Intended Sarcasm Detection

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SemEval-2022 Task 6

- A workshop that organizes shared NLP tasks annually
- Task 1 - Given a text, determine whether it is sarcastic or non-sarcastic
- Task 2 - Given a sarcastic text and its non sarcastic rephrase, determine which is the sarcastic one

Examples from the dataset

Task 1

Example of a sarcastic text:

I love it when drunk, inconsiderate flatmates come back and start climbing on the roof #istillhaveexams #tryingtosleep

Example of a non sarcastic text:

man I really hate seeing two idiots raising a baby

Task 2

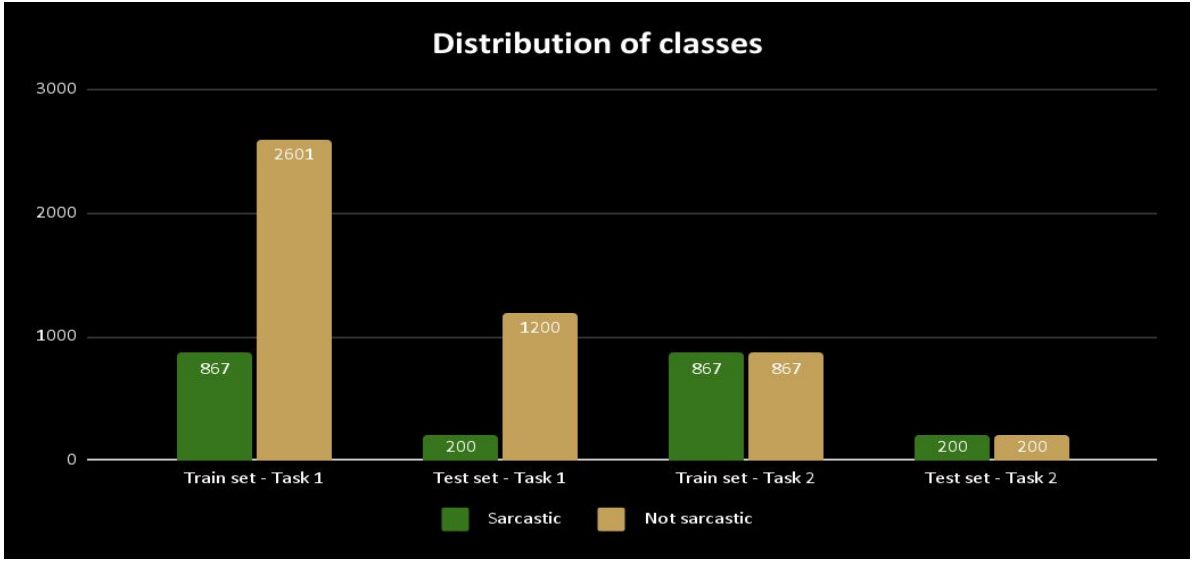
Example of a sarcastic text

The only thing I got from college is a caffeine addiction

Example of its non sarcastic rephrase

College is really difficult, expensive, tiring, and I often question if a degree is worth the stress.

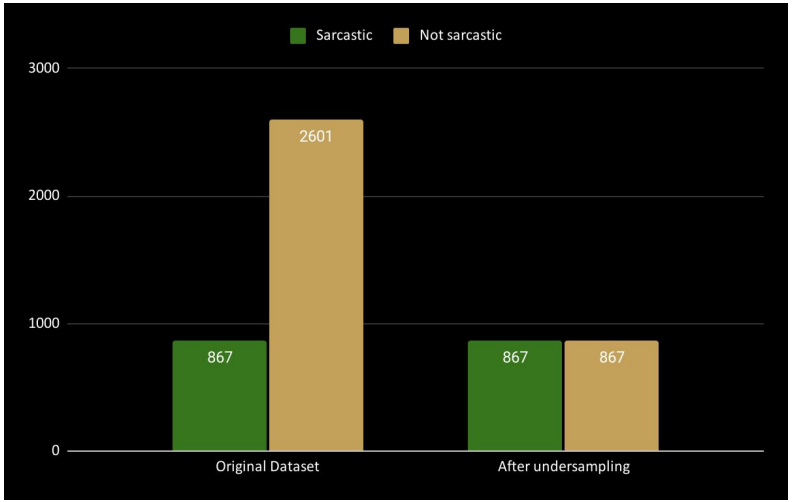
Distribution of classes in the training and testing data



