

Changemakers: Creativity and Value Creation

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Q1: Innovation

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Unit 1 Topic 1 – How Innovation Shapes the World explains how innovation changes society, the economy, and technology. Innovation is not just about creating new ideas; it is about putting those ideas into practice to create value and improve everyday life [1].

A key concept is the difference between innovation and invention. An invention is the creation of something new, while innovation is when that new idea is successfully used and adopted by people. Therefore, innovation focuses on practical use and real-world impact rather than just originality [1].

Innovation is driven by factors such as advances in technology, competition between businesses, social needs, and environmental challenges. For example, concerns about climate change have encouraged the development of renewable energy technologies, while the need for global communication has led to improvements in digital technologies. Governments, universities, and businesses all support innovation through funding and research [2].

The topic also looks at how innovations spread through society. New ideas are usually adopted first by innovators and early adopters, followed by the majority of people and finally late adopters. The speed of adoption depends on factors such as cost, ease of use, and the advantages offered by the innovation [3].

Innovation has many benefits, including increased productivity, improved quality of life, and the creation of new industries. However, it can also have negative effects, such as job losses and increased inequality if people cannot develop new skills [2].

Finally, the topic highlights ethical and environmental issues. Although innovation can help solve problems such as climate change and improve healthcare, it can also create challenges such as data privacy concerns, bias in technology, and electronic waste. Responsible innovation aims to ensure that technological progress benefits society while reducing negative impacts [1].

Q2: Ideation

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Project Ideas

Sentiment tracker for a business

- Tracks customer opinions about a business using feedback data
- Analyses sentiment from reviews, comments, or surveys
- Displays overall customer satisfaction trends in a dashboard
- Helps businesses understand strengths and weaknesses

Sentiment Analysis for product review

- Analyses customer reviews for specific products
- Classifies feedback as positive, negative, or neutral
- Calculates overall product sentiment score or rating
- Helps compare customer satisfaction between different products

Call Centre analytics system

- Analyze recorded customer service calls
- Detect satisfaction level and common issues
- Identify agent performance trends

Meeting summary generator

- Convert meeting speech into text
- Summarize key points automatically
- Highlight decisions and action items

Accent recognition system

- Identifies different accents (e.g., British, American, Indian)
- Can be used in language learning tools
- Uses speech pattern recognition

Skill Development

Develop data analysis, organization, and presentation skills.

Project Title

Sentiment Score Dashboard

Description

To design and develop a Sentiment Score Dashboard for review analysis and customer insights. Sentiment analysis enables organizations to understand customer opinions and improve decision-making by analyzing customer feedback [4]. Interactive dashboards also support effective data visualization and interpretation of large datasets [5].

Aim

To design and develop a sentiment score dashboard that analyses customer interactions to understand customer opinions and satisfaction levels.

Objectives

- To collect and preprocess product review data from a business.
- To apply Natural Language Processing (NLP) techniques to classify customer interactions into positive, negative, and neutral sentiment categories.
- To generate sentiment scores from customer interactions to measure overall product satisfaction and performance trends.

- To design an interactive dashboard displaying sentiment results using charts, graphs, and product comparison visuals.
- To evaluate the effectiveness of the dashboard in helping users understand customer feedback and identify areas for improvement.

Brief Description

This project focuses on developing a sentiment score dashboard for analyzing customer interactions. The system collects call logs and review data, processing the information to generate sentiment scores.

Using Natural Language Processing (NLP), the text data is analyzed and classified into positive, negative, or neutral sentiments. A sentiment score is then calculated to represent overall customer satisfaction for each interaction.

The results are displayed through an interactive dashboard featuring visual tools such as bar charts, pie charts, and trend graphs. This allows users to review customer feedback, identify common issues, and track customer opinion trends over time.

The project demonstrates how sentiment analysis can support businesses in making data-driven decisions based on real customer feedback.

Q3: Research

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The following courses and learning resources have been identified to support the successful completion of the project aim and objectives.

1. Advanced Tokenization and Sentiment Analysis

This course provides knowledge on processing text data and classifying customer feedback as positive, negative, or neutral using Natural Language Processing (NLP) techniques. It will support the development of the sentiment analysis and sentiment scoring components of the project.

2. Create Dashboards in Power BI

This course focuses on building interactive dashboards, charts, and reports using Power BI. It will support the design and presentation of sentiment analysis results.

3. Building Powerful Reports and Dashboards in Power BI

This course develops skills in creating professional dashboards and visualizing data trends. These skills will be useful for displaying customer satisfaction levels and product comparisons.

4. Analysis and Visualization of Data with Power BI

This resource explains how to analyze datasets and create effective visualizations. It will help present sentiment scores and trends in a clear and meaningful way.

