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Social Media Effect on Drought Crisis

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Abstract: *Social media is a very promising platform for communication between the societies. Social Media plays a vital role in the context of drought risk management system. This paper focuses on the significance of social media in drought risk management. We analyzed the tweets polarity by using the R Tool and Python and compared the results. We tries to extract the opinion of users on drought in social media and its impact.*
Keywords: *Drought, drought impact, R Tool, Python.*

I. Introduction

At the beginning of the 21st century, numerous countries, including India, are facing a growing water crisis. About 80 countries comprising 40 percent of world's population already suffer from serious water shortages [1]. This will lead to various problems related to social, political and environmental costs that indirectly affect the socio economic condition. Nearly 44 million people in India are affected by water quality problems either due to pollution, the prevalence of fluoride, arsenic and iron deposits in groundwater, or due to ingress of sea-water into groundwater aquifers [1]. Millions do not have enough water, particularly during summer months, and women and girls have to walk long distances to fetch water. In the search for water, people are going deeper into the ground, lowering the groundwater table and leaving wells dry. In India, the availability of surface water in the years 1991 and 2001 were 2309m3 and 1902 m3. However, it has been projected that per capita surface water availability is likely to be reduced to 1401 m3 and 1191 m3 by the years 2025 and 2050, respectively. The Per capita water availability in the year 2010 was 1588 m3 against 5200 m3 of the year 1951 in the country. [2]

Sever actions are needed to preserve the valuable resources in nature. We need to focus more towards the management of water. Water management is the management of water resources under set policies and regulations. Water, once an abundant natural resource, is now becoming a more valuable commodity due to droughts and overuse[3].Lot many research are going on to optimize the use of water and in minimize the environmental impact of water use on the natural environment.

One of the biggest natural water disaster is Uttarakhand disaster 2013. According to the Indian Meteorological Department, rainfall in Uttarakhand during the week of 20th to 26th June 2013 has been in excess by 37 per cent of normal rainfall. During this period, the state received 73.3 centimetres of rain while the normal rainfall is usually 53.6 centimetres. On 1 July 2013, the IMD has warned of heavy rainfall over Uttarakhand (locations not specified) during the next 48 hours.
Uttarakhand 2013 damage details [4]

- 822 Deaths (official estimates)
- 1,800 Missing persons
- 2,232 Fully damaged houses
- 154 Damaged bridges
- 1,520 Damaged roads

In Maharatra's Marathwada region the year 2015 came up as a drought affected year. This is much worse than that in the year 1972 and year 2004. There is an alarming rise in number of farmers' suicides. As many as 2,234 farmers' have committed suicides in year 2015 and 1981 in 2014, and 1296 in 2013 in Maharashtra (Sunday Times of India, Aurangabad Oct 11, 2015). The highest suicides recorded in Vidarbha that is 11, 08, followed by Marathwada 766, Nashik division 303 and Konkan region has one case of farmer suicide. The major reasons are failure of the monsoon, ineffective implementation of crop insurance and planning of drought mitigation measures that includes short term and long term basis. [5]

II. Natural Disaster – Drought

Drought occurs over most parts of the world, even in wet and humid regions. This is because drought is defined as a dry spell relative to its local normal condition. On the other hand, arid areas are prone to drought because their rainfall amount critically depends on a few rainfall events [6].

Drought is often classified into three categories [7, 8]:

1) Meteorological drought is a period of months to years with below-normal precipitation. It is often accompanied with above-normal temperatures, and precedes and causes other types of droughts. Meteorological drought is caused by persistent anomalies (e.g., high pressure) in large-scale atmospheric circulation patterns, which are often triggered by anomalous tropical sea surface temperatures (SSTs) or other remote conditions [9-11]. Local feedbacks such as reduced evaporation and humidity associated with dry soils and high temperatures often enhance the atmospheric anomalies [12].

2) Agricultural drought is a period with dry soils that results from below-average precipitation, intense but less frequent rain events, or above-normal evaporation, all of which lead to reduced crop production and plant growth.

