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ProtectMe : Elaboration

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Introduction

In recent years, there has been an enormous growth in social media platform usage and influence on the masses.
This growth can mostly be attributed to the rise in usage of mobile computing devices and the now easier access to the internet (mostly through the usage of wireless technologies).
Although the usage of social media has come to improve the life of the common person, be it through facilitating the spread of news or offering an easier way to communicate with one's peers, but with this rise people who use social media platforms in order to improve their lifestyle, there is also an increasing number of people who abuse these platforms in order to spread malicious content and fulfil a given agenda.

1. Requirements Elicitation

The specification process can be divided in two stages: firstly, an assessment of the main goals and objectives we expect to fulfil, in order to define the scope of this project; and secondly, an evaluation of the current state-of-the-art (projects and academic papers on this subject and related to the integral parts of this project) so as to understand what has and hasn't yet been done in this context.

1.1 Context

This subsection presents a description on how the system is expected to be used and its general purpose.
The original aim of this system was to allow a user to check if a given social media post contains any malicious information through the analysis of a social media post's text and it's associated multimedia content
However, this project since the beginning had a very strong exploratory nature, and midway through development we realized that this original objective wasn't feasible due to the lack of an already annotated data set.
Thus, the original objective was discarded in favour of a new and more reasonable goal.
Since there is no data set with an analysis of both textual and multimedia content, we took matter to hands and decided to generate this data set and provide and interface that enables the user to analyze the gathered data in a logical manner.

1.2 Objectives and Purpose

The ProtectMe! project aims to provide the means to analyse and correlate the content in a social media posts (more specifically tweets) through the usage of Natural Language Processing(NLP) algorithms, Media Content Extraction Tools and Machine Learning Software.

As such, by the end of the project, we expect to have completed the following objectives:

- Gather a list of functional and non-functional requirements;
- Analyze the current State of the Art;
- Produce a content extraction pipeline;
- Use various pre-trained machine learning models;
- Produce a database that contains the analyzed tweets data;
- Produce a web interface to analyze the results gathered.

1.3 State of the Art

Although the spread of malicious content on social media platforms has always been a very serious problem in this type of web services, there hardly ever was an attempt to monitor/detect the spread of this type of content making use of Natural Language Processors (NLP) and Media Content Extraction Algorythms (mostly because only recently have these technologies become ready for generic usage).
As such, most works done in this area have mostly been focused on detecting spam attacks and offensive content spread (mostly detecting the spread of gore/pornographic content regardless of the context).
The best example we could find that's related to this kind of work was done by Johnny Wales (Wales Technology LLC) in November, 2019.
In this article, Wales explains the process he went through in order to create and train a Machine Learning Model that would classify news articles as either normal or fake news based on the way the article itself was written.
Of course this article by itself has no immediate connection to the work we are trying to develop in this project. However, the usage of NLP in order to categorize text in an article solely based on the way it was written is part of the aim of our project. Data sets are few and almost non existent apart some in specific contexts.

2. Users

This application foresees usage mostly in a research context. As such, the expected end users of this project are mostly researchers, or people who have interest in analyzing social network content's data and correlation between a given post and it's mediatic content.
Thus, we can categorize our end users into 3 different roles, which are defined by the way they are expected to use the system. They are:

- Data Analyst
- Machine Learning Researcher
- Data Miner

In the following sections we will be further defining the purpose and use cases for each type of user, as well clarifying some of their key aspects

2.1 Data Analyst

The Data Analyst's main focus is to analyze the data gathered in order to reach any sort of conclusion about this data. As such, the Data Analyst should have at his disposal a set of tools that enable him to analyze the data in a simple and intuitive way.

2.2 Machine Learning Researcher

The Machine Learning Researcher has as his main goal the modelling and training of a Machine Learning Model based on a social networking platform's post patterns. As such, he needs a decently sized data set of a given social network's posts (both plain text and mediatic content included within the post), in a format that allows him to train the given ML model the way he so desires.

2.3 Data Miner

The Data Miner's sole purpose is to gather data from a given subject. As such, in the context of this project, he needs a tool (or a set of tools) able to gather data according to a given criteria.

3. Non Functional Requirements

In this section, we will the approach the application's non functional requirements, along with a priority evaluation and a short description of the decision for the priority attributed to a given requirement.

3.1 Usability

Due to the nature of this application, it must be easy to use and easy to learn. Although there are no functionalities that require complex knowledge about the application's inner workings, it still deals with data and statistics as such, it is on our best interest to make the application easy to learn and to give relevant feedback to the user as well as provide useful documentation in regards to usage and troubleshooting.

Priority: High

3.2 Reliability

As this system relies mostly on the current state of the art of the technologies used, there is hardly any reliability in the results gathered in the moment the data set is made public due to the continuous growth of these technologies.
However, there will be an effort to make all the data gathering and analysis tools developed to produce results.

Priority: Average

3.3 Security

All the data included in this data set is already made publicly available on Twitter. As such, Security concerns were deemed irrelevant in this stage of the project

Priority: None

3.4 Interoperability

As the main goal of this project is to generate a data set and the tools needed to analyze and use it, as well as increasing its size, interoperability is pretty important factor for future developments of this project, but in this mostly explorative implementation, it's being regarded as a an additional feature instead of the main focus.

Priority: Low/Medium

3.5 Portability

Due to the nature of this project, there is a need for this set of tools to work in most Operative Systems used for research and/or data mining. As such it needs to work reasonably well in both Windows, Linux and Mac OS operating systems.

Priority: High

4. System Architecture

In this chapter we will approach the several aspects of the system architecture, beginning by taking a look at the assumptions and dependencies of this project.

4.1 Assumptions and Dependencies

In this section, we will approach the assumptions made and the dependencies of this project.

4.1.1 Assumptions

This project assumes the user has a basic understanding of the Twitter social media platform and the data related to a given social media post, as well as the user being able to accurately read graphs and other common ways of displaying data in a statistical manner.

4.1.2 Dependencies

We will now list the dependencies for two main building blocks of this project: the Data Gathering and Analysis Tools (which as the name implies are used to gather data as well as analyze it) and the User Interface.

Data Gathering and Analysis Tools

These tools rely mostly on web APIs, as such, these tools require a stable internet connection, as well as an Azure and Twitter API keys.

User Interface

The user interface relies on the usage of a browser that support HTML5, JavaScript and CSS, as well as Python, in order to launch the Django Service that hosts the Web Interface. Besides these technologies, there is also the need for an instance of a Database Engine to be running, in order to access the stored data.