5. Microsoft Power BI Learning Resources

This collection of tutorials covers data preparation, analysis, and dashboard development. These resources will be used throughout the project lifecycle to support the successful creation of the sentiment score dashboard.

Q1: Project scope

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Project aim:

The aim of this project is to design and develop a Customer Sentiment Analysis Dashboard that enables businesses to monitor customer opinions and satisfaction levels by analyzing feedback from reviews, surveys, support tickets, and social media comments. The dashboard will use Natural Language Processing (NLP) techniques to automatically classify customer feedback as positive, negative, or neutral and display the results through interactive visualizations. A sentiment dashboard is a tool that collects and displays people's opinions and feelings about a brand, product, or topic. Sentiment analysis is widely used by organizations to understand customer experiences and support data-driven decision-making [6].

Proposed Solution

Many organizations receive large volumes of customer feedback that are difficult to analyze manually. The proposed solution is a web-based dashboard that automatically collects customer feedback, processes text data, calculates sentiment scores, and presents the results in an easy-to-understand format. The system will follow a data pipeline consisting of data collection, preprocessing, sentiment analysis, storage, and visualization. Customer comments will first be cleaned by removing irrelevant characters, duplicates, and stop words. NLP techniques will then be used to classify the sentiment of each comment. The results will be stored in a database and displayed through charts, graphs, and key performance indicators (KPIs), including overall sentiment score, sentiment trends over time, and the percentage of positive, negative, and neutral comments. Modern sentiment analysis systems help organizations identify customer concerns, monitor satisfaction levels, and respond more effectively to emerging issues [7].

Technologies and Resources

- Programming language: Python
- Natural Language Processing using NLTK
- Database creation using SQL
- Development environment: Visual Studio Code (VS Code)
- Dashboard development using Power BI

Python is widely used in data science and machine learning because of its extensive range of NLP and analytics libraries [7]. Power BI will be used to create interactive dashboards that enable users to explore sentiment data through dynamic visualizations and support effective decision-making [8].

Project Timeline and Task Schedule

The project will be completed over a three-week period. Most development activities will be carried out on Mondays, with smaller tasks, testing, and documentation completed throughout the week.

Week 1

Define the project scope, objectives, and requirements, conduct a literature review, design dashboard wireframes, and identify data sources.

Week 2

Collect and clean customer feedback data, develop the sentiment analysis model using NLP techniques, and begin dashboard development and database integration.

Week 3

Complete dashboard development, perform testing and evaluation, deploy the solution, and complete the final report and presentation.

Detailed task schedule

Day	Activity
-----	----------

Monday (Week 1)	Project planning, requirements gathering, and literature review
Tuesday–Friday (Week 1)	Research sentiment analysis techniques and create dashboard designs
Monday (Week 2)	Data collection, cleaning, and preprocessing
Tuesday–Friday (Week 2)	Build sentiment analysis model and connect database
Monday (Week 3)	Finalise dashboard development and visualisations
Tuesday–Wednesday (Week 3)	Testing and evaluation
Thursday (Week 3)	Deployment and user feedback
Friday (Week 3)	Reflection, documentation, and final submission

Q2 Gantt chart

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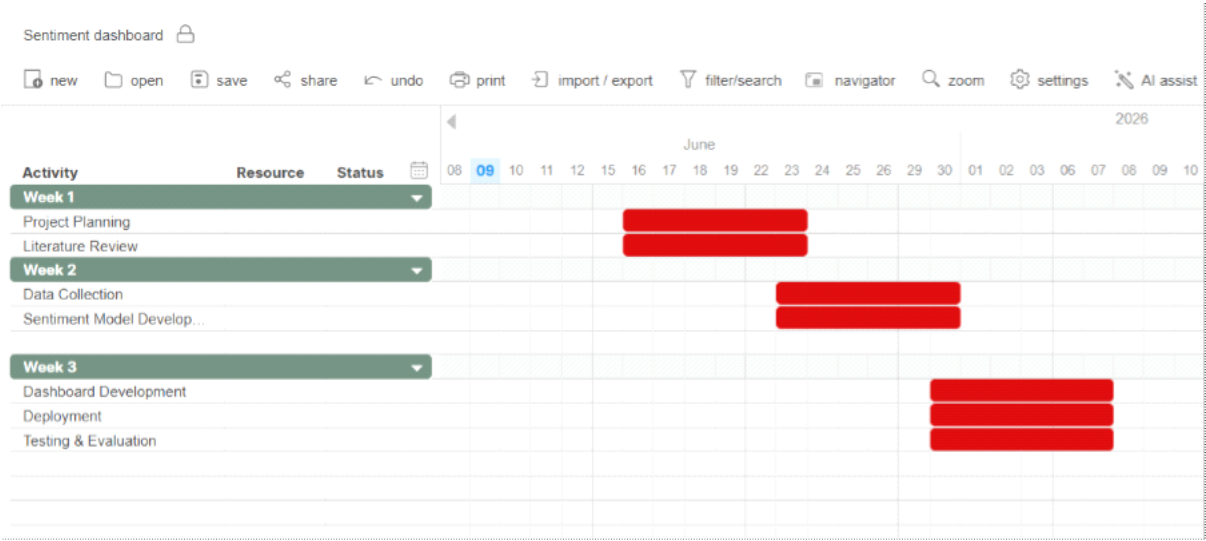


