Text Based Emotion Detection

SemEval2025-Task 11 [1]

CS779
Group-3

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Agenda

- Intro to the SemEval Task along with it's tracks (A,B,C)

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- Experiments with shortlisted models
- Results of the provided datasets on those models
- Future Directions

- Emotion Detection: Determining what emotion most people will think the speaker may be feeling given a sentence or a short text snippet uttered by the speaker

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  - Track A: Multi-label Emotion Detection
  - Track B: Emotion Intensity
  - Track C: Cross-lingual Emotion Detection

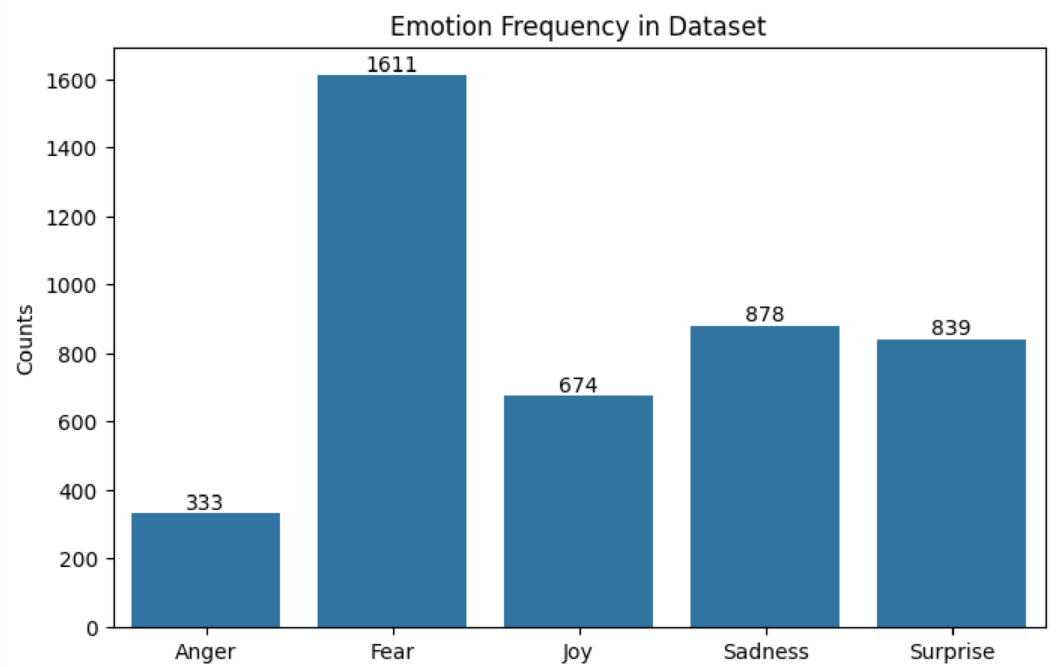
Dataset for Track A

	A	B	C	D	E	F	G
1	id	text	Anger	Fear	Joy	Sadness	Surprise
2	eng_train_track_a_00001	But not very happy.	0	0	1	1	0
3	eng_train_track_a_00002	Well she's not gon na last the whole song like that, so since I'm I	0	0	1	0	0
4	eng_train_track_a_00003	She sat at her Papa's recliner sofa only to move next to me and	0	0	0	0	0
5	eng_train_track_a_00004	Yes, the Oklahoma city bombing.	1	1	0	1	1
6	eng_train_track_a_00005	They were dancing to Bolero.	0	0	1	0	0
7	eng_train_track_a_00006	Still had sex with her, though.	0	0	1	0	0
8	eng_train_track_a_00007	But I am exhausted-my eyes feel like they are about to pop out o	0	1	0	1	0
9	eng_train_track_a_00008	We ordered some food at Mcdonalds instead of buying food at th	1	0	0	0	0
10	eng_train_track_a_00009	Now my parents live in the foothills, and the college is in a large	0	0	0	0	0
11	eng_train_track_a_00010	We get to the porch and my dog starts *growling*, like a big boy	0	1	0	0	1
12	eng_train_track_a_00011	I moved my arms, stretching the muscles, watching ribbons of fl	0	0	1	0	0
13	eng_train_track_a_00012	The room was small but brightly lit and I sat on a two-seater cou	0	0	0	0	0
14	eng_train_track_a_00013	The top of the mattress comes up a little above my waist!	0	0	1	0	0
15	eng_train_track_a_00014	I have plenty more.	0	0	1	0	0
16	eng_train_track_a_00015	it took a little longer for my feet to hurt which was nice.	0	0	1	0	0
17	eng_train_track_a_00016	About 2 weeks ago I thought I pulled a muscle in my calf.	0	1	0	1	0
18	eng_train_track_a_00017	I still cannot explain this.	0	1	0	0	1
19	eng_train_track_a_00018	more funny than creepy being on this side of the story:	0	1	1	0	1
20	eng_train_track_a_00019	5 year old me was scarred for life.	0	1	0	1	0
21	eng_train_track_a_00020	The waitress had physical therapy experience and prepared a ni	0	0	1	0	0
22	eng_train_track_a_00021	Then I decided to try and get up to go to the restroom, but I coul	0	1	0	0	1
23	eng_train_track_a_00022	" The cop tells him to have a nice day and walks away.	1	0	1	0	1
24	eng_train_track_a_00023	The following two days, I was in a moderate amount of pain and	0	1	0	1	0
25	eng_train_track_a_00024	He saw blood and said, "Mommy!	0	1	0	1	1
26	eng_train_track_a_00025	Not the most unnerving feeling, but the most prominent event in	0	1	0	0	1
27	eng_train_track_a_00026	When the dust settled I looked over at my wife and saw she was	0	0	1	0	0
28	eng_train_track_a_00027	I love you boy.	0	0	1	0	0
29	eng_train_track_a_00028	i brush my teeth at least twice a day.	0	0	0	0	0
30	eng_train_track_a_00029	Needless to say, I turned her down.	0	0	0	0	0

