



UNIVERSIDADE
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Language-Independent Approaches to Detect Extremism and Collective Radicalisation Online

Special Session along with ICIMP 2020
The Fifteenth International Conference on
Internet Monitoring and Protection
September 27, 2020 to October 01, 2020
Lisbon, Portugal

<https://www.iaria.org/conferences2020/ICIMP20.html>

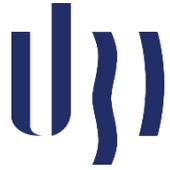
Authors:

Irfan Tanoli - irfan.khan.tanoli@ubi.pt

Sebastião Pais - sebastiao@di.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).

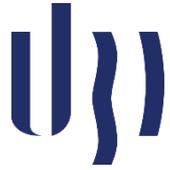




Outline

- Introduction
- Objective
- Background
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- Discussion
- Conclusion
- Future Work





Introduction

- In the last few years, the advent of **micro-blogging services** has been impacting people's **mind, communication, behavior, and activities conduct**.
- Users use **social networks** for various purposes.
- However,
 - Few use it to spread distorted beliefs, negative opinion about things like spreading **terrorism, extremism, and radicalism**.
- Aim to provide a theoretical review related to **extremism and collective radicalisation** detection based on **sentiment analysis**.



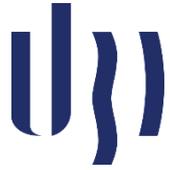


Objective

To propose an **effective system** to detect **extremism** and **collective radicalisation** on social media based on **sentiment analysis**.

To do so, focus is on **statistical and probabilistic methods** that can be used to develop an **unsupervised and language-independent system**.





Machine Learning Classifiers for Extremism and Collective Radicalisation

- **Radicalisation:**

Radicalisation involves a movement towards the support or representation of radical behavior(s).

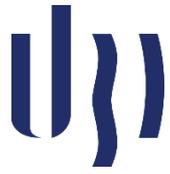
- **Extremism:**

Extremism is defined as the statistical sense of extreme views in terms of frequent behavioral occurrence within some aggregate or community.

- **Sentiment Analysis**

Sentiment Analysis is the computational study of people's opinions, attitudes, and emotions toward an entity. The entity can represent an individual, event, or topic.





Case Study 1: The roots of radicalism

- Fernandez et Al [1] proposed:
 - An innovative **NLP** and **Collaborative Filtering (CF)** based approach for detecting **radicalisation** on social networks.
 - The different **roots** of radicalisation, i.e., **micro-roots**, **meso-roots**, and **macro-roots**, are captured , and each user is represented through **keyword-based vector** description.
 - The approach presented in [1], is sufficient enough to detect and predict **radicalism**.



Case Study 2: Terrorism Detection using Sentiment Analysis and Machine Learning

- The proposed work in [2] is to present a system for improvising current techniques for **sentiment analysis** through **machine learning** to detect **terrorist** acts on **Twitter** more accurately.
- The novelty of the research is having divided the sentence:
 - **positive, negative, and neutral categories.**
- All **three categories** are compared to the **previous sentence** for a given account holder based on the **sentiment score** for the **latest and previous sentence.**

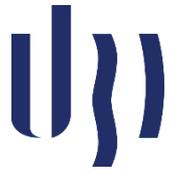




Case Study 2: Terrorism Detection using Sentiment Analysis and Machine Learning

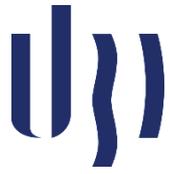
- This means a specific **account holder's tweet** history in each of the categories is extracted, and the **sentiment value** is calculated.
- The **sentiment score** from the above **statement** will be compared with the **sentiment value** of the identified sentiment.