Figure 1

A Gantt chart is a project management tool that displays project tasks against a timeline. It helps to track progress, manage deadlines, and monitor project activities throughout the project lifecycle [9]. For this project, the Gantt chart will be used to schedule, monitor, and manage the development stages of the Customer Sentiment Analysis Dashboard, ensuring that all tasks are completed within the planned three-week period. The chart will also assist in identifying task dependencies and ensuring that project milestones are achieved on time

Q3: Risks and challenges

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Risks, Challenges and Mitigation Strategies

Every computing project has potential risks that can affect quality, time, and successful delivery. For the Customer Sentiment Analysis Dashboard, several technical and project-related risks may arise.

Poor Data Quality

Customer feedback data may contain spelling mistakes, slang, missing values, or irrelevant text, which can reduce the accuracy of sentiment analysis.

Mitigation: Apply strong data preprocessing techniques such as text cleaning, removing duplicates, stop-word removal, and tokenization before analysis.

Inaccurate Sentiment Analysis Results

The sentiment model may misclassify complex language such as sarcasm or mixed opinions, leading to incorrect sentiment scores.

Mitigation: Use well-tested NLP libraries like TextBlob or NLTK and evaluate model performance using metrics such as accuracy and precision. Testing with different datasets can also improve reliability.

Limited Project Time

The short development timeframe may lead to incomplete features or rushed implementation.

Mitigation: Prioritize core features such as data processing, sentiment analysis, and dashboard visualization. Use the Gantt chart to strictly manage weekly tasks and avoid scope creep.

Data Privacy Concerns

Customer feedback may include personal or sensitive information, raising privacy issues.

Mitigation: Anonymize all user data and ensure compliance with data protection principles such as GDPR by avoiding storage of personal identifiers.

Dashboard Performance Issues

Large datasets may slow down dashboard loading and affect user experience.

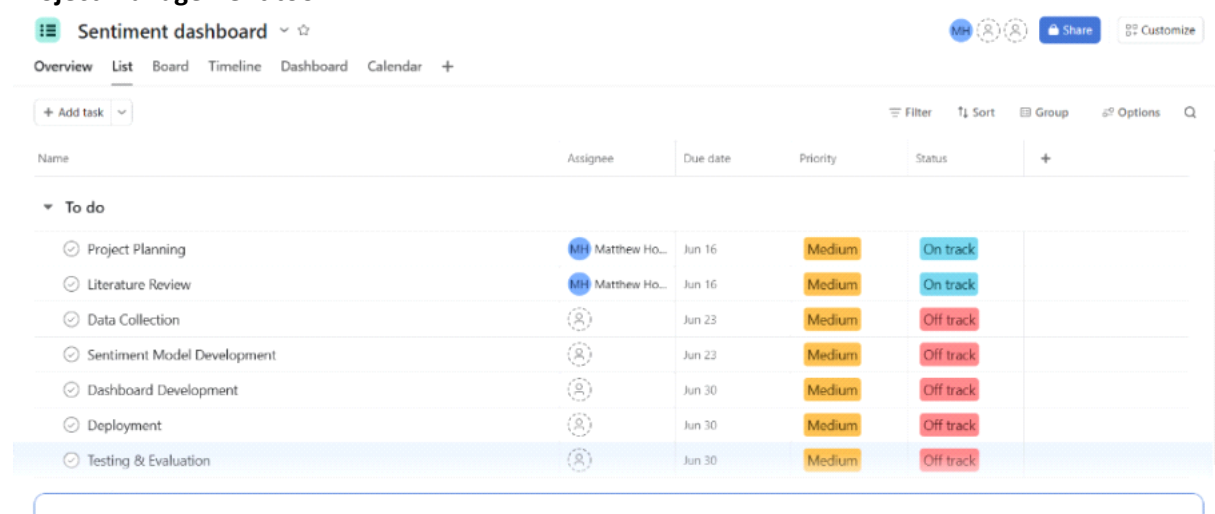
Mitigation: Optimize queries, reduce unnecessary calculations, and use aggregated data for visualization.

