Literature Review (Secondary Research) Template

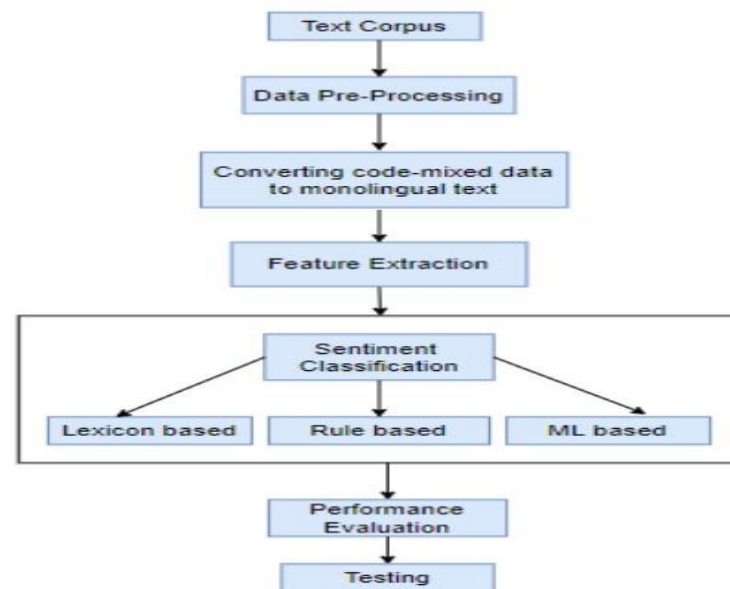| Student Name	A.Rohan
Project Topic Title	Emotion recognition from text and feedback analysis using deep learning

1		
Reference in APA format		
URL of the Reference	**Authors Names and Emails**	**Keywords in this Reference**
https://ieeexplore.ieee.org/document/9544554	Priyanka Awatramani Rucha Daware Hrushabhsingh Chouhan Anmol Vaswani Sujata Khedkar	Sentiment Analysis, Data Preprocessing, Hinglish, Natural Language Processing, Code-Mixed Text, TF-IDF features, Logistic Regression, Random Forest, SVM, KNN, Machine Learning, Lexicon Based Approach, Rule based approach
The Name of the Current Solution (Technique/ Method/ Scheme/ Algorithm/ Model/ Tool/ Framework/ ... etc)	**The Goal (Objective) of this Solution & What is the problem that need to be solved**	**What are the components of it?**
Lexicon based approach Rule based approach ML algorithms (SVM,Logistic Regression,KNN,Random Forest)	The aim of this paper is to solve the limitations and challenges by studying and analyzing the different approaches to tackle the Hinglish text.	Handling data with noise, Case folding, Punctuation Removal, Special character removal, Spelling Correction, Stop-Word Removal

	The Process (Mechanism) of this Work; Means How the Problem has Solved & Advantage & Disadvantage of Each Step in This Process		
	Process Steps	**Advantage**	**Disadvantage (Limitation)**
	The datasets that have been considered here IIITH and SemEval , the first approach to the problem was to convert the Hindi Language to the English Language using Google Cloud Translate API	Balanced dataset plays a crucial role	
2	The API only detects the Hindi Language if the input given to it is written in Devanagari Script. For this purpose, there was a need to convert the romanized Hindi text to Devanagari Text using Indic-Transliteration API.	The hindi language in the text is converted to english easily using the APIS	
3	Also Here the simple steps such as preprocessing has been done consisting of handling noisy data,case folding,punctuation removal,special character removal, etc. Also, in the data given the spellings of the words can also be wrong so spelling correction is also needed to be done	Sentiments can be properly be detected because here spelling correction is also done.	
	Then after here the code mixed data is converted into monolingual data and on this text/data sentiment classification is carried out		
5	The sentiment classifications that can be used here are: Lexicon based, Rule based, ML based Lexicon based:-AFINN Rule based:-TextBlob, Vader sentiment	Varied classification approaches helps in accurately classifying the sentiments	The NLP based approach much rely on the weightage of emotion related words which means that they are not beneficial for long term dependencies

