Contents

1 Introduction

1.1 Overview

Introducing Domain Pulse, the ultimate sentiment analysis platform. With Domain Pulse, you can easily gauge the sentiment surrounding any domain. Whether it's a business, a person, or anything else, Domain Pulse gathers information from across the internet and analyzes what people are saying.

Domain Pulse presents the results in a visually stunning and easy-to-understand format. Our wide range of visualizations brings statistics to life, making it a breeze to grasp the online presence and sentiment for any domain. Take control of understanding public opinion like never before with Domain Pulse.

1.2 Objectives

The objectives of the Domain Pulse project are to develop a comprehensive web application that enables users to track and analyze data from multiple sources, perform sentiment analysis, and visualize statistics. The application aims to provide a user-centered design approach, ensuring usability, accessibility, and a clear and intuitive interface. The system will be built using a scalable and modifiable architecture, leveraging microservices to handle high traffic and enable easy modification and extension. Security will be a top priority, with encryption and access control measures in place to protect user data. The project also aims to achieve high performance through caching and database optimization techniques. Overall, the objective is to create a reliable and efficient platform that empowers users to gain valuable insights from data analysis.

2 User Characteristics

2.1 Demographics

- **Age**: Users of varying age groups, depending on their professional roles and interests.
- **Gender**: Users of all genders.
- **Education Level**: Users with diverse educational backgrounds.
- **Occupation**: Business professionals, social media managers, researchers, PR professionals, etc.

2.2 Psychographics

- **Attitudes**: Users interested in sentiment analysis, monitoring online presence, and understanding public perception.
- **Values**: Users who value data-driven decision-making and insights for decision support.
- **Interests**: Users interested in market research, branding, reputation management, and online sentiment analysis.
- **Lifestyles**: Users with professional roles that involve monitoring and managing online presence and sentiment.
- **Personality Traits**: Users with analytical and research-oriented mindsets.

2.3 Technological Proficiency

- **Novice Users**: Users with basic technological skills who may require more guidance.
- **Intermediate Users**: Users with moderate experience and comfort using technology.
- **Expert Users**: Users who are technologically proficient and can quickly adapt to new systems.

2.4 Physical Abilities

- **Vision**: Users with varying visual abilities.
- **Other Physical Abilities**: Consideration for accessibility and usability for all users.

2.5 Cognitive Abilities

- **Attention**: Users with different levels of attention spans.
- **Memory**: Users with varying memory capabilities.

2.6 Prior Knowledge and Experience

- Users with different levels of knowledge and experience in sentiment analysis and online presence monitoring.
- Familiarity with Similar Tools or Platforms

2.7 Goals and Tasks

- Monitoring and analyzing sentiment and online presence of specific domains.
- Gathering insights for decision-making, market research, or branding purposes.
- Tracking public perception, PR campaign impact, or personal brand sentiment.
- Supporting research and analysis with data on sentiment trends and patterns.

2.8 Emotional Factors

- Users with preferences for user interfaces and interactions that evoke positive emotions.
- Designing a user experience that is intuitive, engaging, and delightful.

3 User Stories

4 Functional Requirements

4.1 Authentication

- Registration
  - Can register using username and password
  - Can register using Google account
- Login
  - Can login using username and password
  - Can login using Google account
- Log out
  - A user has a means whereby they can log out of their account
- Update password
  - If a user has forgotten their password, they may securely reset it
- Remove account
  - A user can delete their account

4.2 Domain management

- A user may create and domains with custom names, the domain acts as a 'folder' for a number of sources of data
- A user may add a description for a domain
- A user may add an image or select an icon to represent the domain
- A user may remove a domain
- Within a domain, the following operations can be performed
  - Add a data source (ex: Comments on a specified Instagram account) by selecting a source type and specifying additional parameters relevant for that source
  - Remove a data source
  - Refresh the data for the whole domain or a singular source
  - Edit a source type or source URL
  - Optional: Add, edit, and remove groups of keywords to track
- A user can delete domains (deleting the sources within the domain too)