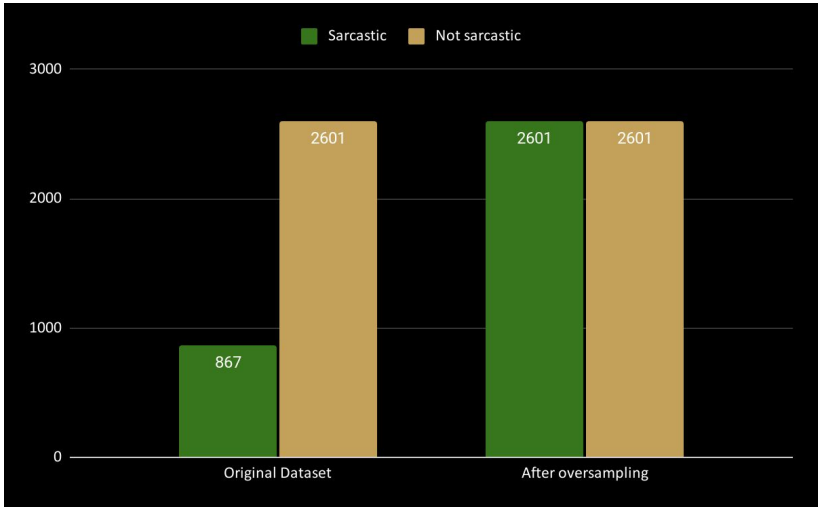
- For Task 1, the sarcastic class is a minority class (1:3 in the training data and 1:6 in the testing data)
- For Task 2, the dataset is balanced for both training and testing