		ML based: SVM,KNN,Random Forest,Logistic Regression		
6		Analyze the performance of chosen sentiment classification and the analysis of sentiment of hinglish text is done.		Focused on classification of sentiments not on the emotions

Major Impact Factors in this Work

Dependent Variable	**Independent Variable**	**Moderating variable**	**Mediating (Intervening) variable**
Sentiment(Positive,negative,neutral)	Set of Sentences, tweets		

Relationship Among The Above 4 Variables in This article

Input and Output	**Feature of This Solution**	**Contribution & The Value of This Work**

Input	Output
Hinglish text(Hindi+English)	Detecting sentiment present in the given text, either positive,negative or neutral

1. The solution handles code-mixed text

2. A novel romanized Hindi dictionary is created using sentiment scores from HindiSentiWordNet. This helps overcome the lack of Hindi resources.

Good to have this knowledge from this paper, as we got better understanding about how to handle hinglish text and also gained insights about lexicon and rule based approach for sentiment analysis.

Positive Impact of this Solution in This Project Domain	Negative Impact of this Solution in This Project Domain
Both NLP based approaches and ML approaches have been used in order to accurately determine sentiments. Also, the dictionary based approach used, i.e a dictionary of Romanized Words derived from Hindi SentiWordNet is helpful for properly translating hindi to english	The research focuses only on Hindi-English code-mixing. It may not generalize well to other language pairs without further study.

Analyse This Work By Critical Thinking	The Tools That Assessed this Work	What is the Structure of this Paper
This work is good, as they tried to provide a good solution for sentiment analysis for hinglish text because on social media the text written is not always english it can be english in addition with the regional language (Hindi) so it is important to understand the sentiments in hinglish text.	Accuracy, Precision,Recall	Abstract I. Introduction II. Related Work III. Problem Definition IV. DataSet V. Methodology VI Results VII. Conclusion and Future work

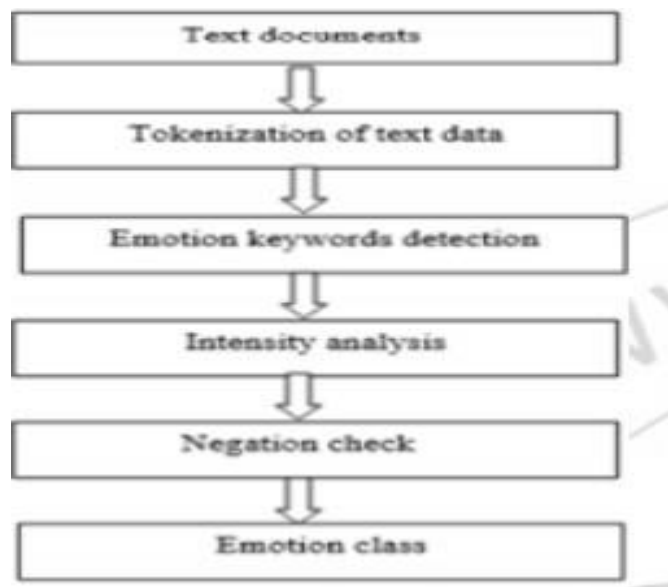| Diagram/Flowchart |
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2

Reference in APA format		
URL of the Reference	**Authors Names and Emails**	**Keywords in this Reference**
https://www.ijsr.net/archive/v5i5/NOV163818.pdf	Ashish V C Somashekar R Dr. Sundeep Kumar	Digital systems, Human Behavior, Emotion, Intelligent Behavior, Human Express, plain text and Hybrid Based Approach
The Name of the Current Solution (Technique/ Method/ Scheme/ Algorithm/ Model/ Tool/ Framework/ … etc)	**The Goal (Objective) of this Solution & What is the problem that need to be solved**	**What are the components of it?**
Keyword spotting method, Lexical Affinity Method, learning based method and hybrid methods	appropriately identifying the emotion in text and analyzing various approaches	Text document preprocessing the data Tokenization of data Emotion keyword detection Intensity analysis Negation check Emotion class
The Process (Mechanism) of this Work; Means How the Problem has Solved & Advantage & Disadvantage of Each Step in This Process		
Process Steps	**Advantage**	**Disadvantage (Limitation)**