4.3 Data Visualization and Statistics

- A user can view a select sample of data that was retrieved from their specified sources
- A user can view all the statistics (derived from sentiment and meta data) for different sources contained within the domain or all the combined sources
- A user can view data visualizations for sentiment data, meta-data, and optionally: Time-series data

4.4 Sentiment Analysis

- Sentiment analysis can be performed within any of the following groupings
  - For the domain as a whole (this includes all data across all specified sources)
  - Per data source (this considers all the data retrieved from one specific source)
- The results of sentiment analysis on a grouping are returned as follows
  - The ratios of positive, negative, and neutral sentiment
  - An objectivity-subjectivity score
  - An overall sentiment score (from negative to positive)
  - An overall categorization within the following groups
    - Very negative
    - Negative
    - Negative-to-Neutral
    - Neutral
    - Neutral-to-Positive
    - Positive
    - Very positive
- Meta-data is returned whenever a user performs sentiment analysis on an entire domain
  - The meta-data to be returned is as follows
    - Which analysis sources were consulted (ex: Twitter, Instagram, etc.)
    - How many pieces of data from each source were considered
    - An indication of the timeframe over which the data was produced
    - Whether new data needed to be retrieved from the web
    - Display metrics pertaining to how quickly data was retrieved
    - Optional: Based on the number of and type of sources consulted, provide the user an estimate of how good a source the data is for sentiment analysis
- Optional: Time-series data

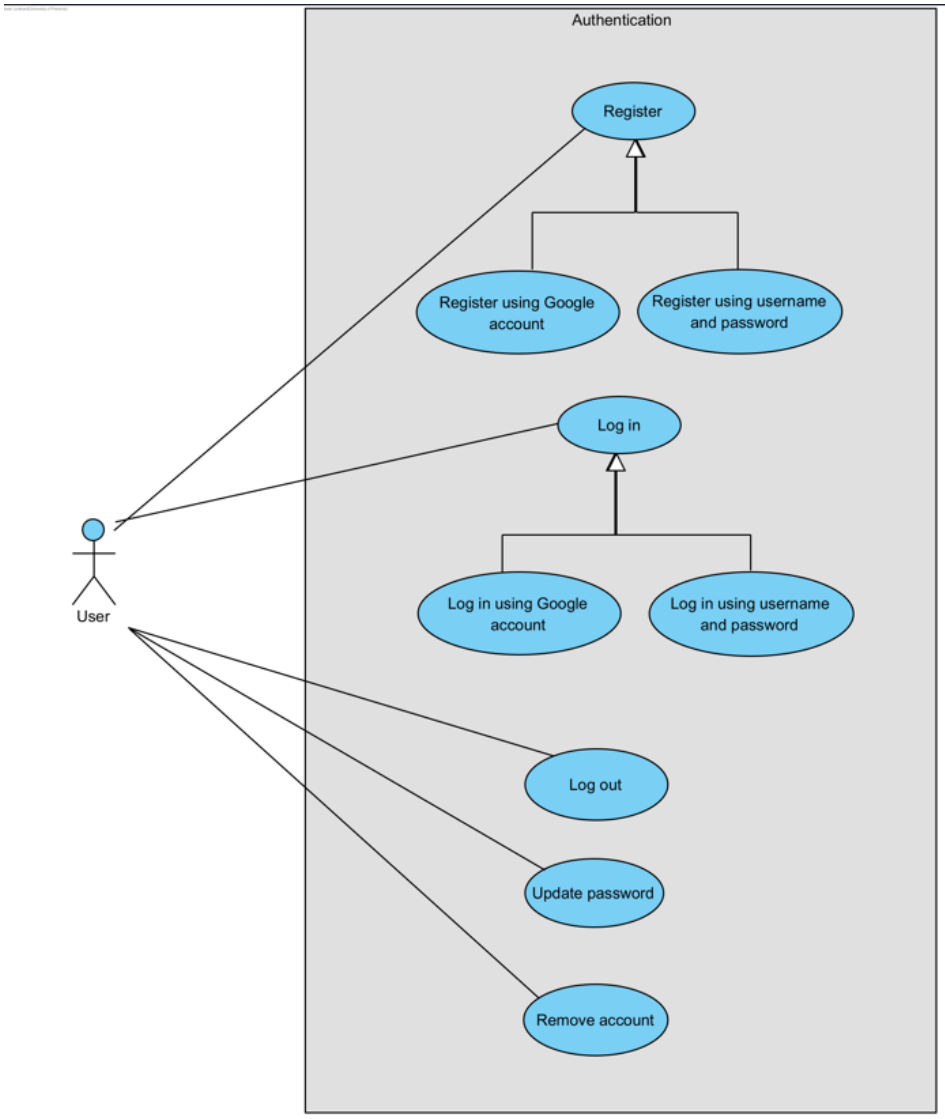
  - Time-series data is returned whenever a user performs sentiment analysis
  - The following time-series data will be returned
    * The change in sentiment score (negative to positive) over a period of time.
    * A prediction of the future trend of the sentiment of the domain

