



Emotion Classification

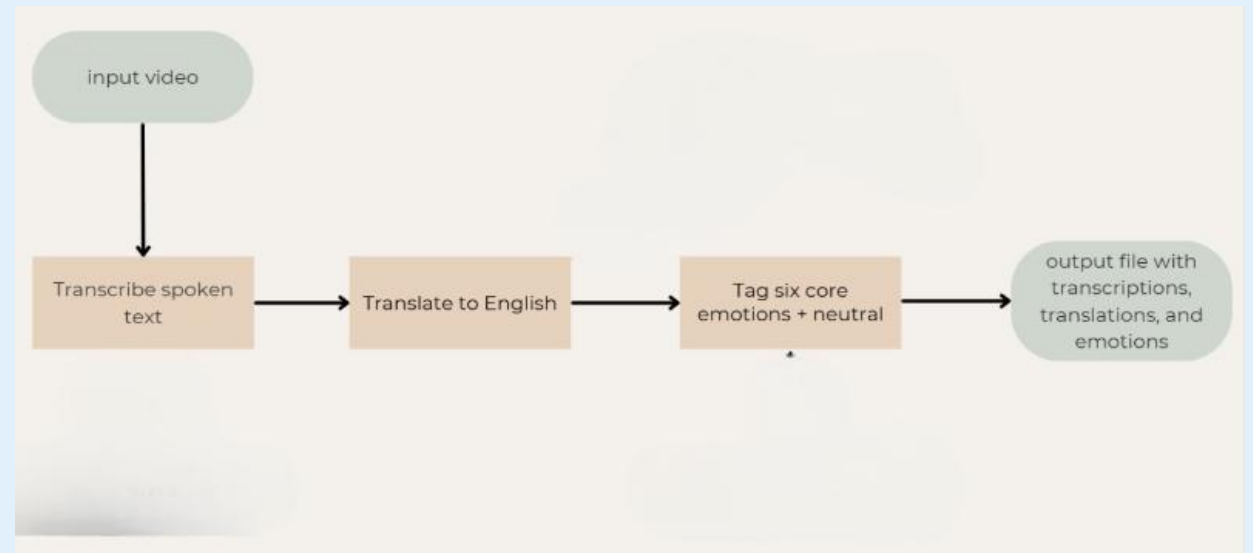
Group 13, German

Block C Year 2 2024-2025

CREATING MEANINGFUL EXPERIENCES

Introduction

- Emotion Classification
- End-to-End Pipeline
- Content Intelligence Agency (CIA)



Value for the Client

- Software
 - Ideal Cast
 - Best Scene for Product Placement
- Content Analysis
 - Identify Emotional Tones
 - Track Emotional Progression
 - Analyse Characters' Emotions
- Sentiment Tracking
 - Social Media
 - Public Reactions

Data

- Datasets used for **training**:

- MELD
 - GOEMOTION
 - Affect Data
 - Daily Dialogue
-

- Datasets used for **testing**:

- MELD
- Company pipeline

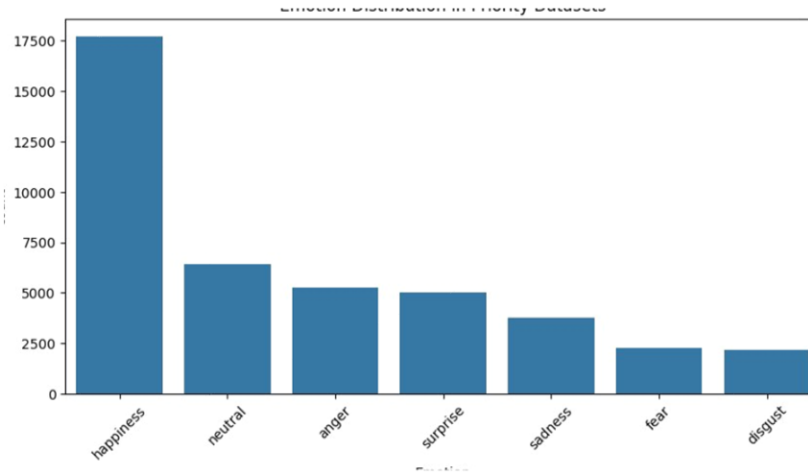
- Preprocessing steps:

- Removing unnecessary columns
- Mapping the emotions
- Feature extraction

- Limitations

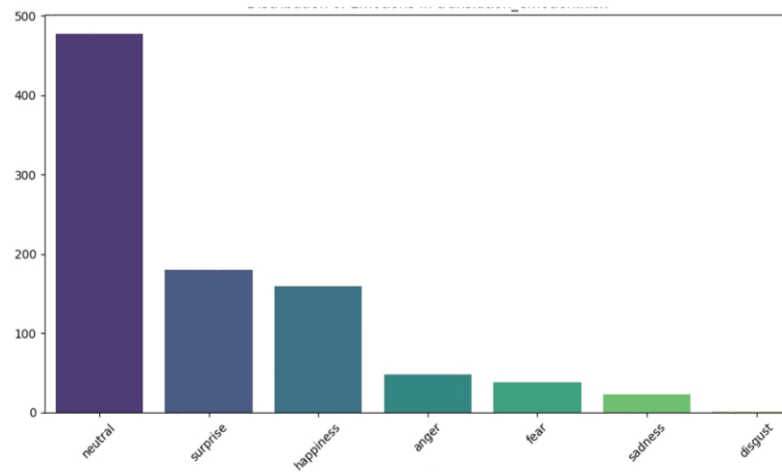
- Skewed
- English Data
- Translation Model
- Balanced Dataset