1		Firstly, dataset needs to be considered and then after preprocessing of the data needs to be carried out.		
2		And then after tokenization is carried out after that various approaches are considered those are:- keyword based, Lexical Affinity Method, learning based method and hybrid methods		
		The keyword based approach identifies the emotion related words and then analysis of the intensity of the emotion words is performed. The sentence is checked whether negation is presented in it or not then finally an emotion class will be found as the required output.	Simple and easy to implement	It is not a reliable method because it totally depends on the emotional related keywords as the meanings of keywords could be multiple and vague
4		The other approach is lexical affinity based approach, which is an extension of keyword based approach here it assigns probabilistic affinity for a particular emotion word	Uses probabilities for arbitrary words, not just keywords	Probabilities can be biased by corpus and doesn't recognize emotions
5		The other approach can be used is lexicon based approach here counting of number of emotion related words and then the emotion label of the text is determine	Identifies the class of emotion based on count such that if there are varied emotional words then that can be identfied properly as compared to keyword and lexical affinity based	
		And, other approaches can be used are using SVM, and hybrid based approach		
7		Here, the hybrid based approach is combination of the keyword based method and learning based method.	Hybrid based approach achieves good accuracy as compared to other approaches	

Major Impact Factors in this Work

Dependent Variable	Independent Variable	Moderating variable	Mediating (Intervening) variable
Emotions	Set of text		

Relationship Among The Above 4 Variables in This article

Input and Output	Feature of This Solution	Contribution in This Work
<table><tr><th>Input</th><th>Output</th></tr><tr><td>text document is taken as input</td><td>output is generated as an emotion class</td></tr></table>	1.Detects six different emotions. 2.Some covered techniques support multilingual emotion detection across languages.	It was good to have knowledge about various approaches for recognizing emotion from text where the simple and complex approaches help in recognizing emotion from simple text to moderate text.

Positive Impact of this Solution in This Project Domain	Negative Impact of this Solution in This Project Domain
Varied approaches have been discussed for emotion detection from text such that the methods can be used on the basis of type of text.	A firm solution/method has not been provided that can be helpful for detecting complex emotions or text.

Analyse This Work By Critical Thinking	The Tools That Assessed this Work	What is the Structure of this Paper

The work is good as they tried to provide varied solutions for detecting emotion from text because there are varied approaches for recognizing emotion ranging from simple to complex. However the performance of the emotion recognition from text can be enhanced by using the other approaches		Abstract 1. Introduction 2. Text Based Emotion Recognition Methods 3. Limitations 4. Text Normalization Techniques For Resolving Short Messaging Language 5. Conclusion

Diagram/Flowchart

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│      Text documents          │
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              ⬇
┌──────────────────────────────┐
│   Tokenization of text data  │
└──────────────────────────────┘
              ⬇
┌──────────────────────────────┐
│  Emotion keywords detection  │
└──────────────────────────────┘
              ⬇
┌──────────────────────────────┐
│      Intensity analysis      │
└──────────────────────────────┘
              ⬇
┌──────────────────────────────┐
│       Negation check         │
└──────────────────────────────┘
              ⬇
┌──────────────────────────────┐
│        Emotion class         │
└──────────────────────────────┘
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--End of Paper 2–

3

Reference in APA format		
URL of the Reference	**Authors Names and Emails**	**Keywords in this Reference**
https://ieeexplore.ieee.org/document/9230725	Juyana Islam Sadman Ahmed M. A. H. Akhand N. Siddique	Emotion Recognition, Emoticons, Deep Learning, Long Short-Term Memory.
The Name of the Current Solution (Technique/ Method/ Scheme/ Algorithm/ Model/ Tool/ Framework/ … etc)	**The Goal (Objective) of this Solution & What is the problem that need to be solved**	**What are the components of it?**
Long Short-Term Memory	To improve emotion recognition from microblog keeping semantic relation among texts and emoticons	Dataset Preprocessing Emoticon Representation Tokenization Embedding Layer LSTM Network
The Process (Mechanism) of this Work; Means How the Problem has Solved & Advantage & Disadvantage of Each Step in This Process		