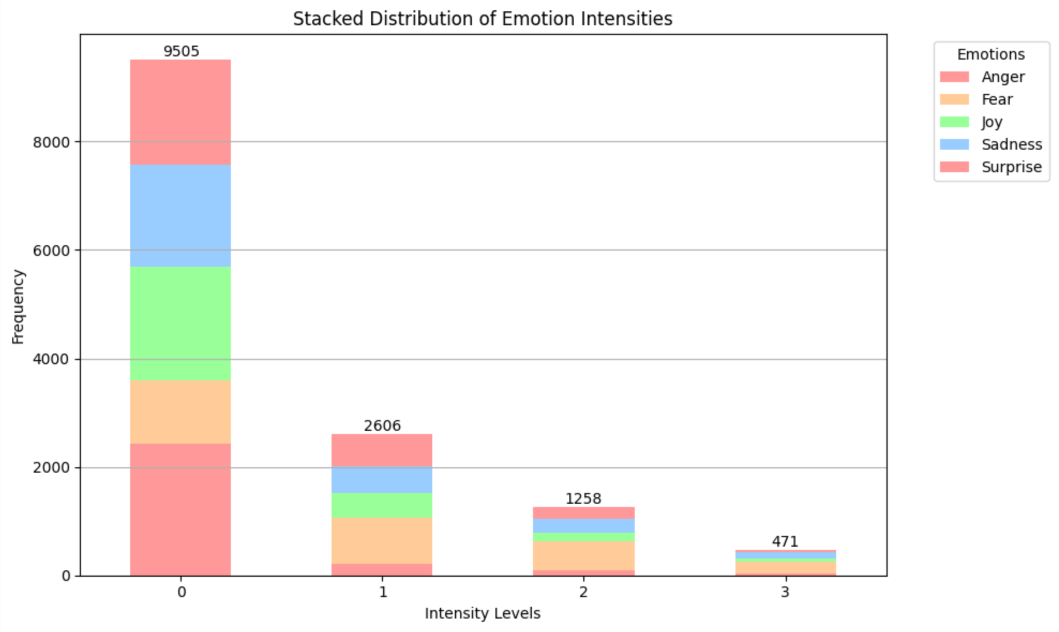
Dataset for Track B

	B	C	D	E	F	G
1	text	Anger	Fear	Joy	Sadness	Surprise
2	My Spanish language skills were fairly basic.	0	1	0	0	0
3	Don't mess with my orange juice.	2	0	0	0	0
4	So, I am from a science background and analyze everything skeptically.	0	0	0	0	0
5	I was writing away.	0	0	1	0	0
6	Apparently it wasn't as life threatening as I believed at the time because the doctor d	0	1	0	1	0
7	I could not believe how fast it went considering I had to stay on my back the whole la	0	1	0	0	1
8	The room really isn't a room, it is as though she is kneeling on the floor but I don't se	0	2	0	0	2
9	It looks like dark smelly applesauce.	0	1	0	0	1
10	like seriously, alot can not understand and im slow at registering words in my brain d	0	2	0	1	0
11	Life readings obviously defective.	1	1	0	0	0
12	months before that, i just prayed to God that i wanted to meet someone right for me,	0	0	0	2	0
13	My grandmother fell very ill this past summer, and ended up suffering from encepha	0	1	0	3	0
14	A highly intoxicated roommate and a black girl going at it.	1	2	0	0	2
15	You are the demon.	2	1	0	0	1
16	I had an ant crawling on my elbow just now, and I flicked him off.	0	1	0	0	0