Train and test set data



Distribution of the train data

Distribution of the test data



Map to the 6 core emotions based on the study by Ekman & Friesen, 1971

Models

- Emotion Classification Model:
 - Logistic Regression
 - BERT Transformer
 - MLP
 - Prompt Engineering
 - Transcription Model:
 - Whisper
 - AssemblyAI
-
- Translation Model:
 - German – English
 - Helsinki-NLP-opus-mt-de-en

Evaluation and Performance (Emotion)

MELD Test

- Logistic Regression (0.785 F1)
- BERT Transformer (0.617 F1)
- MLP (0.795 F1)

Company Pipeline Test

- Logistic Regression (0.375 F1)
- BERT Transformer (0.453 F1)
- MLP (0.463 F1)

Difference

- Examples Company Pipeline
 - You Write? (Happiness)
 - Is that allowed? (Happiness)
 - No, just do it from here. (Anger)

Model we Used

- Final Model
 - MLP
 - MELD Test

*F1 score is a measure of the harmonic mean of precision and recall

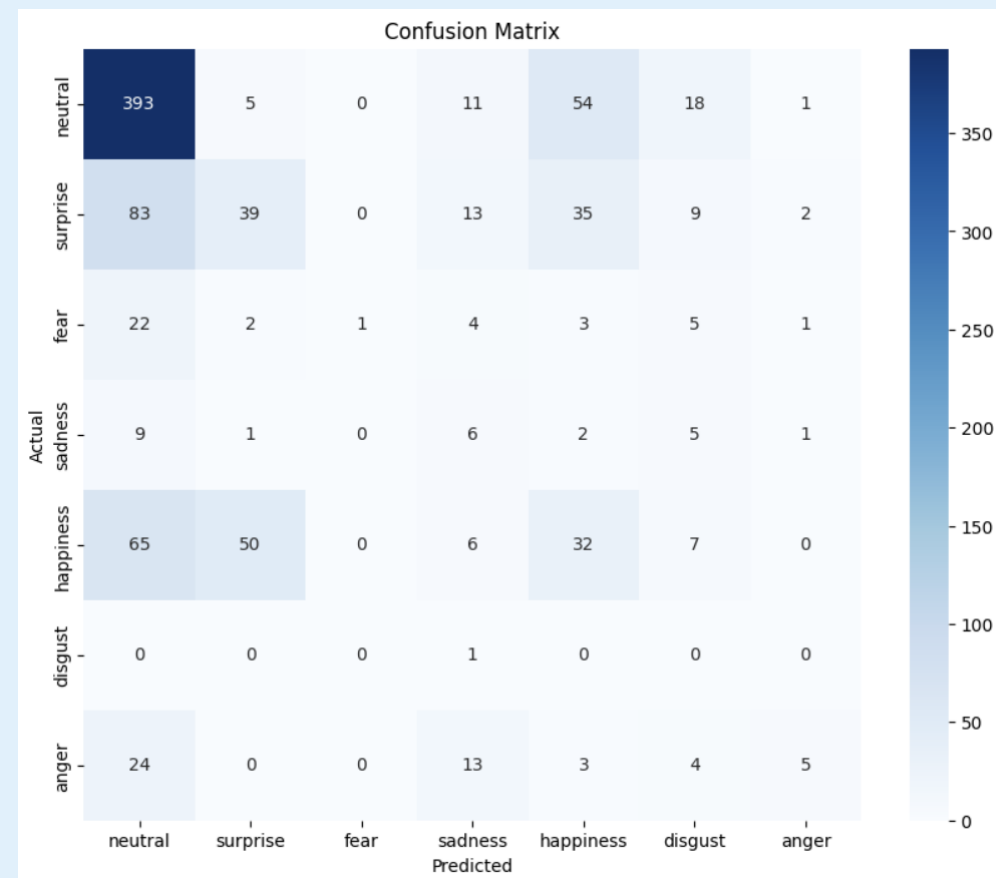
Error Analysis for Emotion Classification

- **Quantitative Analysis**

- Similar Features
 - Neutral vs. Happiness
 - Neutral vs. Sadness
- Similar Emotions
 - Happiness vs. Surprise
 - Fear vs. Sadness
- Underperformance
- Influence of punctuation (! and ?)