Handling class imbalance for Task 1

Approach 1 - Undersample the non-sarcastic class

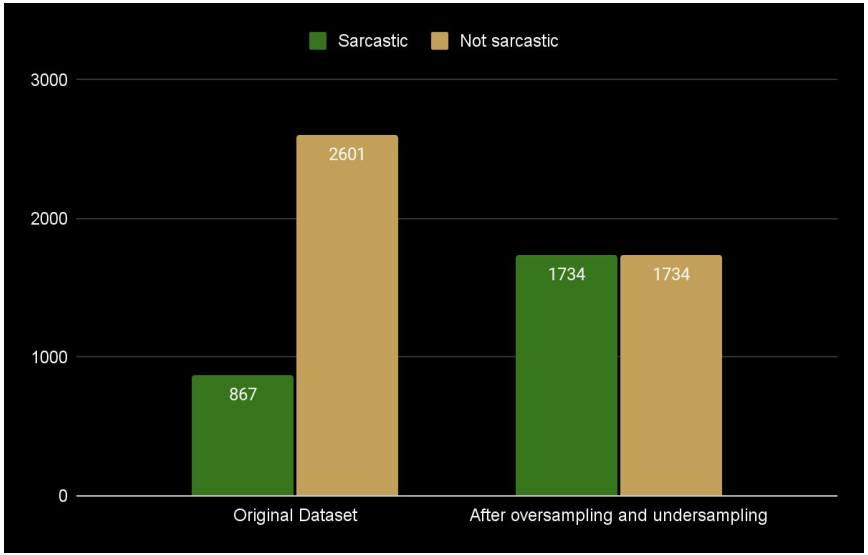


Approach 2 - Oversample the sarcastic class



Handling class imbalance for Task 1

Approach 3 - Both Undersampling and Oversampling

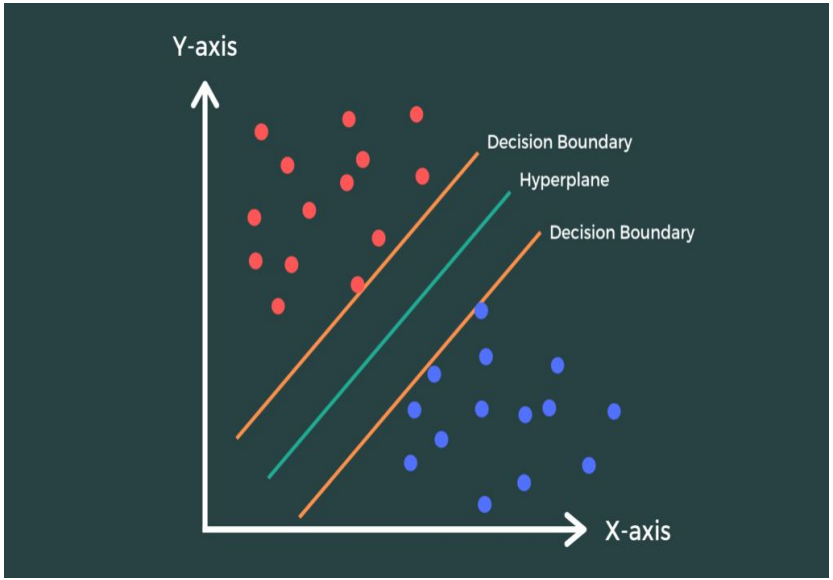


Approach 4 - Weighted loss function

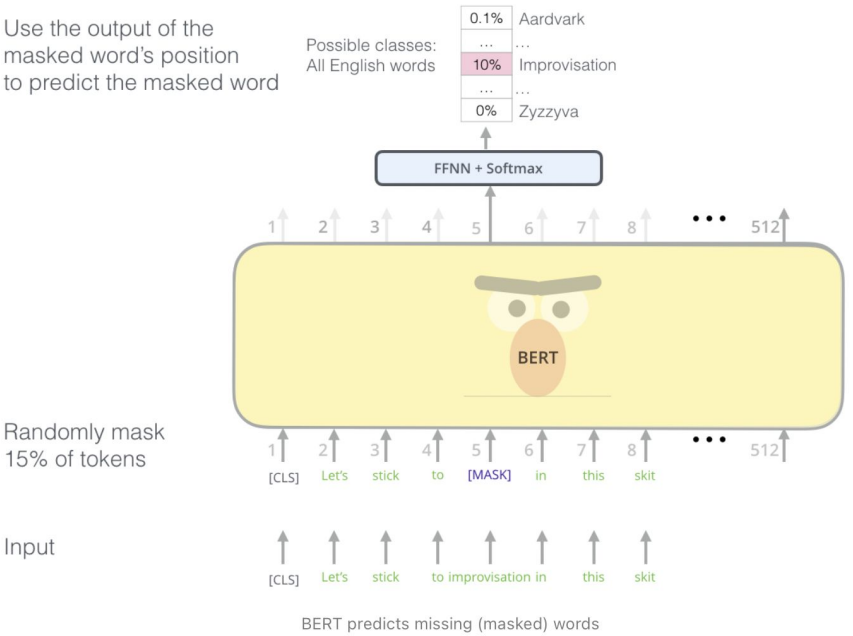
- Use Cross Entropy loss function with class weights

Models

Baseline Model - SVM (Support Vector Machine)