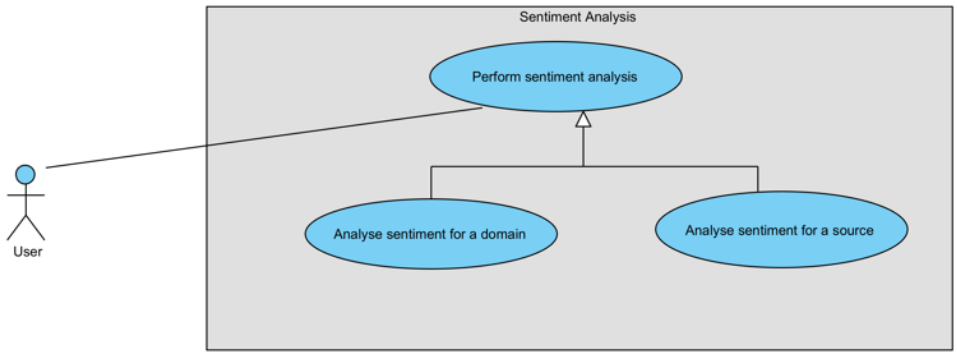
4.5 User Profiles

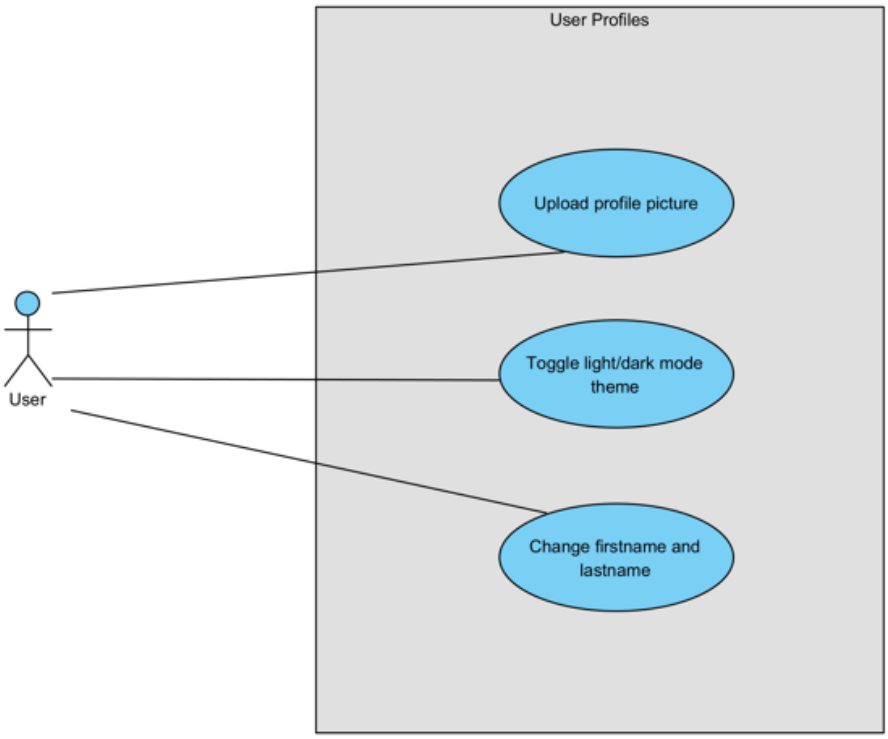
- The domains a user wants to track are stored, this includes:
  - The sources for the domain
  - Optional: The keywords to specifically monitor
- Personalization and preferences
  - User can specify either dark mode or light mode
  - User can upload a profile image
  - User can change their first name and last name