3) Hydrological drought occurs when river streamflow and water storages in aquifers, lakes, or reservoirs fall below long-term mean levels. Hydrological drought develops more slowly because it involves stored water that is depleted but not replenished. A lack of precipitation often triggers agricultural and hydrological droughts, but other factors, including more intense but less frequent precipitation, poor water management, and erosion, can also cause or enhance these droughts.

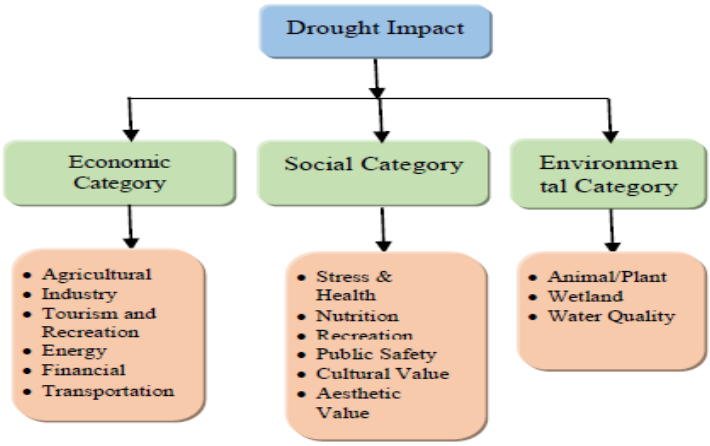

Fig. 1 Impact of drought

III. Measure To Avoid Drought

The World watch Institute launched a 12 step guide to combatting drought and desertification. These tips can be used by policy makers around the world and in dry climates in the Middle East.

Following 12 steps are [13]:

1).Agroforestry: Planting trees in and around farms reduces soil erosion by providing a natural barrier against strong winds and rainfall. Tree roots also stabilize and nourish soils. The 1990 Farm Bill established the USDA National Agroforestry Centre with the expressed aim of encouraging farmers to grow trees as windbreaks or as part of combined forage and livestock production, among other uses. See Green Prophet's feature on the Nabateans to see how this idea can be applied in the Middle East.

2). Soil management: Alternating crop species allows soil periods of rest, restores nutrients, and also controls pests. Soil amendments, such as biochar, help soils retain moisture near the surface by providing a direct source of water and nutrients to plant roots, even in times of drought.

3). Increasing crop diversity: Mono-cropping often exposes crops to pests and diseases associated with overcrowding, and can increase market dependence on a few varieties: in the United States, almost 90 percent of historic fruit and vegetable varieties have vanished in favour of mono-cultured staples such as Pink Lady apples and Yukon Gold potatoes. Encouraging diversity through agricultural subsidies and informed consumption choices can help reverse this trend and the threat it poses to domestic food security. In the worst case, do what Syria does and seed bank your seeds to preserve biodiversity.

4). Improve food production from existing livestock: Improved animal husbandry practices can increase milk and meat quantities without the need to increase herd sizes or associated environmental degradation. In India, farmers are improving the quality of their feed by using grass, sorghum, stover, and brans to produce more milk from fewer animals. This also reduces pressure on global corn supplies.

5). Diversify livestock breeds: Most commercial farming operations rely on a narrow range of commercial breeds selected for their high productivity and low input needs. Selective breeding, however, has also made these breeds vulnerable to diseases and changing environments. Lesser-known livestock such as North American Bison are often hardier and produce richer milk.

6). "Meatless Mondays": Choosing not to eat meat at least one day a week will reduce the environmental impacts associated with livestock as well as increase food availability in domestic and global markets. Current production methods require 7 kilograms of grain and 100,000 litres of water for every 1 kilogram of meat. Livestock production accounts for an estimated 18 percent of human-caused greenhouse gas emissions and roughly 23 percent of agricultural water use worldwide. You can just become more Vega ware.

