SMART CUSTOMER CARE

CSCI 495

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Abstract

Customer loyalty is one of the most essential factors in the success of all services and products, the most efficient way to achieve customer satisfaction is by actively collecting their feedback. Traditional methods of collecting customers' feedback such as, surveys, text messages or even phone calls have mostly proven inefficient over the years.

Nowadays, there is one consistent place where people share most of their thoughts and opinions, that place being social media. Smart Customer Care (SCC) is an application designed to analyse how consumers feel and predict their relative feedback and opinions regarding any topic of choice using the opinions that they voice through social media. Our primary source of data as of this versions release is Facebook posts and groups.

Using a web-based approach, users of our system will be able to create an account of their own, giving them access to our data analysing tools and user interface. Comments, posts and other useful insights are then scrapped according to the given user input / criteria. Data is then pre-processed, put through our machine learning models, and then displayed on the user's dashboard.

By the end of the project, we expect to have a fully developed web-scraper, a functional machine learning model, an accessible database, and a functional web-application (User interface), all linked together to provide useful analytical services to the customers.

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Introduction

Over the years, it has been proven challenging for companies and services to collect customers' feedback in a convenient manner, since most traditional ways of doing so have often been lacking in one element or the other. Primarily the fact that such methods require the customer to devote a portion of their time to provide feedback, which is often regarded as an inconvenience. As a result, they tend to give responses that are insufficient, incorrect, or worse yet non-existing.

This has proven to be a very detrimental problem due to customers' feedback being the most decisive factor of improving a service's effectiveness and usability. As a result, developing a better method of collecting customer feedback is required. peoples' opinions and impressions of any service they experience are often voiced through social media, which makes it a perfect place to collect customer feedback efficiently, which brings about the idea that utilizing social media could be an upgrade to all traditional methods of tracking customer satisfaction.

It is no wonder that improving on an issue this crucial comes with its economic impact.
While on one hand, Corporations hire giant social media teams and invests heavily in tools necessary to track shifts in loyalty and sentiment. This is usually followed up with massive financial costs and liabilities. On the other hand, it results in more customer satisfaction and loyalty, which allows for growth in the overall number of faithful customers and consequently, more overall profit.

Literature Survey

Social media analyzer software focuses on analyzing data scraped from social media websites to discover people's relative opinions and topics on certain products or services. Companies use this data to learn and implement future improvements.

Benefits of this category:

1. Automated
2. Low cost (as a result of automation)
3. Acquires genuine feedback
4. Does not need direct customer interaction

Issues with this category:

1. Constant software maintenance, as social media websites tend to try and block scraping tools

2. Large amounts of data needed for analysis (If machine learning and modelling is used)

3. Most social media data is irrelevant and requires extensive filtering

One of the famous implementations is the paper regarding a Twitter Emotion Analyzer. This program scrapes tweets on twitter and identifies its sentiment or whether it is a negative or positive comment. It also tracks the sentiment level of the user over time to check satisfaction over periods of time. The scraping criteria focused on tweets from the accounts of four U.S telecom companies:

1. AT&T
2. T-Mobile
3. Verizon
4. Sprint

This implementation helped identify users with problems quickly for moderators to

respond to where those with more severe sentiment levels were prioritized. On the other hand, this project lacks platform diversity as its only source of data is Twitter and can only identify emotions (Cannot apply classification). It also lacks international relevancy as it only tracks tweets from the 4 mentioned companies who are focused in the US and not other countries.

System Analyzing Bots

Some companies heavily rely on their systems actively working all the time, and require that they do not waste time identifying internal errors when an issue could be related to the customer's device. This is where system analyzing would benefit these companies. Data and general interactions between any customer and the system is stored in a record and is analyzed by the bot to identify whether it was a user or system fault.

Benefits:

1. It improves subscribers' Quality-of-Experience (QoE) by correctly addressing their complaints

2. It maintains system dependability by quickly responding to any failures

3. This information helps in reducing the time complaints and issues are solved by the customer service systems a company is adopting.