	Process Steps	Advantage	Disadvantage (Limitation)
1	The dataset considered is a collection of english tweets. Primarily here, tweepy is used, which is a very useful library to collect data from twitter.		Smaller dataset is prefered, instead larger dataset can be used.
	Then, after data preprocessing is carried out inorder to clean the data here, the cleaning involves case conversion, hashtag and username removal, punctuation removal	Preprocessing is an important step for removing inconsistencies.	
3	as here the text consists of emoticons here emoticons needed to be converted in to corresponding meanings using the function Emoticon meaning(). Here it uses lookup table for knowing the meaning	Emoticons are converted into text so that emotions can be predicted accurately.	
4	then after tokenization is carried where integer encoding of texts is performed.		
5	Here LSTM is considered further, Finally the embedding step transforms integer value transforms in to a dense 2D vector	Word embeddings capture semantic meaning and relationships between words/emoticons.	Instead of LSTM other models such as BI-LSTM
	A softmax output layer finally converts this context vector to probabilities over the emotion classes.		
7	The highest probability class is taken as the predicted emotion for the microblog		Only 4 emotions are considered love,happy,sad,angry

Major Impact Factors in this Work			
Dependent Variable	**Independent Variable**	**Moderating variable**	**Mediating (Intervening) variable**
Emotion	Set of microblogs, text, emoticons		

Relationship Among The Above 4 Variables in This article

Input and Output	Feature of This Solution	Contribution & The Value of This Work
<table><tr><th>Input</th><th>Output</th></tr><tr><td>Text is given as input</td><td>Emotion in text</td></tr></table>	1. The textual data is in the form of sequential manner so the model which is used (LSTM) is best suitable for text such that it can find the emotion hidden in it accurately. 2. Here, emoticons are fused into text embeddings.	It was good to have the knowledge, as we got to know the significance of considering emoticons as a valid data item in increasing the accuracy of model and also what kind of model to be chosen for sequential data

Positive Impact of this Solution in This Project Domain	Negative Impact of this Solution in This Project Domain
Better understanding of emotions expressed in microblogs by incorporating emoticons along with text.	Tested only on Twitter data. Effectiveness for other social media platforms or textual domains is unclear.

Analyse This Work By Critical Thinking	The Tools That Assessed this Work	What is the Structure of this Paper

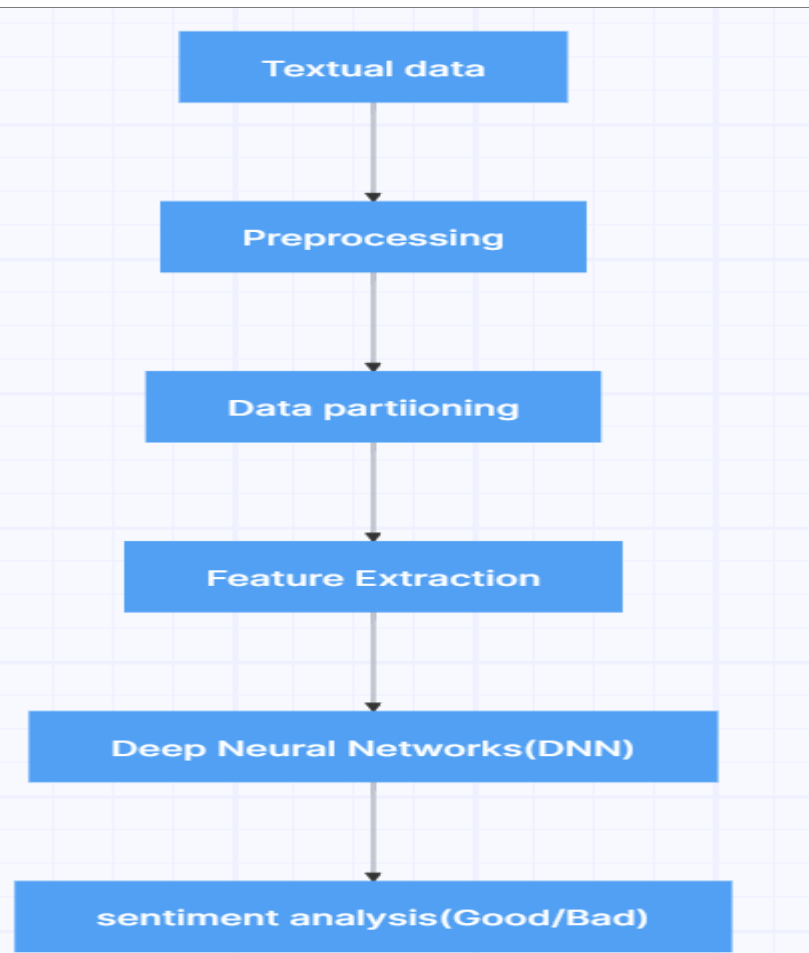| The work done is good because textual data is spread over microblogs/social media so identifying the emotions in the text plays an crucial role and always the text is not of words as now a days many are preferring the usage of emoticons, so identifying the emotions hidden in the text by considering the text as well as emoticons is crucial . So,here the solution suggested helps in finding the emotion in the text accurately.	Confusion matrix, Accuracy score	Abstract 1.Introduction 2. Improved emotion recognition from microblog focusing on both emoticon and text 3.Experimental Studies 4. Conclusion