17	Immediately my throat tightens.	0	3	0	0	0
18	Kick my heels up and shout.	0	0	2	0	0
19	I closed my eyes as I took in a deep breath.	0	0	1	0	0
20	he got pretty fucking scared and started sprinting away from me.	0	3	0	0	1
21	Nothing was touching it.	0	1	0	0	1
22	Met a lot of random canadians that night.	0	0	1	0	1
23	I saw that, too.	0	0	0	0	1
24	just the thought of having to get up and speak in front of 30 people makes my heart	0	3	0	0	0
25	Moral of the story?	0	0	0	0	1
26	I got my first raspberry from a crowd surfer falling and my face hitting the monitor, ba	0	1	0	1	1
27	At this point he decided to consult the woman at the front desk for more information.	0	1	0	0	0
28	When she decided it was time to go back to my stall, I didn't want to leave and I pre	0	1	0	1	0
29	Finding them, I whipped one out and put it in my ear, swabbing.	0	0	0	0	0
30	I looked down only to see a flashing red light buried in the dirt under my feet.	0	1	0	0	1

How are the emotions distributed?



How are the intensity levels distributed?



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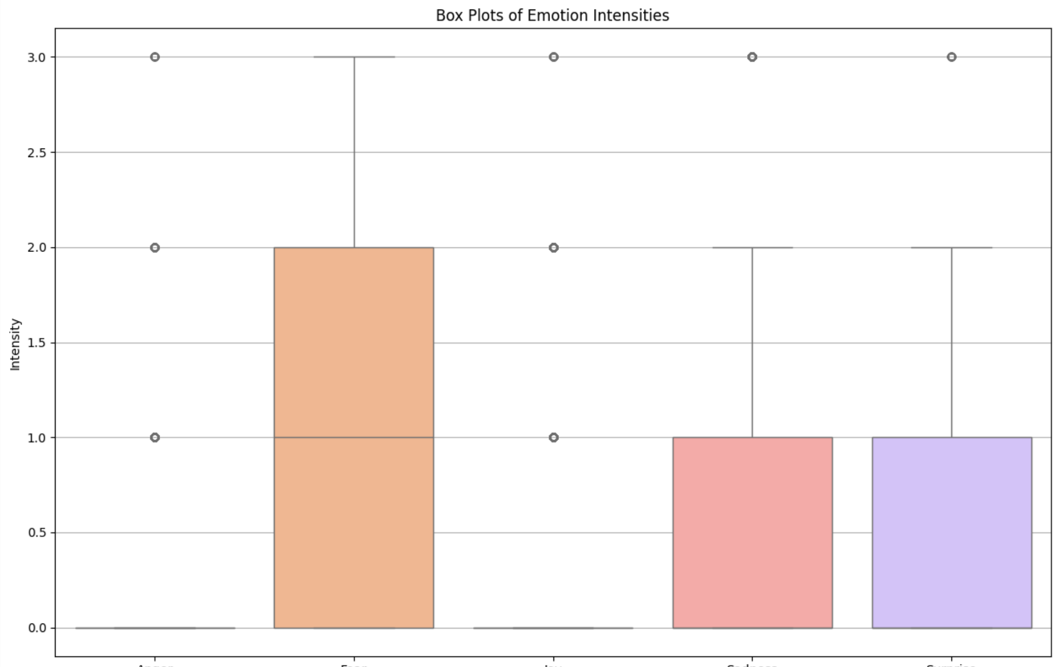
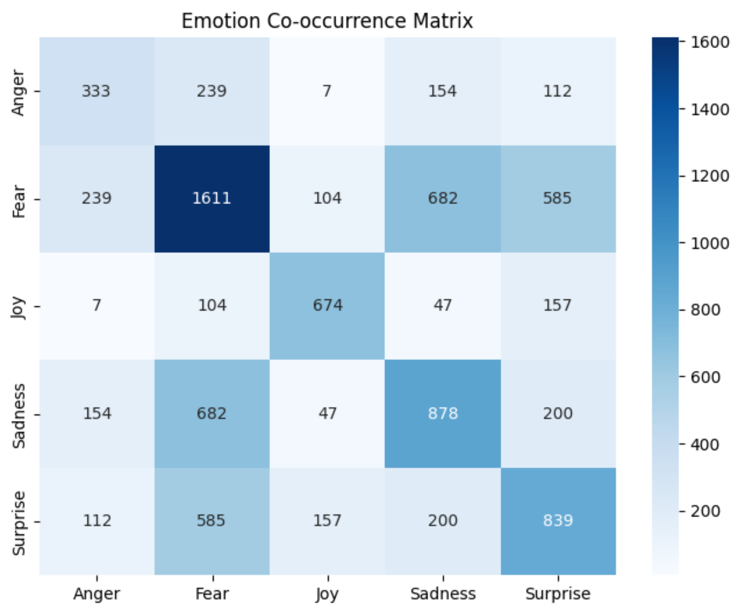


How frequently are the emotions co-occurring?