Issues:

1. It needs to be specifically tailored and built to work with a certain company's system. (Not easily accessible and expensive to modify)

2. Choices are limited when it comes to solving problems. It can only identify whether a customer's problem originated from the user's device or internally from the company.

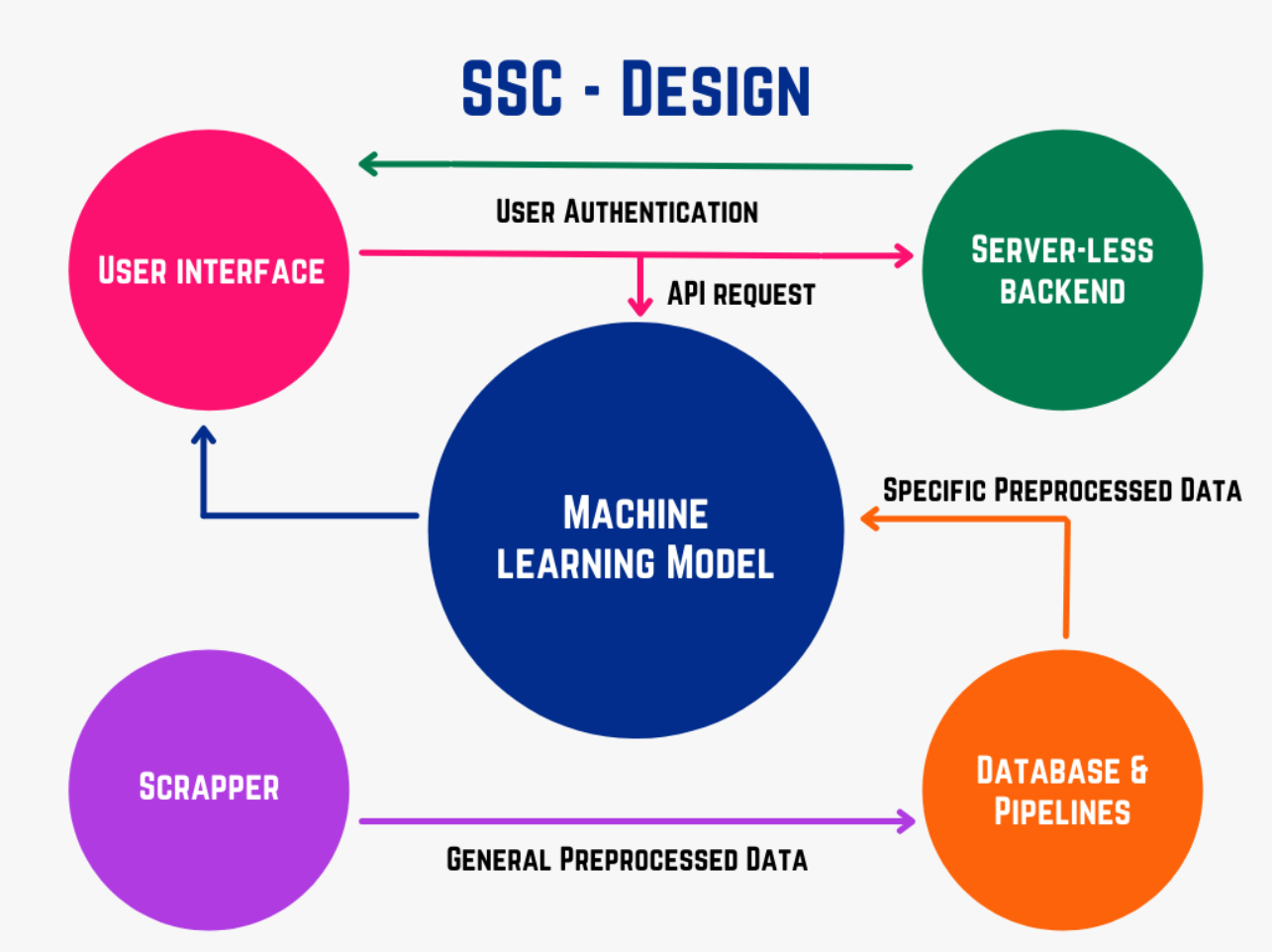
An example of this is a system used by some cellular networks companies in China called **Intelligent Customer Care Assistant (ICCA).** Where 4G and 3G connections are monitored and analyzed to ensure any network issues are solved quickly and system downtime is minimized.

