A Lexicon Based Approach to Detect Extreme Sentiments

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Authors:
Sebastião Pais - sebastiao@di.ubi.pt
Irfan Tanoli - irfan.khan.tanoli@ubi.pt
Miguel Albardeiro - miguel.albardeiro@ubi.pt
João Cordeiro - jpaulo@di.ubi.pt

Presenter

- Irfan Khan Tanoli
  - Post-Doc Researcher at University of Beira Interior.
  - Receive PhD Degree at Gran Sasso Science Institute, L'Aquila, Italy.
  - Received the M.S degree in software engineering from Technical University of Madrid, Madrid, Spain.
  - Current Research Interest
    - Natural Language Processing.
    - Controlled Natural Processing.
    - Semantic Analysis.
    - Software Engineering.
    - Machine Learning.
  - Current Research Project
    - Moves Project (http://moves.di.ubi.pt/).

Co-presenter

- Sebastião Pais
  - Professor at the Computer Science Department, the University of Beira Interior.
  - Researcher at NOVA-LINCS and GREYC Laboratory.
  - Current research and teaching interests:
    - Artificial Intelligence.
    - Statistical Natural Language Processing.
    - Lexical Semantics.
    - Machine Learning.
    - Unsupervised and Language-Independent Methodologies.
  - Current Research Project
    - Moves (http://moves.di.ubi.pt/).
    - C4 - Cloud Computing Competence Centre (c4.ubi.pt).

Outline

- Introduction
- Proposal
- Approach
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Introduction

- Extreme sentiment analysis is to detect and classify extreme sentiment(s):
  - represent(s) the most negative and positive sentiments.
- An extreme sentiment is the worst or the best view, judgment, or appraisal formed in one's mind about a particular matter or people.

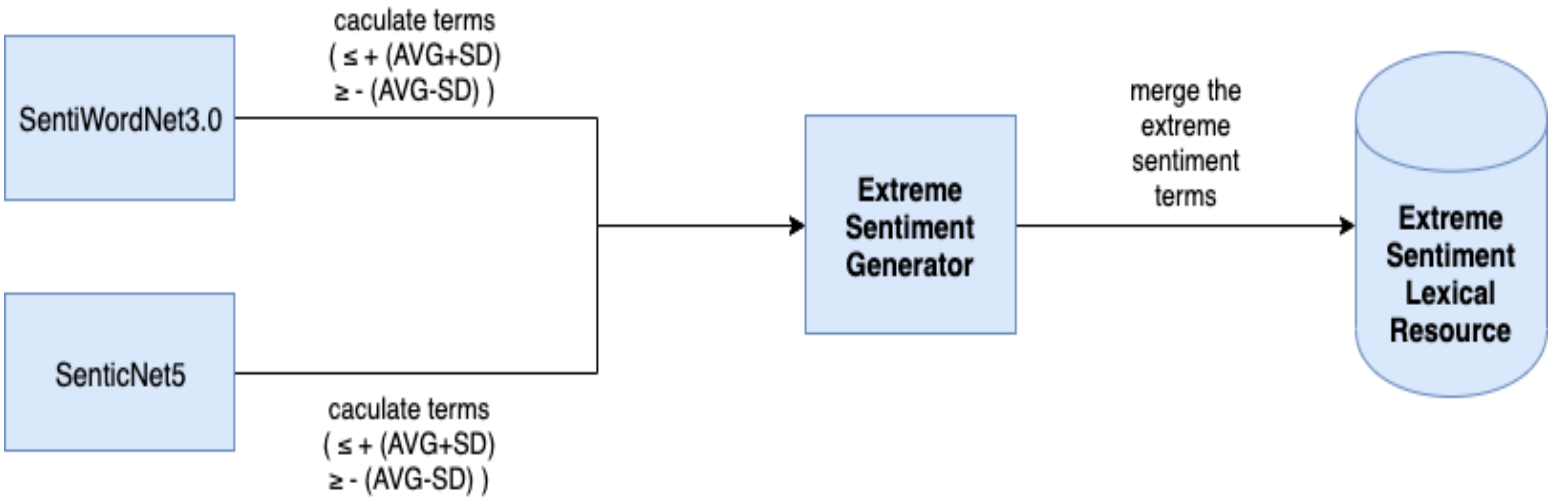
Proposal

- An interesting unsupervised and language-independent approach for detecting people's extreme sentiments on social platforms.
- Analyze two standard corpora:
  - SENTIWORDNET 3.0.
  - SenticNet 5.
- Extract extreme words having a high negative and positive polarity, reflecting people's extreme sentiments.

