Natural Language Processing

Emotion Classification and Topic Analysis of Political Communication on Twitter

Master's Degree in Computer Science

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Research Objectives

Guiding our Analysis

This study aims to answer three core questions based on our data:

- **Question 1:** Which emotions dominate political tweets, and how do these emotional profiles differ between the ruling and opposition parties?
- **Question 2:** How do these emotions intensify or change when the topic shifts to critical issues such as the economy, migration, and health system?
- **Question 3:** Can we observe emotional trends over time, particularly how the tone of parties' tweets changes in the weeks leading up to and after a major political event like an election?

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2 Methodology

Data Acquisition and Preprocessing

2 Methodology

We collected approximately 20.000 tweets from 24 verified politicians across Turkey's seven main parties using a Python script with the `Twikit` library.
To ensure meaningful content, we performed a thorough cleaning process:

- Removed retweets, replies, user mentions, and URLs.
- Converted hashtags to plain text and removed emojis.
- Eliminated extra spaces, special symbols, and punctuation.
- Excluded tweets with fewer than three meaningful words.

Emotion Classification with Fine-tuned BERT

2 Methodology

We fine-tuned a pre-trained Turkish BERT model (`dbmdz/bert-base-turkish-cased`) for multi-class emotion detection. The model was trained on an emotion-labeled dataset for 12 epochs with a batch size of 16 and a learning rate of 2×10^{-5}.

Emotion	Precision	Recall	F1-score
Anger	0.95	0.93	0.94
Disgust	0.95	0.95	0.95
Fear	0.94	0.94	0.94
Happy	0.95	0.95	0.95
Sadness	0.91	0.94	0.92
Surprise	0.91	0.88	0.90
Overall Accuracy		0.9349	

Metric	Value
Eval Loss	0.2652
Eval Accuracy	0.9305
Eval Micro F1	0.9305
Eval Runtime (s)	37.4458
Eval Samples/sec	104.124
Eval Steps/sec	13.032
Epoch (Eval)	4.34
Train Runtime (s)	3523.5243
Train Samples/sec	31.346
Train Steps/sec	0.979
Train Loss	0.2685
Epoch (Train)	4.34

Topic Classification with Zero-shot Classification

2 Methodology

Topic classification was performed using a zero-shot learning approach with the multilingual model `MoritzLaurer/mDeBERTa-v3-base-xnli`. This allowed us to categorize tweets into specific political and social themes without needing a labeled training set for those topics. The predefined topics included key themes in Turkish political discourse:

Turkish Label	English Equivalent
göç	migration
ekonomi	economy
eğitim	education
sağlık	health
adalet	justice
dış politika	foreign_policy
enerji	energy

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3 Emotion Analyses

Emotions by Topic: Economy

A Clear Divide

43_party_topic_economy.png

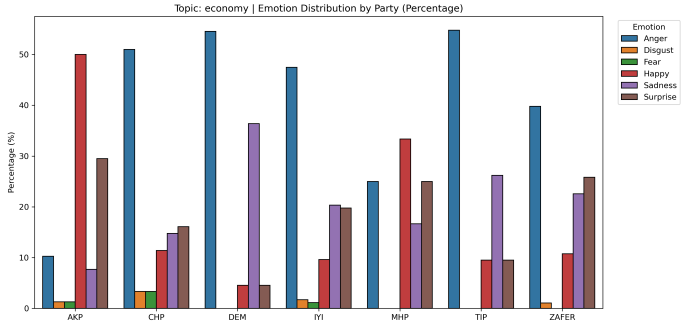
- **AKP:** Dominated by happy emotions.
- **Opposition:** Consistently dominated by anger and sadness.
- **MHP:** Shows a mix of anger and happy emotions.

Key Takeaway

The economy is a highly polarized topic, with opposing emotional responses from the governing and

Emotions by Topic: Economy

A Clear Divide



- **AKP:** The ruling party is dominated by a high percentage of happy tweets, reflecting a positive outlook and confidence in their economic policies.
- **Opposition (CHP, DEM, İYİ, TİP, ZAFER):** These parties are consistently dominated by anger and sadness, showing strong criticism and concern regarding the economy.
- **MHP:** This party has a mixed emotional profile, with significant levels of both anger and happy emotions, which is different from other opposition parties.