Project Design

Throughout the development of Smart customer care, we made sure to design a system that was light, user friendly and pleasing to the eye in the front-end. While also maintaining great system architecture and shape in the back end.

Our project is split into 6 critical components:

- Front-end / User interface
- Serverless Back-end
- Scrapper
- Database
- Models
- Pipelines



User Interface

The user interface is the component that allows the application to bloom and come to life. It grants users the ability to interact with our system. As the current scope of this project, **SCC** is a new self-contained standalone web application.

Serverless Backend

A serverless backend is a third-party server that allows for quick plug and play functionality and services without the hassle of making everything from scratch. In this project we utilize the Firebase API to create and manage user accounts and authentication.

Scrapper

A scrapper is a tool we built that traverses websites, and collects any relevant information (scrapes) and returns it for use in the following stages. We specifically used the scrapy library for development and scrapped information from social media sites such as Facebook.

Database

We utilized MongoDB to store scrapped data and Firebase Firestore to store user account information

Models

Our machine learning models are used to analyze how consumers feel and predict their relative feedback and opinions regarding any topic of choice

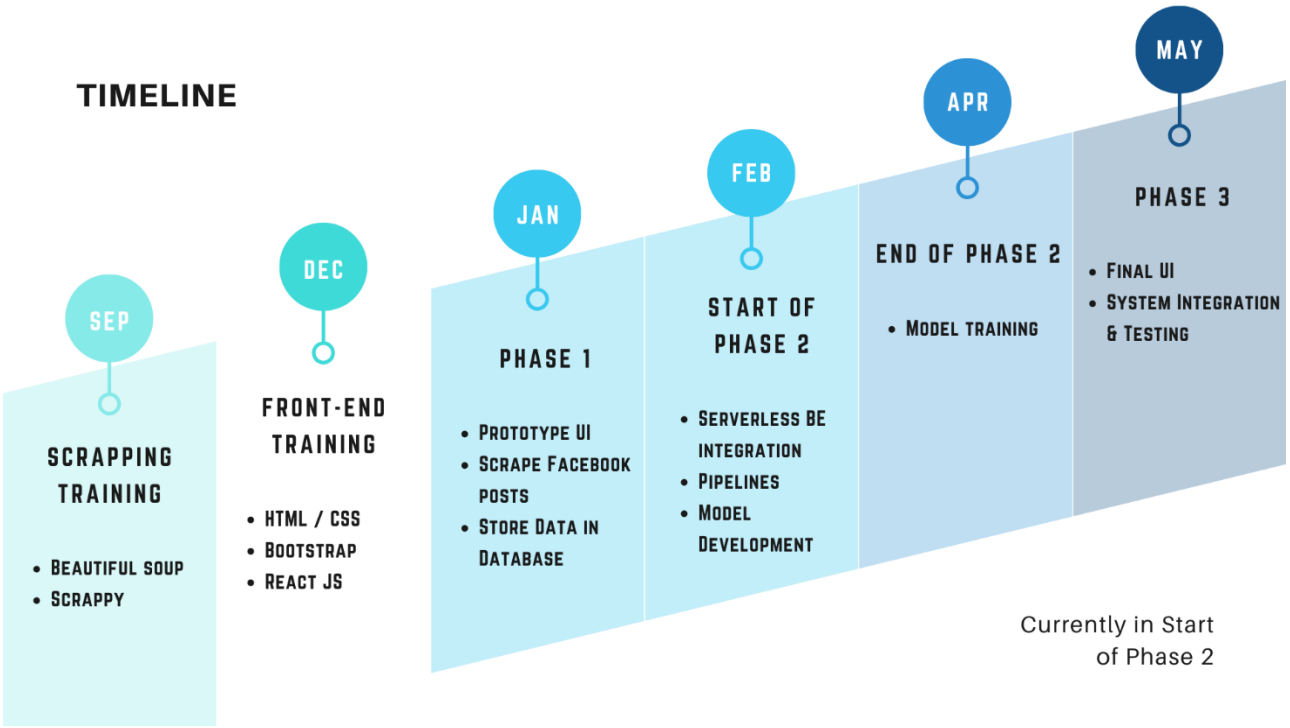
Pipelines

Data preprocessing and preparation for modelling when moving from one place to another