Approach

- Design and develop a prototype system called Extreme Sentiment Analyzer (ESA) composed of two different components:
  - Extreme Sentiment Generator (ESG).
  - Extreme Sentiment Classifier (ESC).
- ESG is based on statistical methods.
- Apply it on SENTIWORDNET 3.0 and SenticNet 5 to generate a standard lexical resource known as ExtremeSentiLex.
- Embed ExtremeSentiLex in the ESC
  - run on the compilation of five different datasets, which are constituted of social network and media posts.

ARCHITECTURE



Extreme Sentiment Collection Process.

Approach

The approach based upon two steps:

1. Define Extreme Polarity.
2. Generating Extreme Sentiment Lexicon.

Approach:
1. Define Extreme Polarity

- Develop a python application "Extreme Sentiment Generator (ESG):
  - Calculate the average and standard deviation of terms from the original lexical resources,
  - Filter and save it into a new lexical resource.
- Define two conditions in ESG:

if Tp > Average + StandardDeviation then

The term is classified as Extreme Positive

end if

if Tn < Average StandardDeviation then

The term is classified as Extreme Negative

end if

Approach:
1. Define Extreme Polarity

- SENTIWORDNET 3.0
  - Average for positive terms: 0.366
  - Standard Deviation for positive terms: 0.211
  - Extreme polarity for positive terms: 0.577
  - Average for negative terms: 0.412
  - Standard Deviation for negative terms: 0.230
  - Extreme polarity for negative terms: 0.642
- For Example:
  - SENTIWORDNET 3.0 terms generated by ESG:
  - ultrasonic 0.375 (non positive extreme)
  - selfless 0.875 (positive extreme)
  - thrash 0.125 (non negative extreme)
  - abduction 1 (negative extreme)

Approach:
1. Define Extreme Polarity

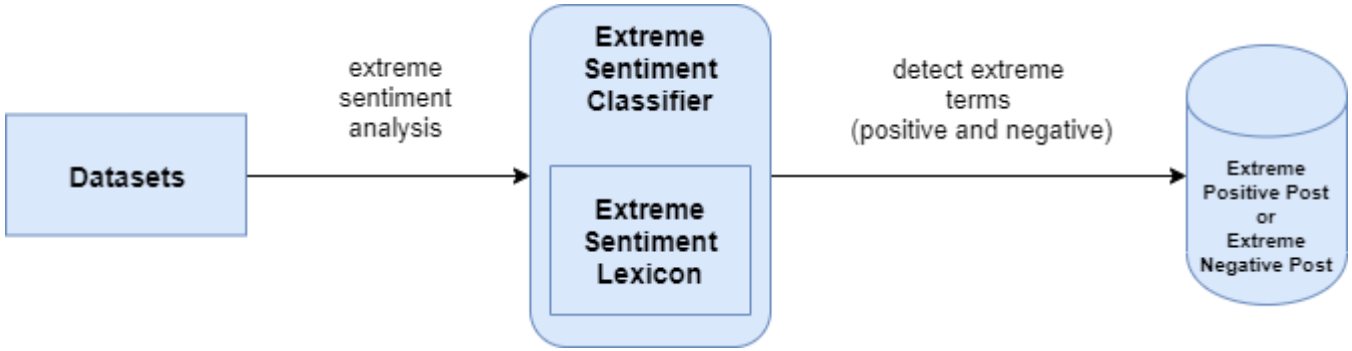
- Senticnet 5
  - Average for positive terms: 0.504.
  - Standard Deviation for positive terms: 0.362.
  - Extreme polarity for positive terms: 0.866.
  - Average for negative terms: -0.616.
  - Standard Deviation for negative terms: 0.306.
  - Extreme polarity for positive terms: -0.922.
- Example:
  - grace 0.79 (positive non extreme).
  - pioneer 0.97 (positive extreme).
  - anemic -0.918 (negative non extreme).
  - traffic -0.97 (negative extreme).