Diagram/Flowchart

--**End of Paper 3-**

4

Reference in APA format		
URL of the Reference	**Authors Names and Emails**	**Keywords in this Reference**
https://ieeexplore.ieee.org/document/93927 10	Mahmud Hasan Munna Md Rifatul Islam Rifat A. S. M. Badrudduza	Sentiment Analysis, Online Product Review Classification, E-commerce, Bangla NLP, Deep Learning.
The Name of the Current Solution (Technique/ Method/ Scheme/ Algorithm/ Model/ Tool/ Framework/ … etc)	**The Goal (Objective) of this Solution & What is the problem that need to be solved**	**What are the components of it?**
Deep Neural Network and Natural Language Processing	developed two Deep Neural Network (DNN) based models for review based classification and sentiment analysis.	Data Preprocessing Removing Stop-words Removing Punctuation Removing Unnecessary Characters Data Partitioning Feature Extraction

The Process (Mechanism) of this Work; Means How the Problem has Solved & Advantage & Disadvantage of Each Step in This Process		

	Process Steps	Advantage	Disadvantage (Limitation)

1	Firstly, for dataset here, product reviews have been collected from various e-commerce sites such as Daraz, BDshop and Evally	Real-world ecommerce data		
2	Then, after data preprocessing is carried out involving stop words removal, punctuation removal, unnecessary character removal.	Cleaned and normalized data Improves model performance	Time-consuming process	
	Then after data partitioning is carried out where data is partitioned in to training,validation and test data			
	pre-trained FastText word embeddings to extract features	Helpful in capturing proper semantic meaning		
5	Then after Deep neural network model has been considered where one DNN model is for sentiment analysis and other DNN is for product reviews classification		Computationally expensive	
6	And the number of neurons in the input and out layers is decided based on the shape of training dataset where as number of neurons for output layer is decided up on number of classes			
	Then after number of hidden layers will be considered and followed by activation function	It defines the complexity and efficiency of DNN architecture		
8	The optimization is considered here to be Adam	It has relatively low memory requirements		
9	Finally, the DNN is made ready and the performance will be evaluated using accuracy,precision,recall and F1 score			

Major Impact Factors in this Work			

Dependent Variable	Independent Variable	Moderating variable	Mediating (Intervening) variable
Type of review	Product review text		

Relationship Among The Above 4 Variables in This article

Input and Output	Feature of This Solution	Contribution & The Value of This Work
<table><tr><td> </td><td> </td></tr><tr><td>Product reviews given as input</td><td>Reviews classified as good/bad as part of sentiment analysis or in to 4 classes as a part of product review classification</td></tr></table>	1. Uses deep neural network architecture for text classification tasks. Can capture semantic information better than traditional ML models. 2. classifies the product reviews in to 4 classes that can be helpful in proper analysis of reviews	It was good to have knowledge about the significance of DNN for sentiment analysis and classification of product reviews. Also got to know about the important parameters of DNN and how to assign them.