7). Smarter irrigation systems: The Ogallala High Plains Aquifer, which supplies essential groundwater to many Midwestern states, is experiencing record rates of depletion due to extraction for irrigation purposes. Almost 50 percent of commercial and residential irrigation water, however, is wasted due to evaporation, wind, improper design, and overwatering. Installing water sensors or micro-irrigation technology and planning water-efficient gardens or farms using specific crops and locations can significantly reduce water scarcity problems. Israel has great solutions for irrigating crops, as do ancients from Afghanistan.

8). Integrated farming systems: Farming systems, such as permaculture, improve soil fertility and agricultural productivity by using natural resources as sustainably and efficiently as possible. Research and implementation of permaculture techniques, such as recycling wastewater or planting groups of plants that utilize the same resources in related ways, are expanding rapidly across the United States. Permaculture is becoming more widespread in the Middle East too.

9). Agro ecological and organic farming: Organic and agro ecological farming methods are designed to build soil quality and promote plant and animal health in harmony with local ecosystems. Research shows that they can increase sustainable yield goals by 50 percent or more with relatively few external inputs. In contrast, genetic engineering occasionally increases output by 10 percent, often with unanticipated impacts on crop physiology and resistance.

10). Supporting small-scale farmers: Existing agricultural subsidies in the United States cater disproportionately to large-scale agribusinesses, 80 percent of which produce corn for animal feed and ethanol. This means that small-scale producers are affected more acutely by natural disasters and fluctuating commodity prices, even though they are more likely to be involved in food production. Government extension and support services should be adjusted to alleviate this deficit.

11). Re-evaluating ethanol subsidies: Although ethanol's share of US gasoline is still relatively small (projected at 15-17 percent by 2030), in 2009 the Congressional Budget Office reported that increased demand for corn ethanol has, at times, contributed to 10-15 percent of the rise in food prices. Encouraging clean energy alternatives to crop-based biofuels will increase the amount of food available for consumption, both at home and abroad.

12). Agricultural Research and Development (R&D): The share of agricultural R&D undertaken by the U.S. public sector fell from 54 percent in 1986 to 28 percent in 2009, and private research has filled the gap. Private companies, however, are often legally bound to maximize economic returns for investors, raising concerns over scientific independence and integrity. Increased government funding and support for agricultural research, development, and training programs can help address issues such as hunger, malnutrition, and poverty without being compromised by corporate objective.

IV. Disaster Awareness Through Social Media

As self made disaster is impacting the world more than the natural disaster or they are the cause of natural disaster in many sense. We are observing the role of Social media in disaster management is also increased. Recent study has analysed the participation of social media in natural disasters, like by following the organizations such as FEMA on Twitter, residents and their families can get factual updates about what is happening in disaster situations. Other disaster such as the Haiti Earthquake in 2010, Queensland floods from 2010 to 2011, Hurricane Sandy in 2012, and Colorado flood in 2013. But still very less efforts or research has been done to improve the drought risk management.

Social media has a significant role in disaster management based on these many reasons:

- Social media convenience. Unlike other traditional technologies, social media is created on the basis of the Internet and developed with the application of web 2.0. Recently, social media has been greatly advanced with
- The development of mobile devices, which make communication increasingly convenient.
- Social media is the basis of social norms [14] .Social media is a platform of online communication. Now the online version becomes an integral part of social norms, which is an immensely important part in disaster management.
- Personal recommendations are a very vital part of social media and they are very useful during a disaster. They can help a lot in disaster management. Another reason why social media can help disaster management lies in the fact that information from social media can last long and it has an element of fun.

- Individuals find it not restrictive when they are using social media to post any information. As a result, the information from social media is pretty new. Everybody can post information about disasters on social media so that people around you can receive updated real-time information which may save lives.
- With the development of mobile devices, people now can use social media more voluntarily, which gives them an advantage during a disaster when they struggle for life.
- Social media can promote community aggregation and help people seek emotional support [14]. When people use social media, chances are that they won't feel that they are alone [15].