- **Qualitative Analysis**

- Mislabeling
 - Surprise - Neutral
 - Happiness - Neutral
 - Happiness - Surprise
 - Surprise - Happiness



Confusion Matrix from the best model's results

Evaluation and Performance (Transcription)

Whisper

- WER (6.173%)
- S = 29
- I = 17
- D = 24

AssemblyAI

- WER (6.210%)
- S = 25
- I = 20
- D = 42

Difference

- Accuracy
- Speed

Model we Used

- Final Model
 - Whisper
 - Accuracy > Speed

* WER is calculated by $S + I + D / \text{Total Words}$

Evaluation and Performance (Translation)

Helsinki-NLP-opus

- Validation Loss (1.6932)

Examples

- Wir bedanken uns wirklich für die zahlreichen Käufe in unserem Merchstore.
- We really thank you for the numerous purchases in our Merchstore.
-

Validation Loss

- Average Per-Token Loss
- 0 = Perfect Predictions
- 1.6 - 2.0 = Decent Translation Model

Model we Used

- Helsinki-NLP-opus-mt-de-en

Final Product

	Start Time	End Time	Sentence	Translation	Emotion
1	0:00:07.080000	0:00:13.060000	In Myanmar hat es nach dem katastrophalen Erdbeben vom Freitag noch mehrere Nachbeben gegeben.	There have been several earthquakes in Myanmar following the disastrous earthquake of Friday.	fear
2	0:00:14.160000	0:00:21.700000	Bei dem Erdbeben vom 28. März sind nach Angaben der Militärregierung mindestens 1700 Menschen gestorben.	According to the military administration, at least 1700 people died in the earthquake of March 28th.	disgust
3	0:00:21.840000	0:00:25.360000	Tausende weitere Menschen sind verletzt oder werden vermisst.	Thousands more people are injured or missing.	disgust
4	0:00:25.360000	0:00:33.240000	Da es in Myanmar seit vier Jahren einen Bürgerkrieg gibt, findet die Katastrophenhilfe unter schwierigen Bedingungen statt.	Since there has been civil war in Myanmar for four years, disaster relief is under difficult conditions.	disgust
5	0:00:35.060000	0:00:44.500000	Kurz nach ihrem Start in Norwegen ist eine unbemannte Testrakete des deutschen Start-ups ISA Aerospace ins Meer gestürzt und explodiert.	Shortly after their launch in Norway, an unmanned test vehicle from the German launch-up ISA Aerospace crashed into the sea and exploded.	disgust
6	0:00:44.820000	0:00:50.200000	Trotzdem sind die Entwickler zufrieden und sagen, dass der Testflug für sie ein Erfolg war.	Nevertheless, the developers are satisfied and say that the test flight was a success for them.	happiness
7	0:00:50.520000	0:00:55.340000	Sie haben nicht geglaubt, dass es die Rakete beim ersten Versuch bis in eine Erdumlage,	They didn't think that the rocket did the first time it tried to get into an earth cover,	surprise
8	0:00:55.360000	0:01:01.360000	Die Rakete soll in Zukunft kleine oder mittelgroße Satelliten ins Weltall bringen.	In future, the rocket will bring small or medium-sized satellites into space.	disgust
9	0:01:03.600000	0:01:09.080000	Syriens Übergangspräsident Ahmed al-Shara hat eine neue Übergangsregierung gebildet.	Syrias transition President Ahmed al-Shara has formed a new interim government.	disgust
10	0:01:09.240000	0:01:14.740000	Dazu gehören einige frühere Rebellen, aber auch Vertreter von Minderheiten und eine Frau.	These include some former rebels, but also representatives of minorities and a woman.	disgust
11	0:01:15.640000	0:01:18.480000	Sie soll Ministerin für Soziales und Arbeit werden.	She is to become Minister for Social Affairs and Labour.	surprise
12	0:01:18.760000	0:01:24.380000	Die autonome Regierung der Kurden im Nordwesten des Landes lehnt die Übergangsregierung ab,	The Kurdish autonomous government in the northwestern part of the country rejects the transitional government,	disgust
13	0:01:25.360000	0:01:27.540000	Weil sie unserer Meinung nach nicht vielfältig genug ist.	Because, in our opinion, it is not diverse enough.	neutral

Audio File from Short Newscast

Ethical Considerations

- Sustainability Consideration
 - Environmental Impact
 - Computational Resources
- Carbon Footprint
 - Training
 - Deployment
- Reducing Environmental Impact
 - Efficient Hardware Usage
 - Optimizing Training
 - Deployment Strategies
 - Monitoring and Reporting

Limitations

- Language
 - English
 - Transcription Model
 - Translation Model
- Emotion Detection Limitations
 - Moderate Accuracy
 - Misleading Insights
- Operational Risks
 - Misinterpretation

Next Steps and Recommendations

- Next Steps
 - Update Training Data
 - Implement New Emotions
 - Transformer Model
- Recommendations
 - Pipeline
 - Using Clear Audio
 - Interpreting the Results
 - Suggested Use Cases
 - Customer Feedback Analysis
 - Survey Analysis

Thank you for your attention!

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