Positive Impact of this Solution in This Project Domain	Negative Impact of this Solution in This Project Domain
the solutions helps the e-commerce domain by harnessing NLP to extract insights from reviews. This is helpful for both customers and businesses.	The model's mediocre accuracy can lead to misclassifications of reviews.

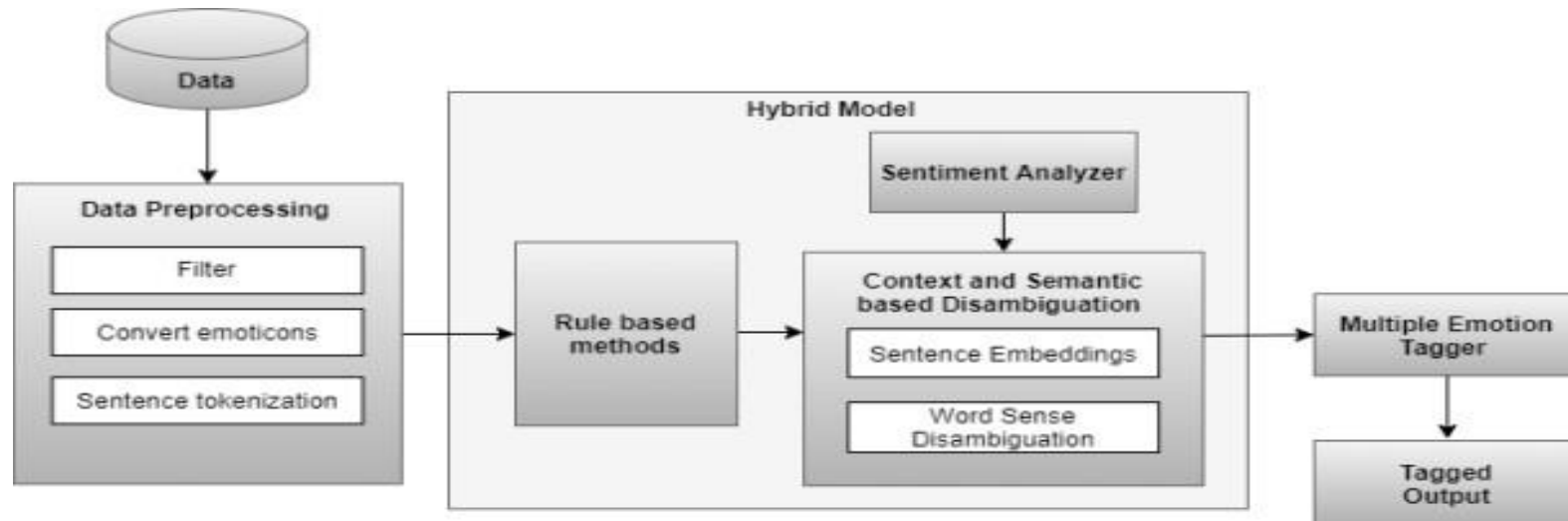| Analyse This Work By Critical Thinking	The Tools That Assessed this Work	What is the Structure of this Paper
The work done is good as they tries to provide a good solution for both sentiment analysis and product reviews classification by using the DNN models, they have not only focused on particular classes for product reviews they have focussed on various classes such as recommended,complain,wrong delivery, and appreciation these varied classifications can help the e-commerce platforms, customers and merchants to better understand about their products and satisfaction level of customers.	Accuracy score, Precision	Abstract 1. Introduction 2. Related Work 3. Dataset Description 4. Data Preprocessing 5. Methodology 6. Result and Analysis 7. Conclusion 8. References

