Real Time Event Monitoring System Using Spark

Group:6

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Introduction

- Event monitoring system is the process of collecting, analyzing, and signaling event occurrences to subscribers such as operating system processes, active database rules as well as human operators.
- In present scenario world is facing the problem of huge data, so analysing the old data is almost impossible.
- We have to do it on the fly!

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Approach

- Tools Used: Apache Spark
  - We use Spark to run the spark job on python.
  - The advantages of using spark is that it is lightning fast.
  - Hadoop comes under generation 2 distributed computing whereas spark comes under generation 3 distributed computing.
  - It also supports a rich set of higher-level tools like Spark Streaming for stream processing.

APACHE SPARK

- Apache Spark is an open source processing engine built for speed, ease of use, and analytics.
- If you have large amounts of data that requires low latency processing that a typical MapReduce program cannot provide, Spark is the alternative.
- Spark performs at speeds up to 100 times faster than Map-Reduce for iterative algorithms or interactive data mining

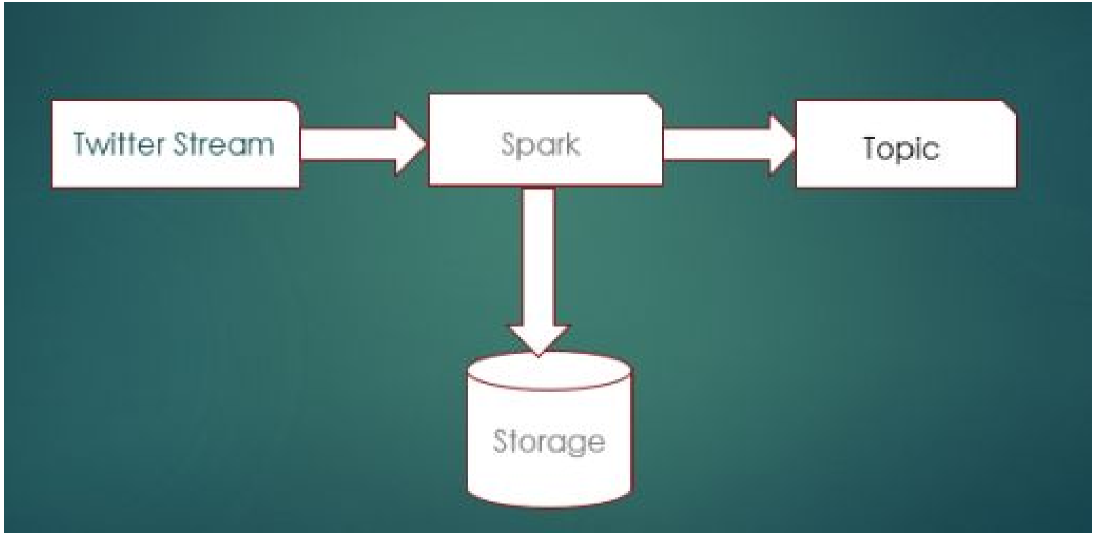
Approach

- Tools Used: **nltk**
  - It is a python package which is used to process human language data.
  - We use it find the similarity between two words.
  - The purpose of nltk is explained in the further sections.

Algorithm

1. Twitter data is considered as the input streaming data. Million of tweets are posted on twitter everyday.
2. These tweets can be used for real time event monitoring.
3. We obtain the tweets using twitter streaming API.
4. The input is taken in the form of Dstreams.
5. On these Dstreams, we try to apply map and reduce functions on spark by which we get the occurrences of a particular hashtag.
6. When we get a peak in the timeline vs tweet count graph, we can consider that as an event.