Case Study 3: Learning with Hashtags

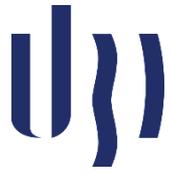
- An interesting weak supervised approach [3] based on for learning **hashtags**, **hashtag patterns**, and **phrases** associated with **five emotions**:
 - **AFFECTION**,
 - **ANGER/RAGE**,
 - **FEAR/ANXIETY**,
 - **JOY**,
 - **SADNESS/DISAPPOINTMENT**.



Case Study 3: Learning with Hashtags

- A **bootstrapping framework** for learning emotion **hashtags** is proposed, which has been further improved to learn more **general hashtag patterns**.
- The **emotion phrases** are extracted from the **hashtags** and the **hashtag patterns** to classify contextual emotions.
- For example:
 - **#Angryatlife** and **#Angryattheworld** have the same prefix.
 - **Angry** at that predicts **ANGER** emotion.

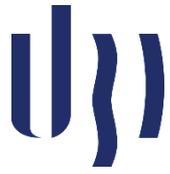




Supervised Natural Language Processing Approach

- Supervised Natural Language Processing (NLP) Approach:
 - **Supervised machine learning** involves labeling or commenting on a series of **text documents** with examples of what the **machine** is looking for and how it should interpret this aspect.
- Several methods used in a supervised approach,
 - **Support Vector Machines**
 - **Bayesian Networks**
 - **Maximum Entropy Conditional Random Field**
 - **Neural Networks/Deep Learning.**





Unsupervised Natural Language Processing Approach

- An unsupervised NLP approach:
 - Refers to a **system** where training inputs are not necessary to discover the target point of the learning.
 - The **system** needs to train itself without **human supervision** and **intervention** or with human intervention only if there is a need to add or change the **functionalities**.



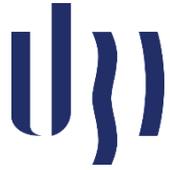
Language-Independent NLP Approach

- Language-Independent Approach:
 - Refers to **a single system** that is applied to different natural languages (e.g., **English, Chinese, German**, etc.).
 - The **results** keep being satisfactory and the **experiment** values represent the reality in a viable way.
 - Once an **algorithm** has been developed for a **specific language**, the question arises, it can be trivially extended to **another language**.
 - All it is needed an adequate amount of **training data** for the new language.



Models

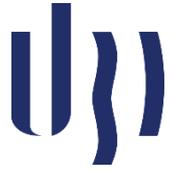
- The most common **Machine Learning** models, commonly used to resolve **ambiguities** in language knowledge with the main tasks of **NLP**:
 - Hidden Markov Model (HMM),
 - Conditional Random Fields (CRF)
 - Maximum Entropy (MaxEnt)
 - Support Vector Machines (SVM)
 - Decision Trees(DT)
 - Naive Bays (NB)
 - Deep Learning (DL)



Conclusion

- **Social media** have a significant role in the process of **extreme** ideas dissemination all over the world.
- People have the dissemination of similar information that can lead to **collective radicalisation** and **extremism**.
- Our aim of this study was:
 - To provide the **state-of-art** to construct an **unsupervised** and **language-independent system** for **collective radicalisation** and **extremism detection** using **sentiment analysis**.
- Furthermore, this study gave a generic structure and guidelines:
 - For developing a new **unsupervised language independent-system** for addressing **radicalisation** and **extremism** issue.





Conclusion

- This study will also **guide students** and researchers with essential resources:
 - To learn what is necessary to know and to advance further the integration of **supervised and language-independent techniques** with different **machine learning models**.



References

1. Fernandez, M. Asif, and H. Alani, “Understanding the roots of radicalisation on twitter,” in Proceedings of the 10th ACM Conference on Web Science, 2018, pp. 1–10.
2. B. S. Iskandar, “Terrorism detection based on sentiment analysis using machine learning,” Journal of Engineering and Applied Sciences, vol. 12, no. 3, 2017, pp. 691–698.
3. Qadir and E. Riloff, “Learning emotion indicators from tweets: Hashtags, hashtag patterns, and phrases,” in Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP), 2014, pp. 1203–1209





THANK YOU