Diagram/Flowchart

--End of Paper 4—

5

Reference in APA format		
URL of the Reference	**Authors Names and Emails**	**Keywords in this Reference**
https://ieeexplore.ieee.org/document/9633843	Mahima M A, Nidhi C Patel, Srividhya Ravichandran, Aishwarya N Sumana Maradithaya	Text Mining, Multiple Emotion Detection, Natural Language Processing, Sentence embeddings, Cosine Similarity, Ekman's emotions
The Name of the Current Solution (Technique/ Method/ Scheme/ Algorithm/ Model/ Tool/ Framework/ ... etc)	**The Goal (Objective) of this Solution & What is the problem that need to be solved**	**What are the components of it?**
a new hybrid methodology for the detection of multiple emotions from the text using sentence embeddings along with rule based techniques.	The goal is to detect the multiple emotions present in the text and also if emoticons are used in text how can they be used in detecting the emotions.	Datasets Preprocessing Hybrid Model Multiple Emotion Tagger

The Process (Mechanism) of this Work; Means How the Problem has Solved & Advantage & Disadvantage of Each Step in This Process			
	Process Steps	**Advantage**	**Disadvantage (Limitation)**
1	The datasets used in this model include: ISEARs, MELD, EmoDB, GoEmotions, and their combinations.	Combining multiple datasets like conversations, social media and generic text makes the model more robust.	

2	Preprocessing of data is carried out, including Filtering, converting emoticons, and sentence tokenization	Conversion of emoticons helps in more precisely detecting/identifying the emotions	
	next the Hybrid model consists mainly of the Rule-based methods, Sentiment Analyzer and the Context and Semantic based Disambiguation model.		Rules and similarity matching have limitations for handling very complex language use cases.
4	The hybrid model has been developed by comparing two state-of-the art pre-trained models known as Sentence-BERT and InferSent.	Here the cosine similarity helps to find the closest matching sentences from the training set.	Need to train and ensemble multiple models (Sentence-BERT, InferSent) which increases complexity.
5	The Tagger gets the scores and assigns the respective emotions to each sentence and these emotions are combined to get the overall emotions present in the text	This allows capturing transitions in emotions within a text.	Restricted to only Ekman's basic emotions. Does not detect more complex or nuanced emotions.

Major Impact Factors in this Work

Dependent Variable	Independent Variable	Moderating variable	Mediating (Intervening) variable
Multiple emotions	Set of text, emoticons		

Relationship Among The Above 4 Variables in This article

Input and Output	Feature of This Solution	Contribution in This Work
	1. Able to detect multiple emotions present within a single text by splitting using rule-based techniques. 2.Employs similarity technique to find most similar sentences for emotion assignment	It was good to have this knowledge, as we got to know how to deal with the ambiguities in the words that can alter the recognition of emotion

Input	Output
Given input as text	identifying the multiple emotions hidden in the text

Positive Impact of this Solution in This Project Domain	Negative Impact of this Solution in This Project Domain
Provides more contextual disambiguation of emotional language by combining semantic similarity and sentiment analysis	Requires large pretrained models like SentenceBERT and InferSent which are computationally expensive to run compared to simpler models.

Analyse This Work By Critical Thinking	The Tools That Assessed this Work	What is the Structure of this Paper
As we know, the text does not contain a single emotion it has multiple emotions hidden in it, so here, the work mainly focuses on identifying multiple hidden emotions and also tries to detect the emotions without any ambiguity.	Accuracy score	Abstract 1.Introduction 2.Methodology 3.Related Works 4. Experimentation and results 5. Conclusion and Future Work

Diagram/Flowchart

End of paper-5

<h1 style="text-align:center; color:red;">Work Evaluation Table</h1>

<Use the same factors you have used in "Work Evaluation Table" to build your own "Proposed and Previous comparison table ">