2. Generate Extreme Sentiments Lexicon

- Merge both files obtained from SENTIWORDNET 3.0 and SenticNet 5 terms stored in CSV files.
- Example:

Term	Score
Absolutely	+0.88
Accept	+0.93
Acknowledgeable	+0.95
Acne	-0.96

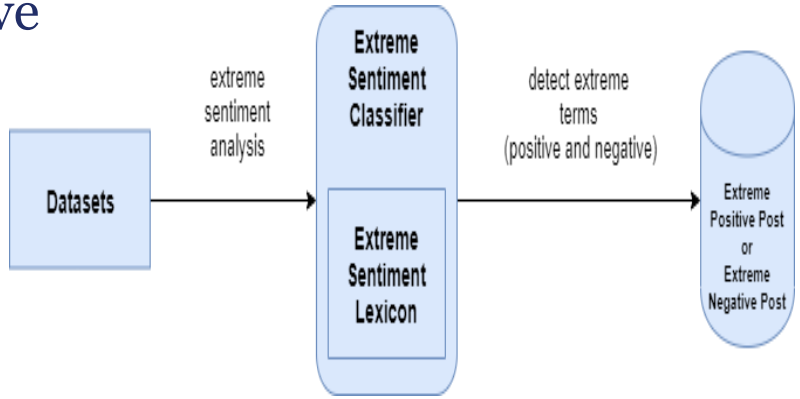
Experimental Setup



Performance testing of Extreme Sentiment Classifier

Experimental Setup

- Develop Extreme Sentiment Classifier (ESC) having ExtremeSentiLex embed in it.
- We perform the experiments five datasets:
  - TurnToIslam.
  - Ansar1.
  - RT-Polaritydata
  - T4SA.
  - Sentiment 140.
- We use confusion matrix to analyze the performance computing:
  - Recall.
  - Precision .
  - Accuracy.
  - F1-score.



Results

	RT-polarity	Sentiment 140	T4SA
Recall EP	91%	95%	98%
Recall EN	21%	50%	45%
Precision EP	59%	65%	89%
Precision EN	65%	92%	86%
F1 score EP	72%	77%	93%
F1 score EN	32%	65%	59%
Accuracy	60%	72%	89%

Table: Indicators Of System Efficiency

Discussion

- The overall status of acquired results are quite satisfactory.
- In some evaluation measures, for certain datasets, we have more than 90%.
- The results of Sentiment 140 and T4SA are really prominent, where none of the values is less than 45%.
- RT-polarity, there appear some low values on negative terms, i.e., recall and F1 score for EN.
- The measure of accuracy for all data resources is equal to or greater than 60%:
  - indicating the overall performance of the approach is better.
- The calculation of recall, precision, f1 score and accuracy for Ansar1 and TurntoIslam is not performed:
  - Since these datasets are directly referred to as 'Correction of common misconceptions about Islam'.
  - There is a possibility of radical participants may occasionally show their support for extremist fundamentalist militant groups.

Conclusion

- Presented an unsupervised and language-independent approach for people's extreme sentiments detection on social media platforms.
- Our approach is based upon:
  - Defining extreme polarity for terms.
  - Generating extreme sentiments lexicon by relying upon two standard lexical resources:
    - SENTIWORDNET 3.0 and SenticNet 5.
- Experimented with five different social networks and media data .
- We provided a standard lexicon:
  - Useful other researchers to exploit it for sentiment analysis studies as well
  - Antiextremism authorities to identify people's extreme sentiments
    - On social networks and can prevent violent extremism.

THANK YOU