement and Future Steps

Training data

Currently:

1 written sentence -> 1 emotion (out of 6)

Future:

3+ sentences of speech -> multiple emotions (increase the choice)

Model

Currently

Outputs 1 emotion

Future:

Outputs multiple emotions

Speech to Text

Currently

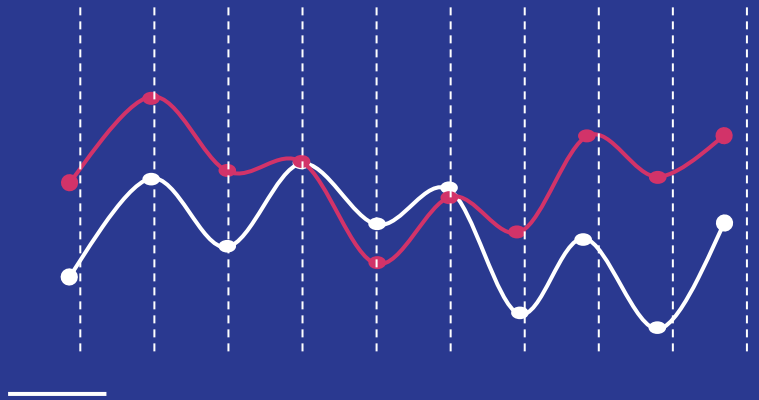
Whisper base model -> good accuracy + fast speed

Future:

Whisper large model ->

Excellent accuracy + slow speed

Conclusion



Questions?