	Work Goal	System's Components	System's Mechanism	Features /Characteristics	Cost	Speed	Security	Performance	Advantages	Limitations /Disadvantages	Platform	Results
Priyanka Awatramani Rucha Daware Hrushabhsingh Chouhan Anmol Vaswani Sujata Khedkar 2021	The goal of this paper is to solve the limitations and challenges by studying and analyzing the different approaches to tackle the Hinglish text.	Handling data with noise, Case folding, Punctuation Removal, Special character removal, Spelling Correction, Stop-Word Removal	Lexicon based approach Rule based approach ML algorithms (SVM,Logistic Regression,KNN,Random Forest)	1. The solution handles code-mixed text 2.A novel romanized Hindi dictionary is created using sentiment scores from HindiSentiWordNet. This helps overcome the lack of Hindi resources.	-	-	-	Out of all the approaches the SVM(Support Vector Machine) and Logistic Regression have performed well	The hindi language in the text is converted to english easily using the APIS Sentiments can be properly be detected because here spelling correction is also done.	Focused on classification of sentiments not on the emotions	Python	Varied approaches have been discussed and evaluated through accuracy, precision and the accuracy obtained is 86%

| Ashish V C Somashekar R Dr. Sundeep Kumar 2016 | The goal of this paper is to appropriately identifying the emotion in text and analyzing various approaches | Text document,preprocessing the data, Tokenization of data, Emotion keyword detection, Intensity analysis, Negation check,Emotion class | Keyword spotting method, Lexical Affinity Method, learning based method and hybrid methods | Detects six different emotions. Some covered techniques support multilingual emotion detection across languages. | - | - | - | Hybrid based approach achieves good accuracy as compared to other approaches | Simple and easy to implement Identifies the class of emotion based on count such that if there are varied emotional words then that can be identfied properly as compared to keyword and lexical affinity based | It is not a reliable method because it totally depends on the emotional related keywords as the meanings of keywords could be multiple and vague | Python | Understood the limitations of existing approaches and as an result it can be understood that the hybrid approaches perform better. |

Juyana Islam Sadman Ahmed M. A. H. Akhand N. Siddique 2020	To improve emotion recognition from microblog keeping semantic relation among texts and emoticons	Dataset Preprocessing Emoticon Representation Tokenization Embedding Layer LSTM Network	Long Short-Term Memory	The textual data is in the form of sequential manner so the model which is used (LSTM) is best suitable for text such that it can find the emotion hidden in it accurately. Here, emoticons are fused into text embeddings.	-	-	-	Comparing the text where the emoticons are eliminated it has been observed that the performance is not good as compared with the text where emoticons are considered.	Word embeddings capture semantic meaning and relationships between words/emoticons.	Python	The accuracy obtained is 82.1%

Mahmud Hasan Munna, Md Rifatul Islam Rifat, A. S. M. Badrudduza 2020	developed two Deep Neural Network (DNN) based models for review based classification and sentiment analysis.	Data Preprocessing Removing Stop-words Removing Punctuation Removing Unnecessary Characters Data Partitioning Feature Extraction	Deep Neural Network and Natural Language Processing	Uses deep neural network architecture for text classification tasks. Can capture semantic information better than traditional ML models.	-	-	-	The Performance of the model is good for sentiment analysis as compared with product review classification	Helpful in capturing proper semantic meaning Activation functions define the complexity and efficiency of DNN architecture	Computationally expensive	Python	The sentiment analysis obtained an accuracy of 84% and product review classification obtained an accuracy of 69%

| Mahima M A, Nidhi C Patel, Srividhya Ravichandran, Aishwarya N Sumana Maradithaya

2021 | The goal is to detect the multiple emotions present in the text and also if emoticons are used in text how can they be used in detecting the emotions. | Datasets

Preprocessing

Hybrid Model

Multiple Emotion Tagger | a new hybrid methodology for the detection of multiple emotions from the text using sentence embeddings along with rule based techniques | Able to detect multiple emotions present within a single text by splitting using rule-based techniques.

Employs similarity technique to find most similar sentences for emotion assignment | - | - | - | Traditional approaches ignore the presence of disambiguities but, here using rules, sentiments and context the model looks to have good performance as compared t traditional approaches | Conversion of emoticons helps in more precisely detecting/identifying the emotions

allows capturing transitions in emotions within a text. | Rules and similarity matching have limitations for handling very complex language use cases. | Python | It can be observed that using EmoDBG Oemotions datasets With vsm produces highest classification with 57.447% |
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