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Informing Disasters Management by Using Twitter tweets

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Abstract: Recently social media plays a major role and providing information during disasters. This paper mainly focuses on how people used social media, especially Twitter, in response to the country's worst flood, Earthquake that had occurred recently.

And these tweets collecting analyzed using machine learning algorithms such as Naïve Bayes, Random Forests, Decision Tree, sentiment Analysis .during the disaster social media provides a surplus of information which includes information about the natural disaster, affected people's emotions, and relief efforts.

And collect the tweets relating to disasters and build the sentimental classifier to categorize the user's emotions during disaster based on various distress levels.

Various analysis techniques are applied in collecting tweets.

Keywords: Twitter Analysis, Sentiment Analysis, Random Forests, Naive Bayes, Decision Tree.

I. INTRODUCTION

Microblogging can form a short chat that allows the user to share chat messages by using the internet. There are many microblogging services available such as Twitter, Facebook, what's app, etc.

But my focus on this research paper is only on Twitter tweets, which allows only short message means tweets these tweets are generally 140 characters or less.

Microblogging is mainly focused on sharing information and tracking general people's opinions during any social, political, Natural Disaster, etc.

During any event of a natural disaster, social media has gained a lot of attention and additional crisis communication. And Twitter is most popular in microblogging sites by users sharing the messages, photos, videos for that disaster crises site globally. Twitter is real-time data generated by the user community. The behavior and emotions that users express from natural disaster crises site to be distributed to users across the globe.

II. RELATED WORK

Twitter plays a major role transmit information during natural disasters. The various methods and techniques are used to extract data from Twitter are described below

The work of Starbird, chatter used Twitter during the red river flood in central North America [1] They have collected all the tweets regarding the Red River Flood using the keyword #redriver.

And each tweet contains such as a tweet, retweet, geographical location approximation distance from the event, and tweets analysis under one of the following categories hopeful, fear, support, and humor.

The work of T.S.Aisha[2] mainly focuses on the 2014 Malaysia Flood that had fully destroyed Malaysia. the number of tweets messages during the flood period was very high as compared to the normal period. This mainly focuses on the satisfaction gained by the Twitter user from sharing information during the flood.

Most useful data for this work in [8],[9], and[10] analysis of user emotion and distributing the geographical location by using Twitter tweets.

Twitter is the best channel for a communication system for natural disasters [13]. Another people's sentiment analysis for disaster victim emotion and relief measurement [14].



Following Related Work as below

No.	Disaster	Finding	Country	Ref.no
1	Flood	Starbird et.al collect the Twitter tweets	North America	(K. Starbird, et al. Chatter
		during red river valley in north America		2010). [1]
		.and tweets were analyzed and categorized		
		including fear, support, hopeful		
2	Flood	Aisha et.al analyzed Malaysia Flood in 2014	Malaysia	(Aisha et al 2014).[2]
		.analyzed before or after the flood response		
		of the users as compared to the normal		
		period.		
3	Earthquake	The work of baek et.al collected tweets of	Japan	(Baek et.al 2013).[15]
		great east japan earthquake-related tweets		
		and analyzed the anxiety of the public		
		during the time of the earthquake.		
4	Typhoon	Takahashi et.al mainly focus typhoon haiyan	Philippines	(Takahashi 2015).[16]
		in Philippines. Collect the tweets and		
		observe the geographical location and		
		different types of users.		
5	Flood and	S.Vieweg mainly focuses on the red river	Oklahoma	(S. Vieweg 2010)[7]
	Grassfire	flood and Grassfire .mainly focus on how to		
		twitter effective contribution to situation		
		awareness about the natural disaster.		
6	Hurricane	J.B.Lee worked for sentiment analysis and	Philippines	(J.B.Lee 2014).[10]
		anxiety in the people before and after the		
		hurricane.		
7	Hurricane	B.mandel, A.culotto , A. Culotta, J.	Philippines	(B.mandel, A.culotto, A.
		Boulahanis, D. Stark, B. Lewis, and		Culotta, J. Boulahanis, D.
		J.rodrigue work for sentiment analysis and		Stark, B. Lewis, and
		anxiety in the people before and after during		J.rodrigue 2012).[14]
		hurricane.		
8	Hurricane	S. Kumar, G. Barbier, M. A. Abbasi, and H.	Philippines	(S. Kumar, G. Barbier, M.
		Liu, work for tweet tracker and analysis tool		A. Abbasi, and H. Liu
		for hurricane and disaster relief during the		2011).[18]
		hurricane.		
9	Flood	V. Lorini, C. Castillo, F. Dottori, M. Kalas,	-	(V. Lorini, C. Castillo, F.
		D. Nappo, P.		Dottori, M. Kalas, D.
		Salamon works show that EFAS flood		Nappo, P.
		forecasts can be successfully used to		Salamon,2019).[19]
		inform satellite imagery acquisition and		
		social media monitoring,		
		improving the timeliness and relevance of		
		the information collection and analysis and		
		prediction of natural disaster-affected areas.		
10	Flood, earthquake	Alexander (2014) identified seven ways in	-	(Alexander DE 2014).[20]
		which social media can be used in disaster		
		risk reduction and crisis response.		