These risks are common in data-driven software projects, but with proper planning, testing, and structured development, they can be effectively reduced or avoided.

Q1: Development method

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Project management tool:



The screenshot shows a project management tool interface for a project named "Sentiment dashboard". The interface includes a navigation bar with tabs for Overview, List, Board, Timeline, Dashboard, and Calendar. A "Share" button and a "Customize" button are also visible. Below the navigation bar, there is a "Filter" button, a "Sort" button, a "Group" button, and an "Options" button. The main content area displays a table of tasks under the heading "To do". The table has columns for Name, Assignee, Due date, Priority, and Status. The tasks listed are: Project Planning, Literature Review, Data Collection, Sentiment Model Development, Dashboard Development, Deployment, and Testing & Evaluation. The first two tasks are assigned to Matthew Ho... and are marked as "On track". The remaining five tasks are assigned to an unnamed user and are marked as "Off track".

Name	Assignee	Due date	Priority	Status
Project Planning	Matthew Ho...	Jun 16	Medium	On track
Literature Review	Matthew Ho...	Jun 16	Medium	On track
Data Collection		Jun 23	Medium	Off track
Sentiment Model Development		Jun 23	Medium	Off track
Dashboard Development		Jun 30	Medium	Off track
Deployment		Jun 30	Medium	Off track
Testing & Evaluation		Jun 30	Medium	Off track

Figure 2:

This project management tool provides a centralized platform for organizing, tracking, and managing project tasks. In the Sentiment Dashboard project, tasks such as planning, literature review, data collection, model development, deployment, and testing are listed with assigned team members, due dates, priority levels, and status updates. The tool helps teams monitor progress, identify delays, manage responsibilities, and ensure deadlines are met. Its main purpose is to improve collaboration, accountability, and project visibility by giving stakeholders a clear view of what work is being done, who is responsible, and whether the project is on track. [10]

Q2: Design work

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Design Work 1: Requirements Specification

A requirements specification was created to identify the main functions and performance requirements of the system.

- Functional Requirements
- The system shall import customer reviews and feedback data.
- The system shall clean and preprocess text data.
- The system shall classify customer feedback as positive, negative, or neutral.
- The dashboard shall display sentiment scores using charts and graphs.
- The system shall allow users to filter results by date or product.
- Non-Functional Requirements
- The dashboard shall provide results quickly and accurately.
- The system shall be easy to use and understand.
- Customer data shall remain secure and confidential.

The requirements specification ensures that all system features are clearly defined before development begins [11].

Design Work 2: Flowchart

A flowchart was designed to illustrate how data moves through the system. The flowchart includes the following stages:

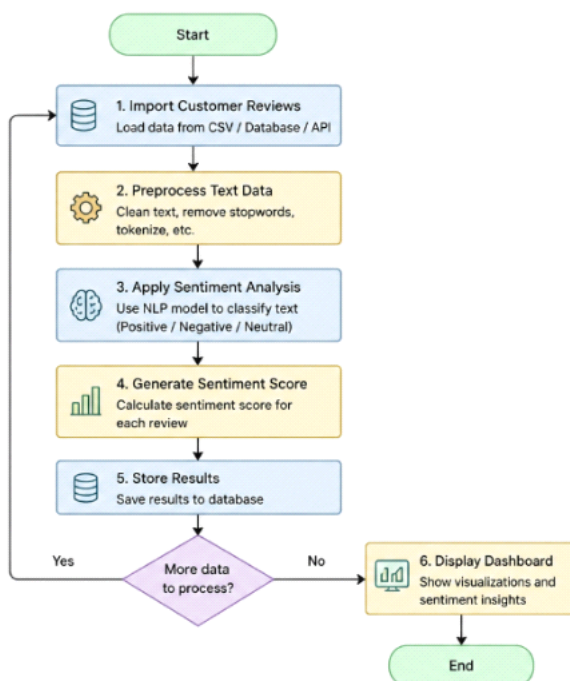


Figure 3:

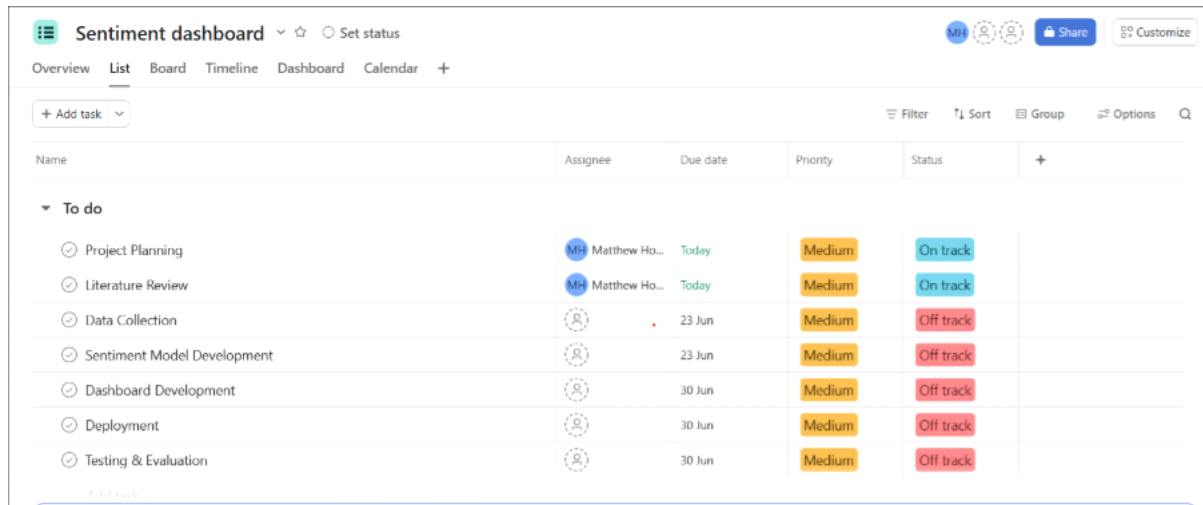
The flowchart provides a visual representation of the processes carried out by the Sentiment Score Dashboard. It helps identify the sequence of tasks and supports system planning and development [12].

Q3: Practical implementation

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Project Management Tool (Kanban Board)

A Kanban board was created to help plan and manage the Sentiment Dashboard project. Tasks were organized into different stages, including To Do, In Progress, Testing, and Done. This makes it easier to track progress, manage deadlines, and ensure all project requirements are completed in a structured and organized way.



Name	Assignee	Due date	Priority	Status	
To do					
Project Planning	MH Matthew Ho...	Today	Medium	On track	
Literature Review	MH Matthew Ho...	Today	Medium	On track	
Data Collection		23 Jun	Medium	Off track	
Sentiment Model Development		23 Jun	Medium	Off track	
Dashboard Development		30 Jun	Medium	Off track	
Deployment		30 Jun	Medium	Off track	
Testing & Evaluation		30 Jun	Medium	Off track	

Figure 4:

Development environment setup

The development environment was set up using Visual Studio Code (VS Code) and Python. A project folder was created to store all files related to the Sentiment Dashboard, including source code, datasets, and documentation. This provides a structured workspace for developing, testing, and managing the project.

Coding example:

```
sentiment dashboard.py x
1 import streamlit as st
2 from textblob import TextBlob
3
4
5 st.title("Sentiment Score Dashboard")
6
7
8 text = st.text_area("Enter a review or comment:")
9
10
11 if st.button("Analyse Sentiment"):
12     if text:
13         analysis = TextBlob(text)
14         score = analysis.sentiment.polarity
15
16         st.subheader("Results")
17         st.write(f"Sentiment Score: {score:.2f}")
18
19         if score > 0:
20             st.success("Positive Sentiment 😊")
```

```

18
19     if score > 0:
20         st.success("Positive Sentiment 😊")
21     elif score < 0:
22         st.error("Negative Sentiment 😞")
23     else:
24         st.warning("Neutral Sentiment 😐")
25 else:
26     st.write("Please enter some text.")

```

Figure 5:

Dataset Collection

A sample dataset was collected to support the development of the Sentiment Dashboard. The dataset contains customer reviews that can be analyzed to determine whether the sentiment expressed is positive, negative, or neutral. This data will be used to test the sentiment analysis functionality and evaluate the accuracy of the dashboard.

Using Kaggle.com is used to download a dataset that can be used for the data in the sentiment dashboard

database.sqlite (5.04 MB)			📄 🔍 ➡
About this file			📝 Suggest Edits
SQLite version of the tweets table			
Table	Total Rows	Total Columns	
Tweets	14485	15	

Figure 6 :

Dashboard Prototype

A basic prototype of the Sentiment Dashboard was created to demonstrate how users will interact with the system. The dashboard includes a text input area for entering reviews, a button to analyze sentiment, and a section that displays the sentiment score and classification. This prototype provides an early visual representation of the final system and allows key features to be tested.

Example of potential dashboard creation:



Figure 7 :

References

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