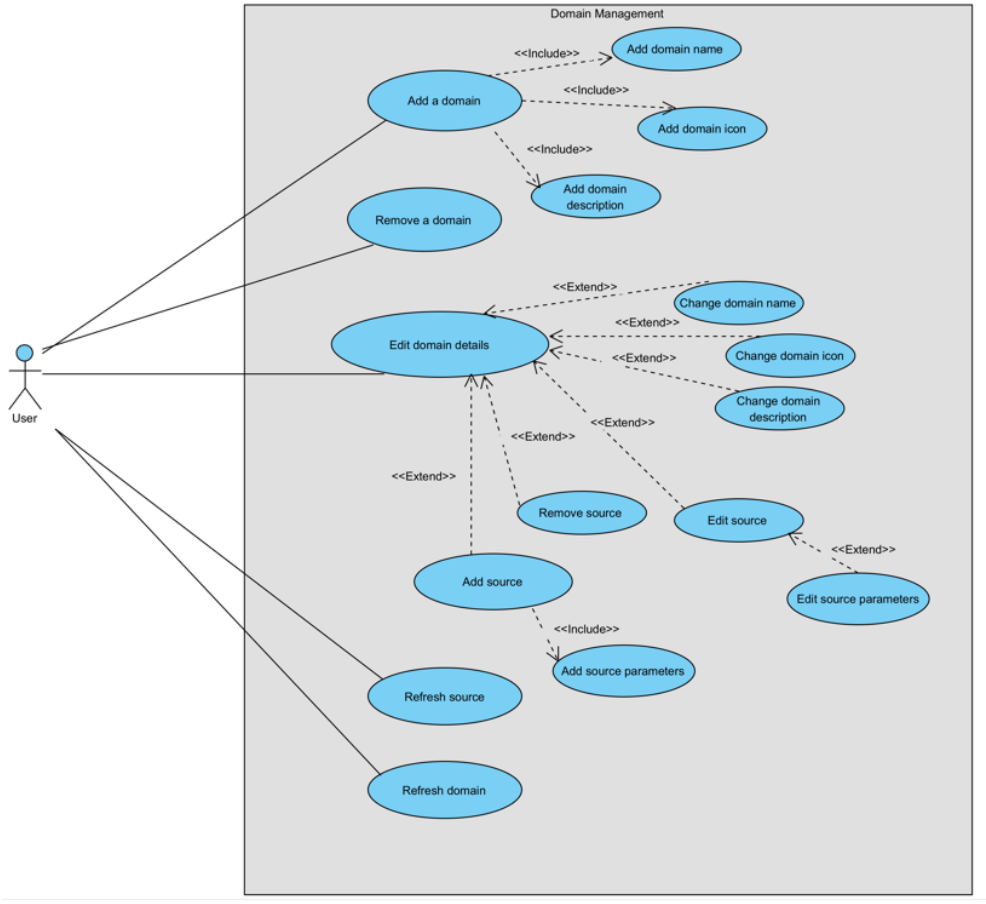
4.6 Requirements

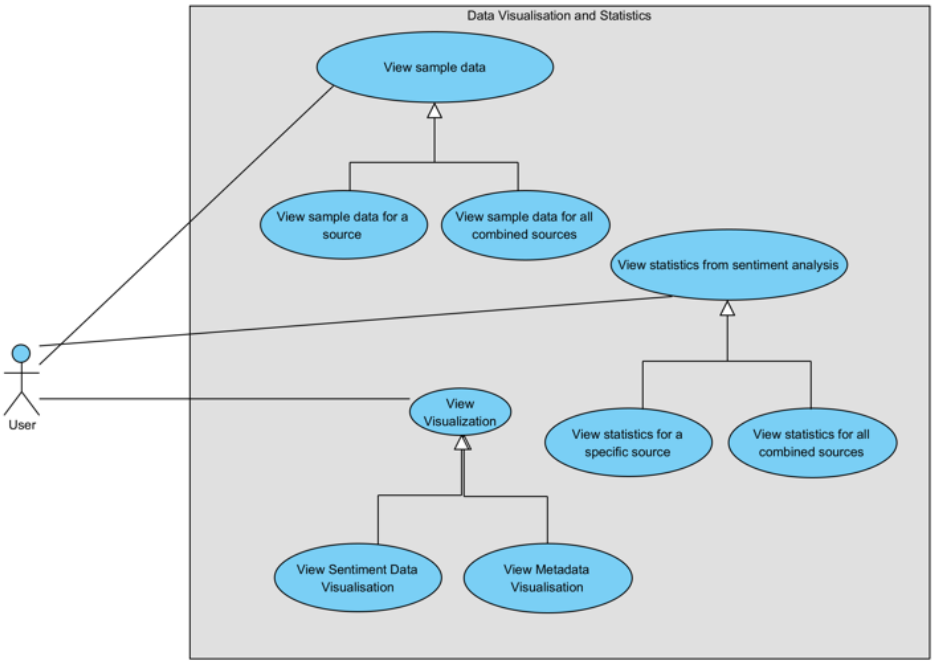
4.7 Use Case Diagrams






User Profiles
Upload profile picture
Toggle light/dark mode theme
Change firstname and lastname
User


Domain Management
Add domain name
<<Include>>
Add a domain
<<Include>>
Add domain icon
<<Include>>
Add domain description
Remove a domain
<<Extend>>
Change domain name
Edit domain details
<<Extend>>
Change domain icon
<<Extend>>
Change domain description
<<Extend>>
<<Extend>>
<<Extend>>
Remove source
Edit source
<<Extend>>
Edit source parameters
Add source
<<Include>>
Add source parameters
Refresh source
Refresh domain
User


Data Visualisation and Statistics
View sample data
View sample data for a source
View sample data for all combined sources
View statistics from sentiment analysis
User
View Visualization
View statistics for a specific source
View statistics for all combined sources
View Sentiment Data Visualisation
View Metadata Visualisation

5 Service Contract

6 Contract Design

7 Database Design

8 Class Diagram

9 Architectural Requirements

9.1 Quality Requirements

- Security
- Usability
- Accessibility
- Scalability
- Availability
- Modifiability
- Performance

9.2 Architectural Patterns and Tactics

Below we discuss which architectural patterns and tactics we will use to meet the quality requirements. The patterns and tactics are in bold.

Security

Usability

- User-Centred Design Approach
  - Consider the end-user throughout the design process and design the system accordingly.
  - Make the terminology easy to understand but still meaningful, considering users with no technical knowledge about NLP (Natural Language Processing).
  - Examples of end-users: R&D specialists, social media managers, project leaders, executives, consultants.
- Clear and Intuitive Interface
  - Reduce clutter on the dashboard.
  - Ensure that the meaning and purpose of actions is clear through the use of descriptive and minimalistic icons.
  - Provide user feedback as they navigate through the application.
  - Utilize a user workflow of top-to-bottom, left-to-right navigation, ensuring that the process of completing steps feels natural and ordered.
- Usability Testing
  - Test the system with representative users.
  - Collect and implement feedback.

Accessibility

- Implement a Dark Mode
  - Cater to visually impaired and cognitive disabilities by providing a simple, distraction-free, high contrast user interface.

Scalability

Availability

Modifiability

Performance

10 Quality Requirements

11 Architectural Patterns and Tactics

12 Design Patterns

13 Constraints

14 Technology Requirements