In foreign countries drought awareness is initiated through social media websites like Twitter, Facebook and Instagram etc. Recent information showcases that California resident taking their neighbour on social media drought shaming sites to shame each other for wasting water. The tattling has also reached social media where residents are using the hashtags 'droughtshaming' and 'watershaming' to reveal any water-wasting activities. An app called DroughtShame was even developed to 'capture geotagged photo proof of disregard for California's water restrictions'. The current situation of drought in various states of India can be alarming signal against exhausting natural resources and the need for their planned use and effective conservation.

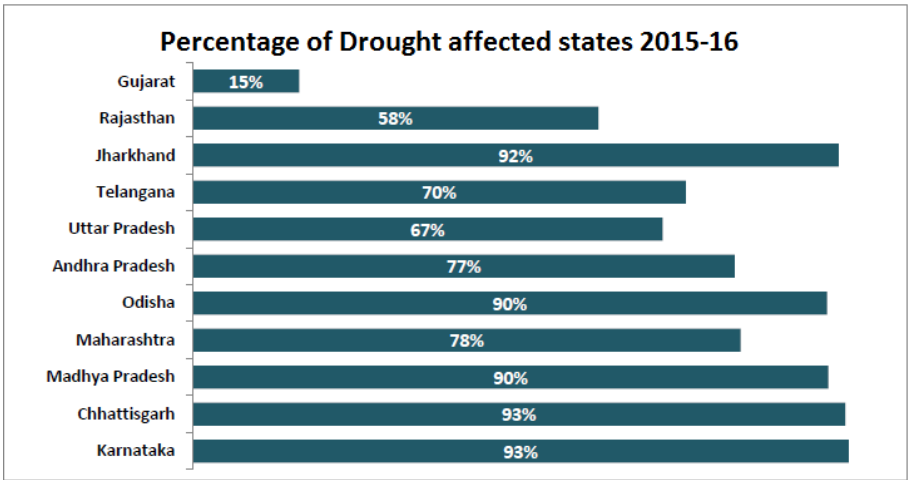

Fig. 2 Drought affected state in India

V. Result With R Tool And Python

As social media plays a vital role in disasters like drought crisis. We tried to analyse the tweets send by users on social media so that real sense or opinion of an individual can be easily predicted. We gathered 1500 tweets from twitter. By using NLP supporting tools Python and R polarity of tweets is generated. This will help to find the positive and negative tags of the user. We had done analysis on 500 tweets gathered from twitter .Out of these 500 tweets 174 i.e. 35%are unique, distinct value is 222 with 0% missing or null value. We used Naïve Bayes algorithm for data analysis. Naive Bayes classifiers perform much better in many critical real-world situations than one might expect. Recently, careful analysis of the Bayesian classification problem has shown that there are some theoretical reasons for the apparently unreasonable efficacy of Naive Bayes classifiers [16].

In Python a function is used that returns the log likelihood of the text of being of polarity pol (pol=0 is for positive polarity and pol=1 for negative polarity). It uses a smoothing factor to avoid likelihoods equal to 0.We had used the smoothing factor for the Naive Bayes classifier.

