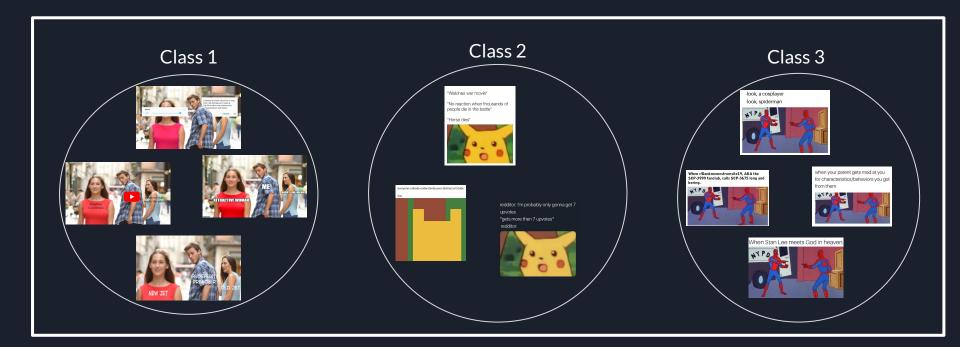
Meme Analysis And Classification

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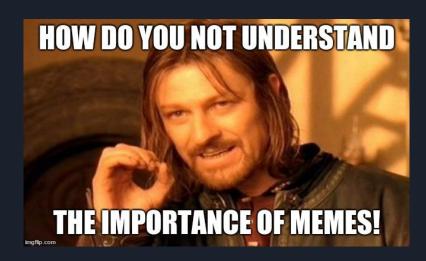
RESEARCH PROBLEM

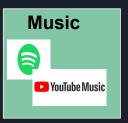
Analysing meme data to classify memes into categories by identifying important features.



Motivation

Internet memes have revolutionized the way we incorporate humor into communication over the recent years









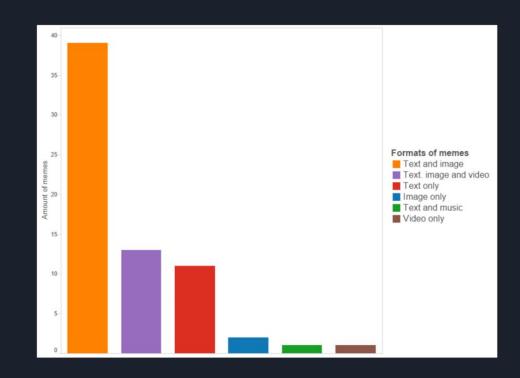


Entertainment Sources

HIGH LEVEL APPROACH

CLASSIFICATION

- Text (Content)
- Image (Template)



DATA

Web Scraping

- Sub reddit memes- content based memes
- Meme generator- template based memes

Train/ Test data Ratio: 80:20

awkward_moment_sealion	50
bad_luck_brian	50
distracted_boyfriend	50
hackerman	50
hackerman	50
pikachu_o	50

Templates and count

Student life	200
COVID-19	200
Depression	200
Climate	200
Election	200
TV Show	200

Content and count

Step 1. Classification Based on Template (Visual Data)

Radial Colour Histogram of the image.

Color + Composition Information



Convert RGB To HSV



Log transformation of pixel counts to help focus on the little differences



TESTING

Predicts
Meme Template Labels
Accuracy = 0.97



TRAINING

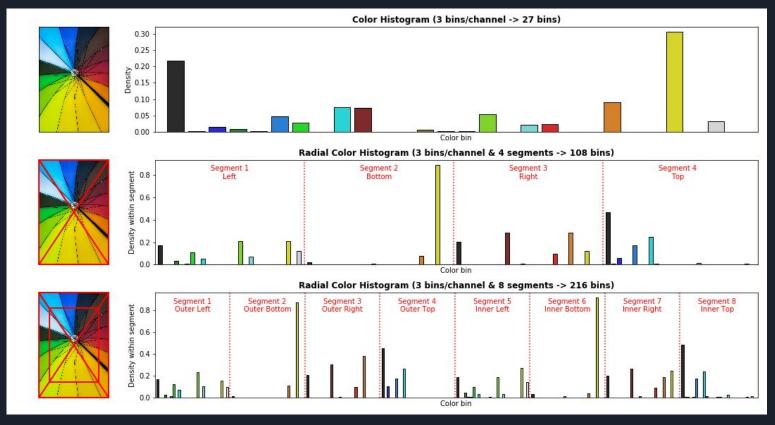
SVM(Features, Labels)

Linear Support Vector Machine



8 bins per channel (instead of 3)

2048 features (instead of 108)

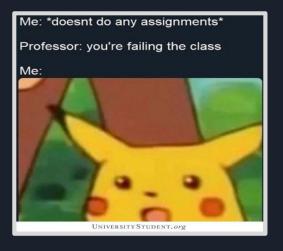


 $8 ^ 3 \Rightarrow 512$ bins per segment (8 bins per channel)

8 segments * 512 = 4096

Step 2. Classification Based on the Content (Textual Data)

- Run Optical Character Recognition on the image to extract text
- Output from Tesseract OCR:





```
Me: *doesnt do any assignments*
Professor: you're failing the class
es
a |
UNIVERSITY STUDENT
```

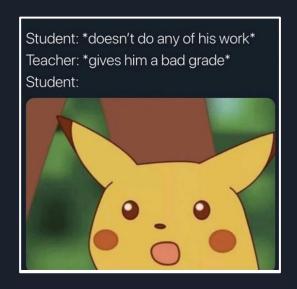
- Clean the input:
 - Remove extra/ non alphabetic characters
 - Keep only valid english characters
 - Stopwords removal

[Me doesnt do any assignment Professor youre failing the class]

- Merge all text data from the same classes
- Extract text features
 - Compute TF-IDF feature vector for train and test data
- Feed input to Supervised Machine Learning Algorithm- Naive Bayes
- Predict class of the testing data

ACCURACY: 0.87

• Classify on the basis of both Content and Template:



[Meme_Template_Label, Content_Label]

[Surpised_pickachu, Student_Life]

Accuracy of combined features: 0.85

Results

- Accuracy metric= Correctly predicted class/ Total Input
- Template based classification
 - Accuracy = 0.97
- Text based classification
 - Accuracy = 0.87
- Combined classification accuracy
 - \circ Accuracy = 0.85

Insights And Limitations

• Not every meme will follow a Fixed Template.

In such cases it is important to understand the sentiment conveyed by the image and not just composition information.

LABEL = Stress or Depression



 Cannot predict upvotes on the basis of just meme features, need user related data as well.

Insights And Limitations

- Structure of memes-positions and color of image and text are fixed for each template. Hence, composition information can be used to classify memes on the basis of template.
- There are common words used within a fixed template as well which can be used to classify memes into different templates.
- Contextual Information of the sentences used in the meme using word2vec or BERT might be helpful to predict the sentiment of the meme along with the visual understanding of image using CNN.

Future Work

- Extract emotion of the meme-humour, sarcasm, offensive, and motivational.
- Try to predict upvotes by using both social network information related to users as well as these features of meme. (Content Based recommendation)
- Use Convolutional Neural Network :
 - Classify memes based on the context depicted by visuals of the image
 - Improve OCR output to avoid partial text retrieval problems

Thank you