Datasets available for TBED

Dataset	Source	Size	Emotion Model
GoEmotions [8]	Blogs (Reddit) ; labeled between 27 emotional classes.	58 K	Discrete, Componential
ISEAR (2017) [19]	Worldwide survey on causes and consequences. Emotional state reported as happiness, fear, anger, sorrow, disgust, humiliation, and guilt.	7.6K	Dimensional
SemEval (2018) [16]	Blogs, Tweets	23 K	Discrete
SemEval (2019) [6]	Text conversation between two people. Dialogue classified as either happy, angry, unhappy, or other	39 K	Discrete
EMOBANK [5]	Blogs, newspaper headlines, letters, and travel guides	10 K	Dimensional
SuperTweetEval [4]	Benchmark for evaluating tweet-level sentiment and language. It contains a diverse collection of tweets, annotated for 12 heterogeneous NLP tasks.		Discrete; Dimensional
Valence and arousal [17]	Facebook posts. Contains labels for two different grades, which are not related to each other:	3.2K	Dimensional
CBET [10]	Tweets	77k	Componential
ISEAR (2018)	Cross-cultural studies	40 K	Discrete

Dataset Overview

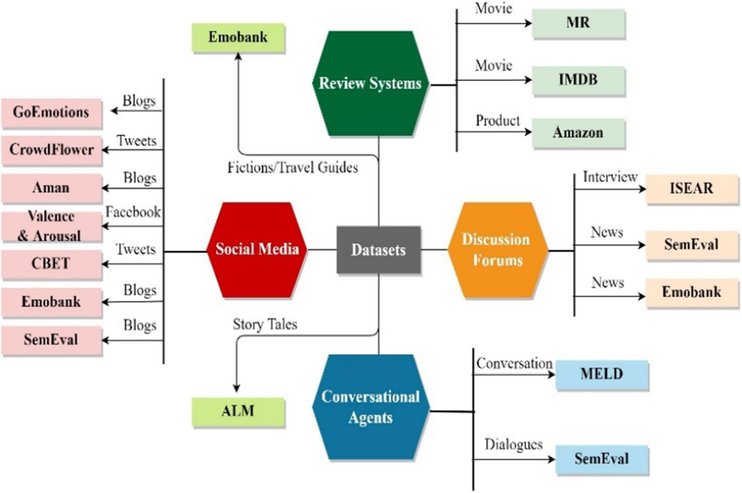


Figure 1: Dataset with topic and domains

Source: [13]

SpanEmo: Casting Multi-label Emotion Classification as Span-prediction

- Proposes a new model called "SpanEmo" [3] that predicts the emotion classes directly from the label set, allowing it to capture relationships between words and the corresponding emotions.

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- Experiments on **SemEval2018 multi-label emotion data** [16].
- Performed over three languages: English, Arabic, Spanish.

Contextual emotion detection using ensemble deep learning

- Proposed an ensemble deep learning approach for TBED by Bi-LSTM, Bi-GRU, CNN along with BERT, RoBERTa, and XLNet. [20]
- Uses weighted hard voting ensemble, the class with the highest number of votes is selected as the final prediction.

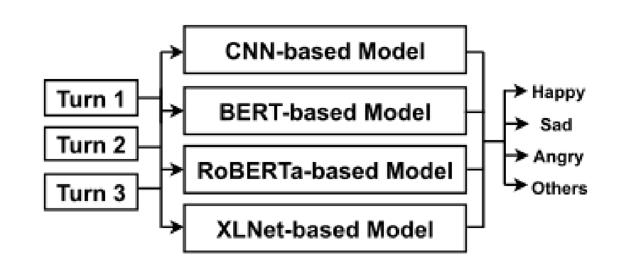

Figure 2: Ensemble Approach

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- The best results were achieved when BERT and RoBERTa were given double the weight (0.333) compared to CNN and XLNet (0.167)
- Evaluated using the **SemEval-2019 Task 3: EmoContext** [6] dataset that contains 3-turn conversations classified as Happy, Angry, Sad, and Others.