How the system works

- Scrapper scrapes data from Facebook and other social media sites
- Data is preprocessed and stored our database (MongoDB)
- Stored data is fed to our models through a pipeline
- Each pipeline further preprocesses / natural language processing and formats the data to accommodate each model's requirements
- Models are trained using the stored data to predict user sentiments and opinions on topics
- The user first creates an account and signs up to gain access to our user interface
- Signing up and logging in (User authentication) is done through a serverless backend (Firebase)
- From the user interface the user may request predictions on topics of his choice. The UI sends a request to the relevant model and retrieves the required results

Current & Future Phases



Before starting this project, we had determined the components necessary for its success and have performed time management techniques to create a detailed Gantt chart filled with all the development details and scheduling. We then followed up with a simplified timeline to maintain focus and morale on our current objectives.

Training Phase (SEP – DEC):

Focused on learning the technologies required to build our system which included the

- Scrapper component
- Front-end / User interface component

Phase 1 (JAN):

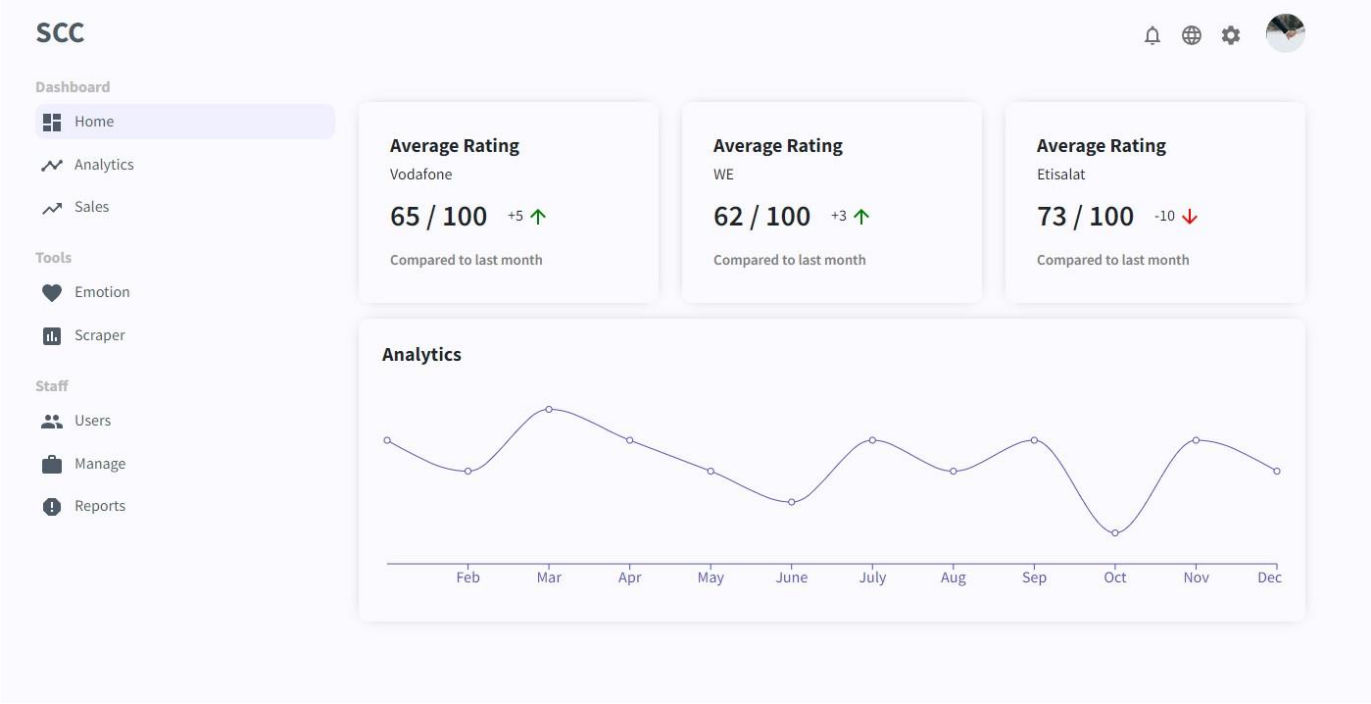
Focused on building a prototype of the user interface and defining the interaction between the user and system without any real backend.