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III. METHODS

A. Naive Bayes

Naive Bayes is a classification technique that gives prime importance to conditional independency between predictors. It is based on the assumption that all the attributes are conditionally independent. It is a statistical classifier that performs probabilistic prediction that predicts the class membership probabilities. Classification is based on Bayes Theorem. It is very useful for high-dimensional datasets and they are easy to build. The posterior probability P(c|x) is calculated from the likelihood P(x|c), class prior probability P(c), and predictor prior probability P(x). P(c|x) = (P(x|c) * P(c))/P(x). Features of Naive Bayes are

- 1) Prediction of a class for a test set is simple and easy.
- 2) Multiclass prediction is a key feature of Naive Bayes.
- 3) Class conditional independency is a limitation of Naive Bayes. This is because in real life it is difficult to get completely independent class predictors.
- 4) It works well for categorical data than numerical data

B. Decision Tree

The decision tree is a graph .and a decision tree is a branching method to exhibit every possible output for the decision. The tree is constructed in a top-down recursive divide and conquer manner. Initially, all the training samples are placed as the root element. They are partitioned recursively based on the selected attribute. The decision tree mainly consists of 2 nodes namely leaf nodes and decision nodes. A decision node or internal node contains 2 or more subspaces or branches, where each denotes the test on a particular attribute. Leaf node contains the resulting class label, classification, or decision. The decision tree is a classification technique that can handle both numerical and categorical data.

C. Random Forests

Random Forests is a machine learning algorithm used for both classification and regression. It is an ensemble learning method that involves the construction of multiple decision trees. Collections of decision tree classifiers are called Forests. Individual decision trees are generated during the training time by the random selection of attributes in each node, which will determine the split.

Each tree will give a classification result that is, all the decision trees will give their vote individually. The forests choose the most popular class. Benefits of Random Forests classification algorithm are:

- 1) Random Forests can handle data that contain outliers.
- 2) It is not mandatory that data need to be pre-processed. They can handle missing values automatically.
- 3) They have a high tolerance to overtraining.
- 4) Random Forests can be built in a faster manner.
- 5) Takes less time to predict the output.

IV. COMPARISON OF PREVIOUS WORK ANALYSIS

Sr.no	Disaster type	Ref.no	Finding	Comparison
1)	Flood	(K. Starbird, et al. Chatter	Starbird et.al collected the Twitter	As compared to my work
		2010). [1]	tweets during red river valley in	analysis and identify most
			north America and tweets were	people's fear, anger, helpful
			analyzed and categorized including	emotion and find the positive-
			fear, support, hopeful	negative, and neutral tweets
2)	Earthquake	(Baek et.al 2013).[15]	The work of baek et.al collected	During earthquake lots of
			tweets of great east japan	positive, negative impacts of
			earthquake-related tweets and	classified and categorized in
			analyzed the anxiety of the public	different aspect views and
			during the time of the earthquake.	analysis

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3)	Flood	(V. Lorini, C. Castillo, F.	V. Lorini, C. Castillo, F. Dottori, M.	As compared to easy identify
		Dottori, M. Kalas, D.	Kalas, D. Nappo, P.	the disaster affected areas using
		Nappo, P.	Salamon works show that EFAS	classification methods identify
		Salamon,2019).[19]	flood forecasts can be successfully	twitter tweets and affected areas
			used to	and provide help services to that
			inform satellite imagery acquisition	areas priority on basis of that
			and social media monitoring,	area.
			improving the timeliness and	
			relevance of the information	
			collection and analysis and	
			prediction of natural disaster-	
			affected areas.	
			By using satellite images for the	
			particular affected area to find and	
			analysis	
4)	Typhoon	(Takahashi 2015).[16]	Takahashi et.al mainly focus	As compared to similar to the
			typhoon haiyan in Philippines.	main focus on floodwater
			Collect the tweets and observe the	density high areas or low areas
			geographical location and different	to identify and observe
			types of users.	geographical location.
5)	Flood and	(S. Vieweg 2010)[7]	S.Vieweg mainly focuses on the red	My work is to help disaster
	Grassfire		river flood and Grassfire .mainly	victims people to categorize by
			focus on how to twitter effective	using support help groups,
			contribution to situation awareness	NGOs, and other people's help
			about the natural disaster.	and suggestion to analyze.

V. ANALYSIS SYSTEM:

- 1) *Tweeter Data Collection:* Data collection with the help of data API. This API collect live or flood, Earthquake disaster-related keywords collect disaster related tweet, retweet, geographical location, likes, followers, etc.
- 2) Sorting: Sorting data in different disaster categories like a flood, Earthquake, Forest fire than to sort data in different attributes needed for help, Relief measure NGO, complaints, suggestion, and most Affected area and worst area and low affected areas to analysis and identify and sort, etc.
- 3) *Preprocessing:* After that collect the pure data remove a bag of words or unused symbols, numbers, the text then collects the pure data and is ready to preprocess data using
- 4) *Classification Data:* After that collect data the first step is to segregate data .like floods, earthquakes, Forest fires. After that classify different aspect-wise tweets and sentiment analysis of users.
- 5) Analysis Data: By using Methods analysis for result showing output. And sentiment analysis of people. And frequency determines and analysis of geographical area accuracy and result.

VI. DATASET DESCRIPTION

Twitter social media is the source of the dataset. The dataset of the text mining data set collects tweets, retweets, likes, followers, and comparisons on a count of tweets. disaster-related data for flood, forest fires, Earthquake, and sentiment analysis of people.

VII. CONCLUSION

This paper presents a systematic Literature review on disaster management. And used a total of 20 research papers on this field and reviewed their proposed system and manage the disaster victims and sentiment analysis of disaster victims save people's lives in the future situation how to manage and precautions that type of situation and Twitter helps to identify the most disaster-affected area and low affected area are easily find and provide help and Twitter Social media plays a major role in Natural Disaster Management help for society and government for quick action in future work.

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