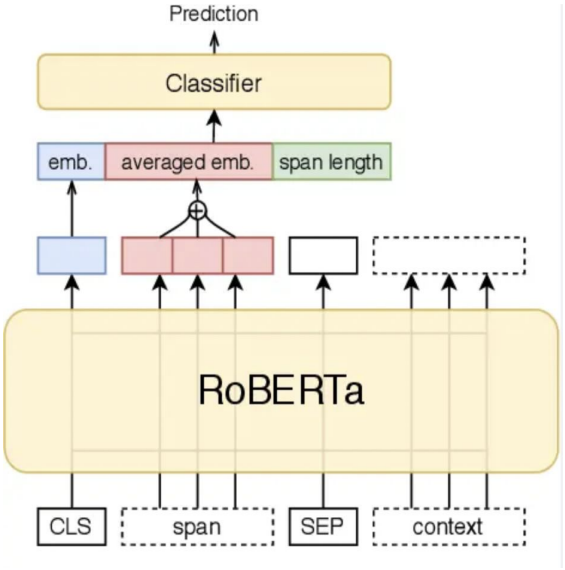


BERT

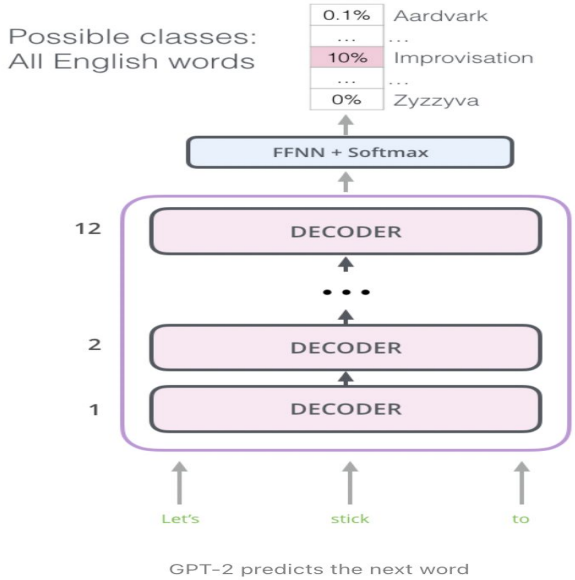


Models

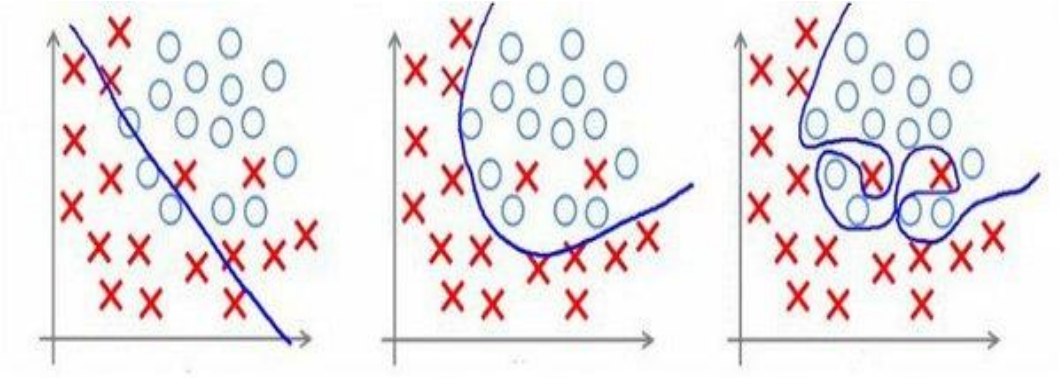
roBERTa



GPT-2



Model development



Under-fitting

(too simple to explain the variance)

Appropriate-fitting

Over-fitting

(forcefitting -- too good to be true)

- Epochs : 1 to 4
- Batch size : 64
- Optimizer : Adam
- Loss function: Cross Entropy

Preprocessing steps for SVM Model

- Removing non alphanumeric characters
  - Punctuation signs
  - emojis
- Lower casing
- Tokenizing
- Stop words removal
- Lemmatizing