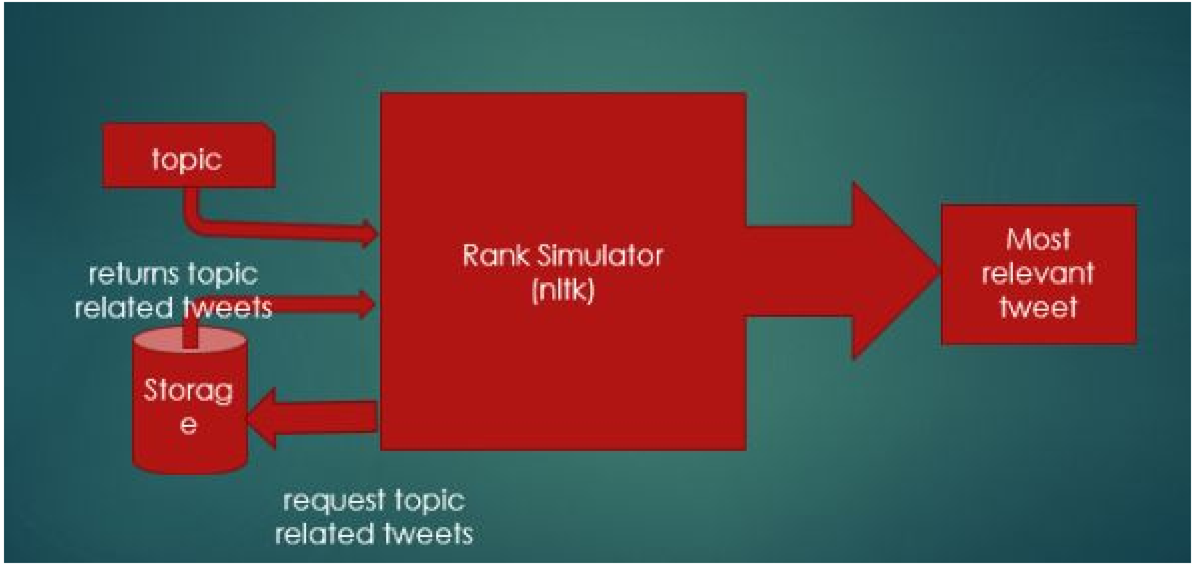
Algorithm



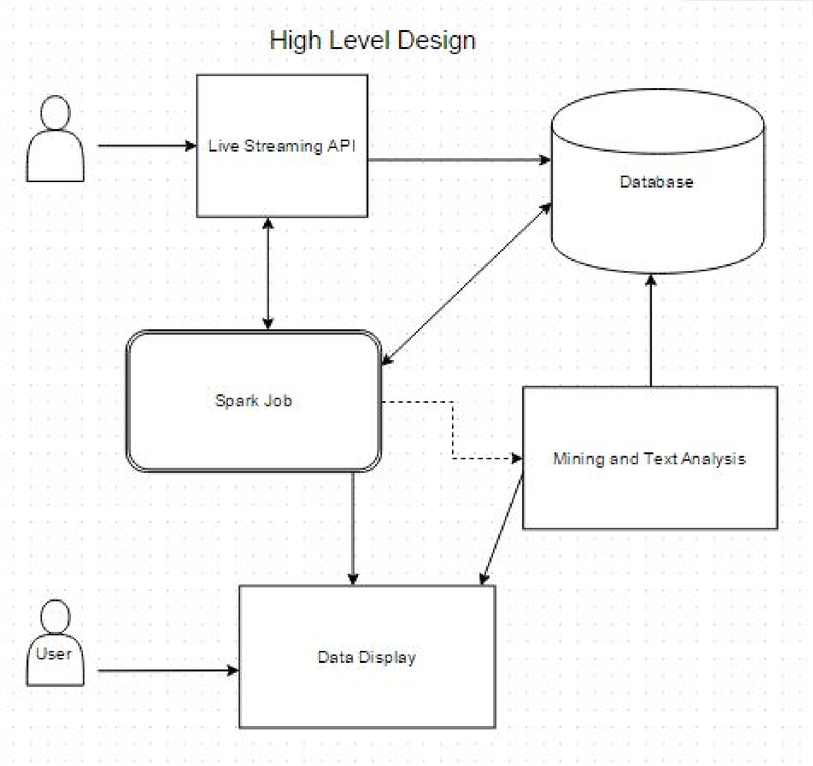
Algorithm

1. In the next step, we do sentiment Analysis on these tweets based on hot hashtag.
2. Consider all tweets related to that hashtag and compute **tweetRank**.
3. **tweetRank:** It is defined as the the tweet with highest pairwise cosine similarity with all other tweets.
4. It is proved in many existing methods(*research paper link provided in references*)that the text with highest pairwise similarity has the highest content in it.
5. Tweet with highest rank will be displayed to the user.

Algorithm


topic
returns topic related tweets
Storag e
request topic related tweets
Rank Simulator (nltk)
Most relevant tweet

High Level Design



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Evaluation and Results

1. A live twitter stream is given as a input.
2. This code is ran at different time periods and following are the events which are detected at that time span as hot topics:
    a. #**earthquake** A 5.9 magnitude #**earthquake** struck Afghanistan on Sunday, the US Geological Survey reported.
    b. #**earthquake** RT @LastQuake: This is the 2nd Strong #earthquake felt in Merida, Venezuela in the last 51 hours and less than 20 km away\n

As we can see, various natural calamities can be monitored by using this tool. In the above example, it detected an earthquake in Afghanistan and Venezuela. We collected the data at 1:00AM on 22nd of November and earthquake actually occurred around 12:30AM on 22nd November.

Results..

- #BBC #World #BBC Djokovic beats Federer to ATP title: Novak Djokovic wins a record fourth straight ATP World Tour Final

As an other example, the code also detected the trending event that Djokovic beat Federer in the ATP finals, which happened the night when we ran the code.

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Conclusion

- In this, project we have devised a method monitoring events in the real time using Apache Spark.
- For evaluation, we have tested on twitter streams at different times.
- We got very good results and we were able to monitor the events.
- This tool can be applied in monitoring various natural disasters like earthquakes, tornadoes etc.

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References

- http://www.cs.cmu.edu/~deepay/mywww/papers/icwsm11-twitterevents.pdf - Main reference paper which has the core idea.
- http://adilmoujahid.com/posts/2014/07/twitter-analytics/ - Getting the twitter stream
- **spark.apache**.org/docs/latest/api/**python**/ - Learning how to code in spark using python
- http://stackoverflow.com/questions/30829382/check-the-similarity-between-two-words-with-nltk-with-python - nltk Reference for similarity between two words.

Project links

- GitHub link

  https://github.com/anirudhalampally/Cloud-Major-Project

- Presentation link

  https://docs.google.com/presentation/d/15IVqeBkn7UEUgHF6Zsbf_dmbJpqkOWtw6-oKHLOA7bw/edit?usp=sharing

  http://www.slideshare.net/anirudhalampally/cloud-major-project

- Video link

  https://youtu.be/bsn9cfLtB70

THANK YOU!!