Emotions by Topic: Migration

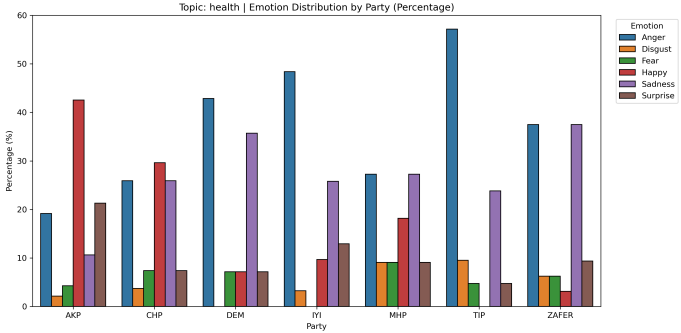
A Highly Charged Issue

4_party_topic_migration.png

- The ruling party, **AKP**, has a mixed emotional profile with high percentages of happy and sadness, reflecting a complex stance.
- Most opposition parties, including **CHP, İYİ, MHP, TİP, and ZAFER**, are dominated by high levels of anger.
- The **DEM** party shows a unique profile, with extremely high levels of disgust alongside a significant percentage of happy emotions.

Emotions by Topic: Health

Widespread Dissatisfaction



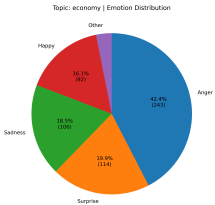
- The **AKP** shows a very high percentage of happy tweets, indicating a positive outlook and confidence in the health system.
- Parties like **TİP, ZAFER, and İYİ** are dominated by anger, reflecting strong criticism of health policies.
- **CHP** has a balanced mix of happy and anger, while **DEM** has significant sadness and anger, showing their specific focus on the issue.

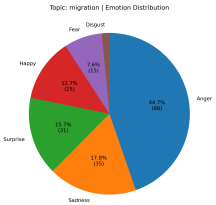
Key Takeaway

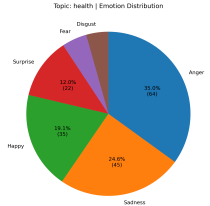
The health system is a highly critical issue for the opposition, but they express their dissatisfaction with a mix of different negative emotions.

Overall Topic Distribution

A Look at Key Issues





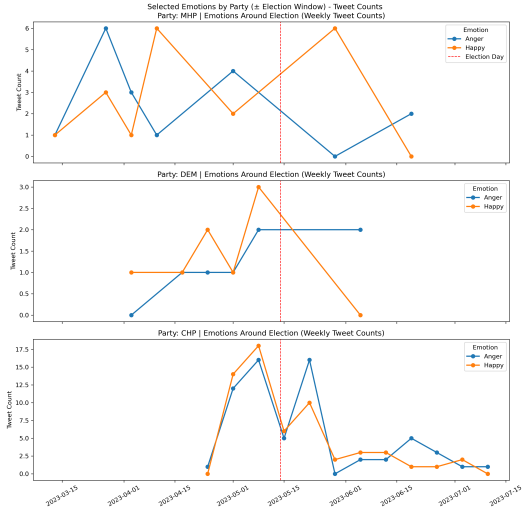


- **Anger** is the dominant emotion for both **economy** and **migration**, showing high levels of public frustration.
- The topic of **health** is also heavily defined by **anger** and sadness, suggesting widespread dissatisfaction with the system.
- In contrast, **education** shows a more balanced emotional profile, with **happiness** as a significant emotion alongside anger.

Key Takeaway

While **anger** defines the emotional landscape for most critical topics, the level of other emotions, like happiness or sadness, can vary significantly.

Time Series Analysis of Emotions



- **MHP:** Happiness peaked before the election, then both happy and anger dropped sharply after.
- **DEM:** Happiness rose before the election, but anger increased afterwards.
- **CHP:** Both emotions peaked before the election, but anger rose significantly after the results, showing dissatisfaction.

Key Takeaway

Emotional trends in political communication are not random; they are a direct response to a major political event like an election, with feelings shifting dramatically before and after the results.

Natural Language Processing

Thank you for listening!

Any questions?