Preprocessing example for SVM model

My eldest is having a wild Friday night out. She's going to bingo. 😂

keeping only alphanumeric characters

My eldest is having a wild Friday night out She s going to bingo

lower casing

my eldest is having a wild friday night out she s going to bingo

tokenizing

[‘my’, ‘eldest’, **‘is’**, **‘having’**, ‘a’, ‘wild’, ‘friday’, ‘night’, ‘out’, ‘she’, ‘s’, **‘going’**, ‘to’, ‘bingo’]

lemmatizing

[‘my’, ‘eldest’, **‘be’**, **‘have’**, ‘a’, ‘wild’, ‘friday’, ‘night’, ‘out’, ‘she’, ‘s’, **‘go’**, ‘to’, ‘bingo’]

stop words removal

[‘eldest’, ‘wild’, ‘friday’, ‘night’ , ‘go’, ‘bingo’]

BERT Tokenizer (padding = 15)

A wrong impression is once again my specialty

[CLS]	a	wrong	impression	is	once	again	my	specialty	[SEP]
[PAD]	[PAD]	[PAD]	[PAD]	[PAD]					

Input Ids

101	1037	3308	8605	2003	2320	2153	2026	12233	102
0	0	0	0	0					

Attention Masks

1	1	1	1	1	1	1	1	1	1
0	0	0	0	0					

Tokenization process for Task 2 (padding = 20)

Sarcastic : A wrong impression is once again my specialty
Rephrase : Unfortunately I made the wrong impressions again

First Tokenization - Sarcastic text followed by rephrase (label = 0)

[CLS]	a	wrong	impression	is	once	again	my	specialty	[SEP]
unfortunately	i	made	the	wrong	impressions	again	[SEP]	[PAD]	[PAD]

Token type ids

0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	0	0

Attention Masks

1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	0	0

Tokenization process for Task 2 (padding = 20)

Sarcastic : A wrong impression is once again my specialty
Rephrase : Unfortunately I made the wrong impressions again

Second Tokenization - Rephrase followed by sarcastic text (label = 1)

[CLS]	unfortunately	I	made	the	wrong	impressions	again	[SEP]	a
wrong	impression	is	once	again	my	specialty	[SEP]	[PAD]	[PAD]