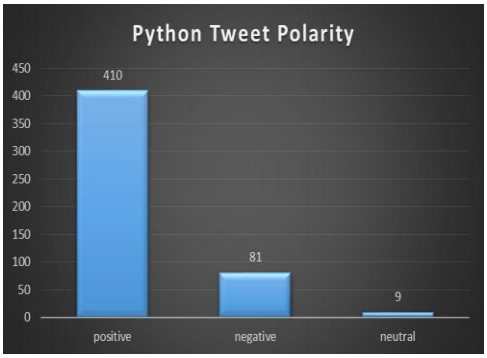

Fig. 3 python analysis

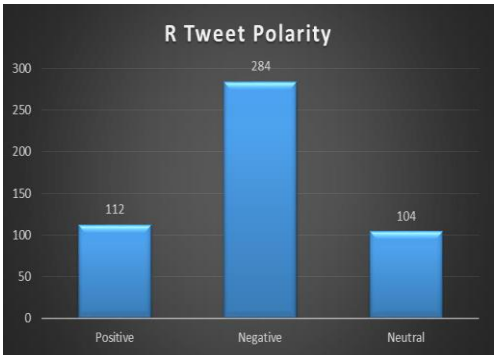

fig. 4 r tool analysis

In R Tool various functions are available to find the sentiment. We can use to do sentiment analysis by utilizing the R package sentiment by Timothy Jurka. We used classify_ polarity function to find the positive and negative sense of text. The classify_polarity function allows us to classify text as positive or negative by using a naive Bayes classifier trained on Janyce Wiebe's subjectivity lexicon. After applying the method on the R tool and python we got the result for polarity analysis as like.As we have applied Naïve Bayes classifier with both the tools R and Python, we find large difference in the comparative results of R and Python.

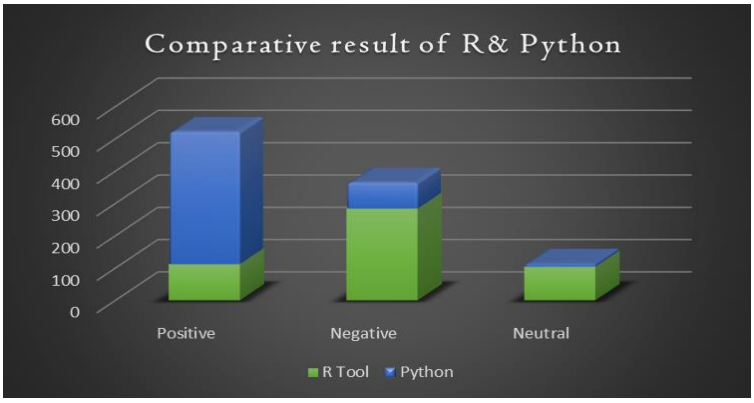

Fig. 5 R Tool and Python comparative Analysis

After comparing the polarity results of tweets with Python and R Tool we got the result that only large gap in percent of polarity result that matches in both the tools. The result we got is also not tracing the opinion truly because there is not any availability of corpus related to drought terminology. This according to the experiment highly specifies that there is a need for drought based corpus and the structure that associates the context for deriving the sentiment.

The main gain after this experiment is that yes in India with major of the population that too youngster are accessing at least one type of social media this can be used as one of the most effective tool for propagating the awareness for social and economic benefit.

VI. Limitations And Future Work

The corpora related to drought is not available that reduces the ratio of effectiveness of the opinions that we wish to come out.

- There is a needs of pre-processing and restructuring of tweets.
- Uniqueness of the tweets should be considered.
- Context on which the tweet is delivered is to be considered while analysis.

In future we try to develop a corpora for drought terminology and also to improve the polarity result. We refine the analysis by pre-processing the Tweet, applying, stemming, polysnomy concepts and association with context.

VII. Conclusion

Drought is a natural disaster that effects the socio- economic status of people. Now a days social media is playing vital role among every aspect of life .We can use social media or social networking sites to develop awareness between them to fight with the drought situation and motivate people using social media.

We had collected 500 tweets from twitter on “drought “issue and applied the Naive Bayes classifier using R tool and Python on tweets to get the polarity of tweets ,So that positive and negative sentiments should be extracted. We found that there is variation in results gain from both the tools.To get the accurate result the tweets collected needs to be pre-processed, the context in which the tag drought is used should be taken in consideration, stemming should be applied, before applying the Naïve Bayes Classifier. In this paper we tried to analyse the user opinion on drought in social media up to some extent. As the analysis has shown the need for the development of the corpora for drought related terminology, development of corpora and refinements in methods would be applied better analysis of result and that to for various applications. Increasing the Drought awareness on social media can lead to motivate people to manage and make proper use of water, so that water should not be wasted. Social media is one of the best way to raise a Drought issue among

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