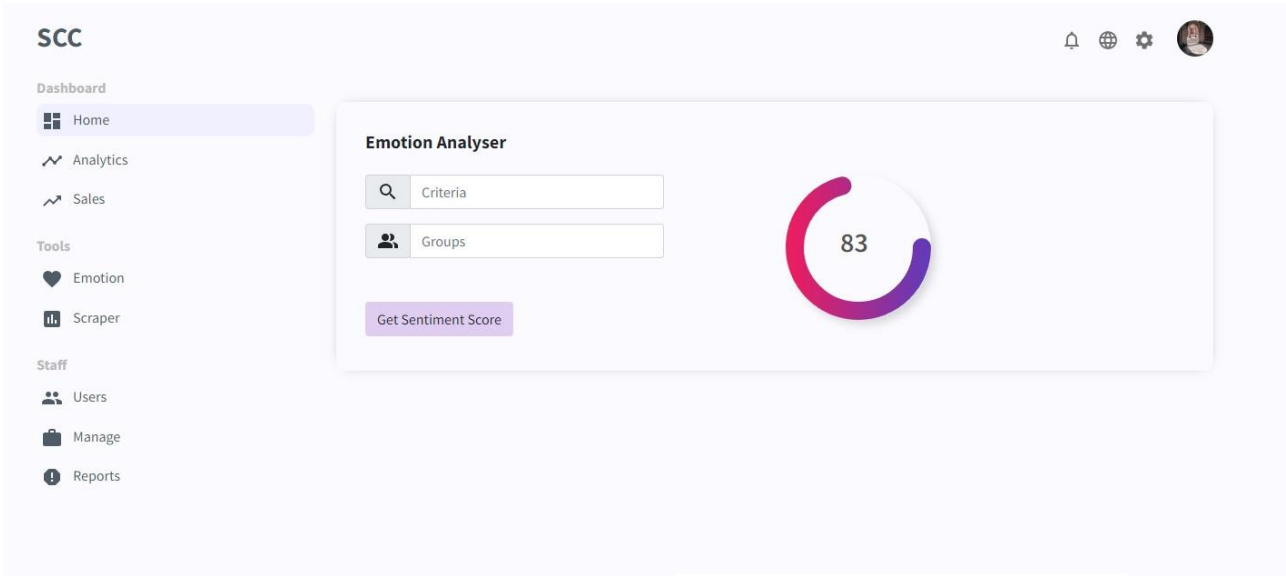
The prototype GUI includes as of this version release:

- Home / Dashboard
- Sign / Log in pages
- Tool pages with a prototype for the emotion checker model results

These components are all in a functional web application environment with responsive nav and sidebars.

We also developed our scraper that currently gathers data from Facebook posts and groups and stores it in our database (MongoDB)





Start of Phase 2 (FEB - MAR) – *Current Phase*

This is the phase we will start working on and will focus on:

- Setting up the serverless backend (Firebase)

  Which will allow us to easily create a fully functional user authentication system

- Creating the machine learning models and pipelines

  Which will allow us to obtain the actual insights and analytics the user needs

End of Phase 2 (APR)

This will be the second part of phase 2 where we will focus on training all the models, we created using the data scrapped, stored, and processed using our pipeline. This will allow our models to return more accurate and precise results, offering the user a more accomplished experience.

Phase 3 (MAY)

This is the final phase and the one where we finalize on the interface design and interaction with the user. And focus on successfully integrating all the components / modules together and making sure they all work as intended.

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