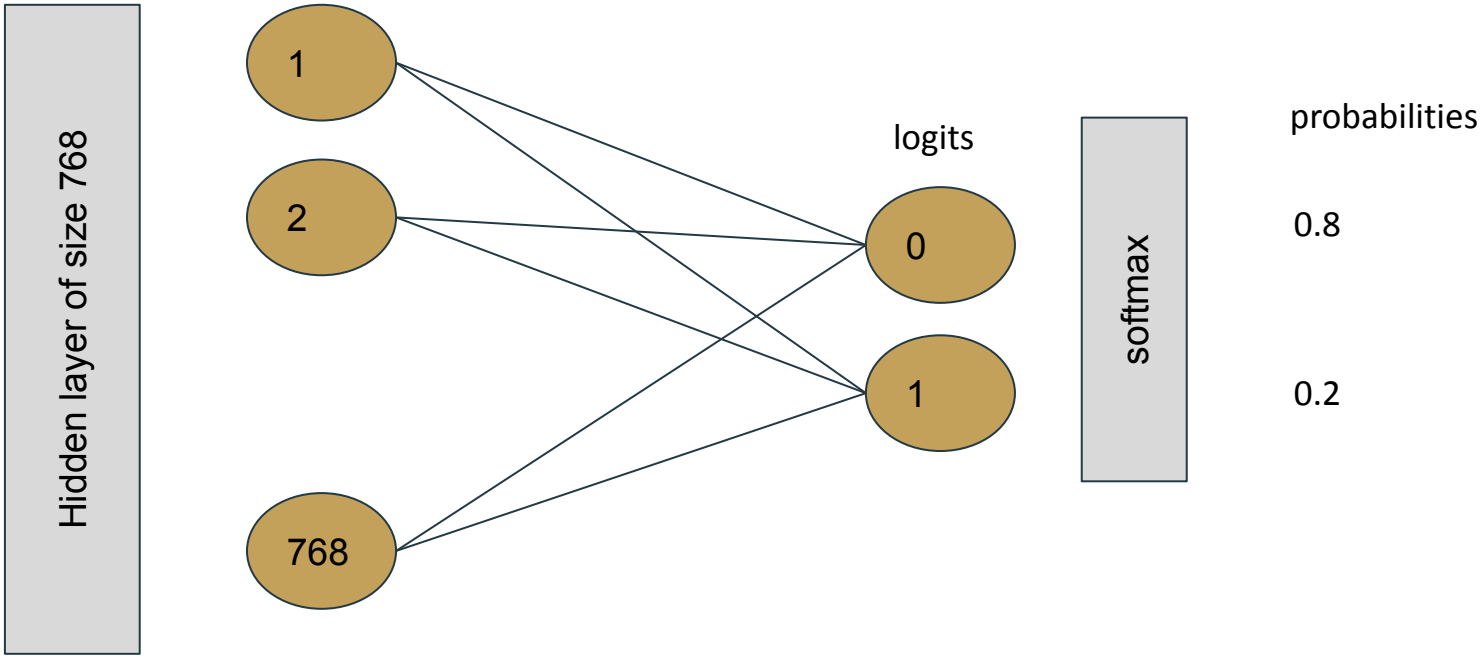
Token type ids

0	0	0	0	0	0	0	0	0	1
1	1	1	1	1	1	1	1	0	0

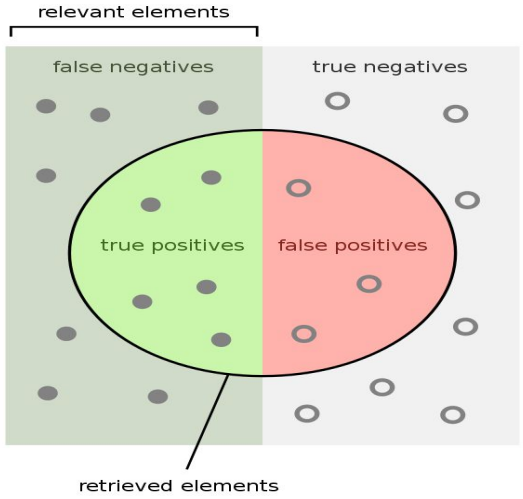
Attention Masks

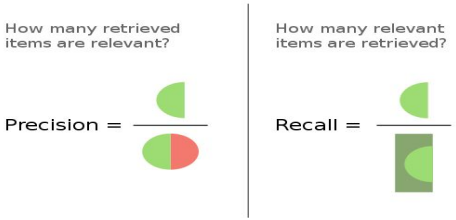
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	0	0