Emotion Detection in Low-Resource Languages

- Multilingual models trained on diverse datasets for language-agnostic emotion recognition.

Emotion Detection in Low-Resource Languages

- Multilingual models trained on diverse datasets for language-agnostic emotion recognition.
- Takes a specific focus on the domain of depression detection within the Thai context. It proposes knowledge transfer from English to Thai as a viable strategy. [2]

Shortlisted Models

- Small Models:
  - SamLowe/roberta-base-go_emotions [15]
  - cardiffnlp/twitter-roberta-large-emotion-latest [4]
  - Emanuel/twitter-emotion-deberta-v3-base [12]
- Large Models:
  - meta-llama/Meta-Llama-3-8B-Instruct [9]

SamLowe/roberta-base-go-emotions

- Pretrained Model: FacebookAI/roberta-base[14]
- Linear classifier trained on top of Roberta base model
- Dataset trained on: google-research-datasets/go-emotions [8]
- Results[15] on Goemotions dataset:
  - Accuracy: 0.474
  - F1: 0.450
- 28 classes for classification (multi-emotion labels)

cardiffnlp/twitter-roberta-large-emotion-latest

- Pretrained model: FacebookAI/roberta-large[14]
- Linear classifier finetuned on: 154M tweets
- Finetuned on: cardiffnlp/super_tweeteval[4]
- Results[4] on super_tweeteval dataset:
  - Avg Macro F1: 0.58
- Results[18] on further finetuned on Goeomotions dataset:
  - F1 : 0.92
- 11 classes for classification (multi-emotion labels)

Emanuel/twitter-emotion-deberta-v3-base

- Pretrained model: microsoft/deberta-v3-base[11]
- Pretrained on: 160GB Data
- Linear classifier finetuned on: dair-ai/emotion[7]
- Results[12] on dair-ai/emotion dataset:
  - Accuracy: 0.937
- 6 classes for classification (single-emotion labels)

meta-llama/Meta-Llama-3-8B-Instruct

- Pretrained Model: LLama3-8B[9]
- Trained on: 15T+ web tokens
- instruction tuned

Experiments

- The training data was released on 10/09/24
- The models were evaluated on the training data for english language without any fine-tuning
- Accuracy, Micro, Macro and Weighted F-1 Scores were calculated for the predictions of these models for Track A dataset
- Accuracy calculated for Track B dataset on the same models

Results

Model Name	Accuracy	Micro F1	Macro F1	Weighted F1
SamLowe/roberta-base-go_emotions	0.21	0.45	0.44	0.42
cardiffnlp/twitter-roberta-large-emotion-latest	**0.29**	0.54	0.53	0.50
Emanuel/twitter-emotion-deberta-v3-base	0.16	0.45	0.40	0.45
meta-llama/Meta-Llama-3-8B-Instruct	0.24	**0.58**	**0.59**	**0.58**

Table 1: Results for Track A dataset without fine-tuning on the shortlisted transformer models

Model Name	Accuracy
SamLowe/roberta-base-go_emotions	0.11
cardiffnlp/twitter-roberta-large-emotion-latest	0.10
meta-llama/Meta-Llama-3-8B-Instruct	0.18

Table 2: Results for Track B dataset without fine-tuning on the shortlisted transformer models

Future Directions

- Fine-tuning with released data to be done on all the models.
- Fine-tuning with an extra classifier on top of some models with fine-grained emotion labels to be done with all weights freezed.
- Ensemble modelling to be explored
- Building and finetuning novel architectures for all the tracks

Timeline

Future Task	Member Responsible and Timeline
Selection of some more models for track A and B	Every member- till 05/10/24
Selection of multi-lingual models for track C	Every member- till 05/10/24
Fine-tuning on all the shortlisted models	Every member- till 13/10/24
Exploring different combination of ensemble models	Every member- till 20/10/24
Building our own models for all the tracks	Every member- till 10/11/24
Fine-tuning our models	Every member- till 20/11/24
Improving and finalizing our models	Every member- till 05/01/25
Final submission on the competition webpage	Every member- till 15/01/25

Table 3: Timeline of planned future tasks

Contribution

Task Done	Members Contribution
Literature survey for Text Based Emotion Detection	Equal contribution by all
Group discussions on literature survey	Equal contribution by all
Shortlisting the models based on literature survey	Equal contribution by all
Initial experimentation with the pretrained models	Equal contribution by all
Creation of presentation slides, Project Document and Mid-Term Project Report	Equal contribution by all

Table 4: Member Contribution

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