Classifier Head added on top of transformer models



Precision, Recall, Accuracy and F1 score





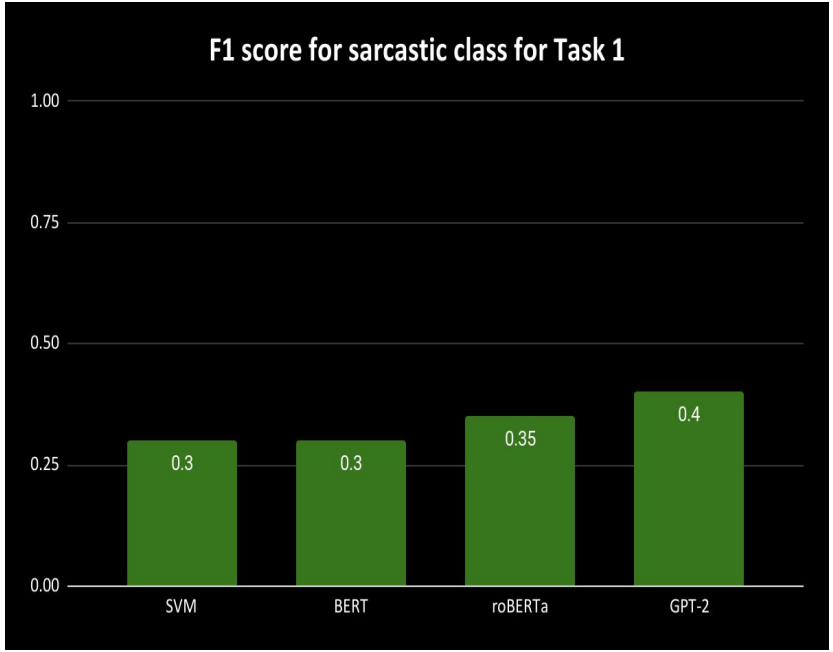
$$\text{precision} = \frac{\text{tp}}{\text{tp} + \text{fp}}$$

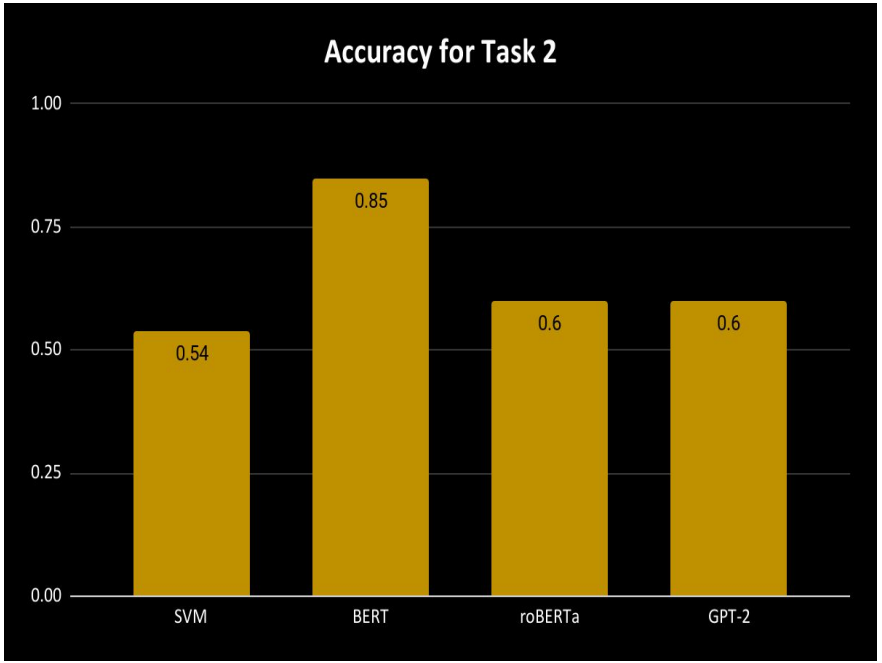
$$\text{recall} = \frac{\text{tp}}{\text{tp} + \text{fn}}$$

$$\text{accuracy} = \frac{\text{tp} + \text{tn}}{\text{tp} + \text{tn} + \text{fp} + \text{fn}}$$

$$\text{F}_1\ \text{score} = 2 \times \frac{\text{precision} \times \text{recall}}{\text{precision} + \text{recall}}$$

Results


F1 score for sarcastic class for Task 1
1.00
0.75
0.50
0.25
0.00
0.3
0.3
0.35
0.4
SVM
BERT
roBERTa
GPT-2


Accuracy for Task 2
1.00
0.75
0.50
0.25
0.00
0.54
0.85
0.6
0.6
SVM
BERT
roBERTa
GPT-2

Remarks

- Attempting to classify text as sarcastic or non-sarcastic in isolation is a difficult task
- It will be helpful to model the context of the conversation

Thank you for your attention