

Section 1 Requirement Analysis:

1.1: Overview of the product and who will use it:

Product: The product will be a web app called "Unemployment Insight Hub", it will be a web based analytics and reporting tool, designed to help users to explore and analyze unemployment trends in the UK. Leveraging the existing database created in Coursework 1, the web app will include an interactive dashboard, linking to three distinctive sections: Gender-Unemployment, UKRegion-Unemployment, LondonTrend-Unemployment. Within each section there will be visualizations, customizable queries, and forecasting tools.

Features:

Interactive Interface:

The homepage features four distinct sections, each represented by buttons for quick navigation. Within each section, users can easily switch between the homepage and their designated section using intuitive navigation options.

- Dashboard: Provides a comprehensive overview of the employment landscape, displaying key trends and insights in an easily navigable interface.
- Key Insights: Each section should include a dedicated insights panel, providing detailed explanations of the purpose and relevance of the specific data set and its associated visualization.
- Downloadable Reports: Allows users to download individual graphs, either with the original data or with added/modified data points, as customized reports.

Interactive Visualizations:

- Hover Feature: Displays exact data points and time periods when hovering over elements on the graph. Includes options for:
 - Closest Point Hover: Highlights the nearest data point.
 - Compare Hover: Displays multiple data points for comparison.
- Zoom In/Reset Axis: Enables users to zoom into specific time frames for a detailed view or reset the axis to the default scale.

Data Collection:

- Add Point Button: Allows users to temporarily add or modify data points within the local environment (without altering the original unemployment.db). These changes are reflected in visualizations and can also be downloaded.
- Reset Button: Reverts all modifications, restoring the data to its original state from database unemployment.db.

1.2: Prioritised requirements for different use case

User type	User Story	Priority	Requirements (Acceptance Criteria)
-----------	------------	----------	------------------------------------

Government Policy Maker	As a policy maker I want to identify disparities and unemployment trends through regions, genders, and time.	High	Users can filter data by gender, region, and time range. Trends are displayed as line and bar charts.
NGO	As an NGO worker, I want to generate reports comparing unemployment trends in London vs. the UK, so I can inform my proposals.	High	Users can generate visual reports comparing regional trends.
Researcher	I want to add or change new data, so I can expand the database, and find insights when there are changes to previous data or adding new data.	High	The app includes a data entry module for adding new attributes.
Researcher	As a researcher, I want to export filtered datasets in CSV format, so I can perform external analysis.	medium	Users can select filters and download the corresponding dataset in CSV format.
Market Analyst	As a market analyst, I want to visualize unemployment data on a map, so I can identify regional hot spots.	Low	The app provides an interactive map with unemployment data overlaid by region.

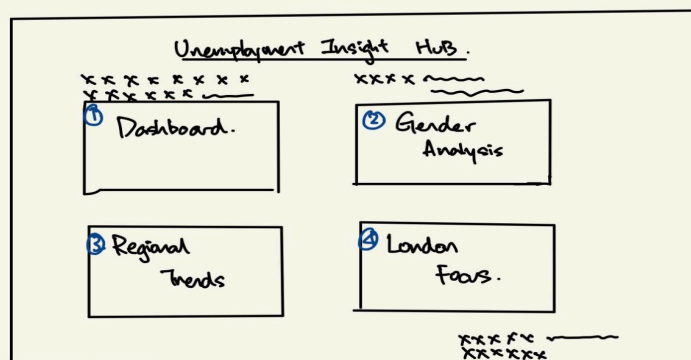
Section 2.1 Interface design:

Wireframe 1, home page:

Wire Frames:

1. Home Page : <http://127.0.0.1:5000/home>.

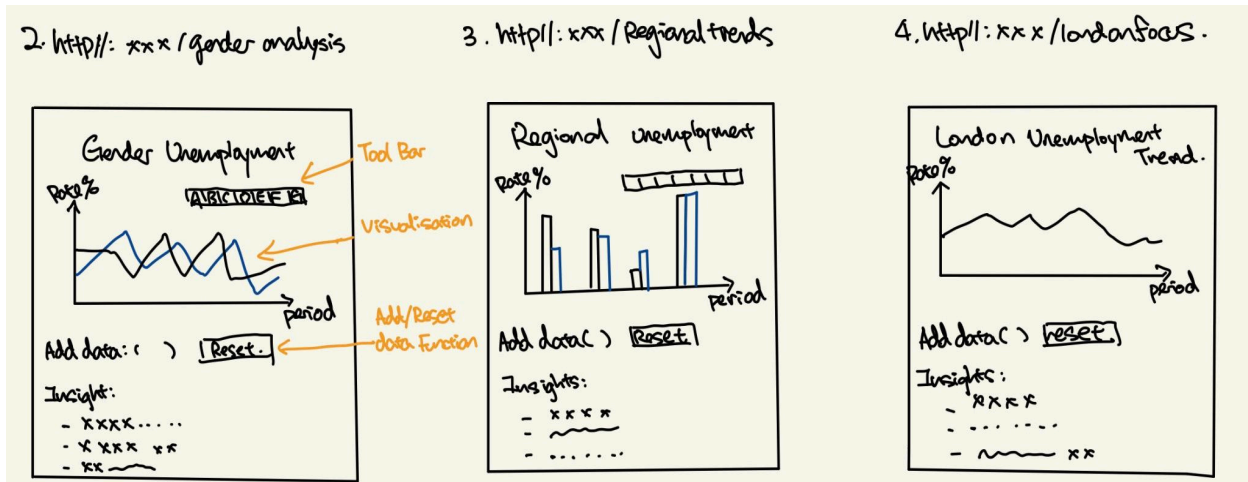
- Main entry point.
- 4 major sections.
- Introduction to purpose of the webapp.



-This page serves as the main entry point of the Unemployment Insight Hub web app.

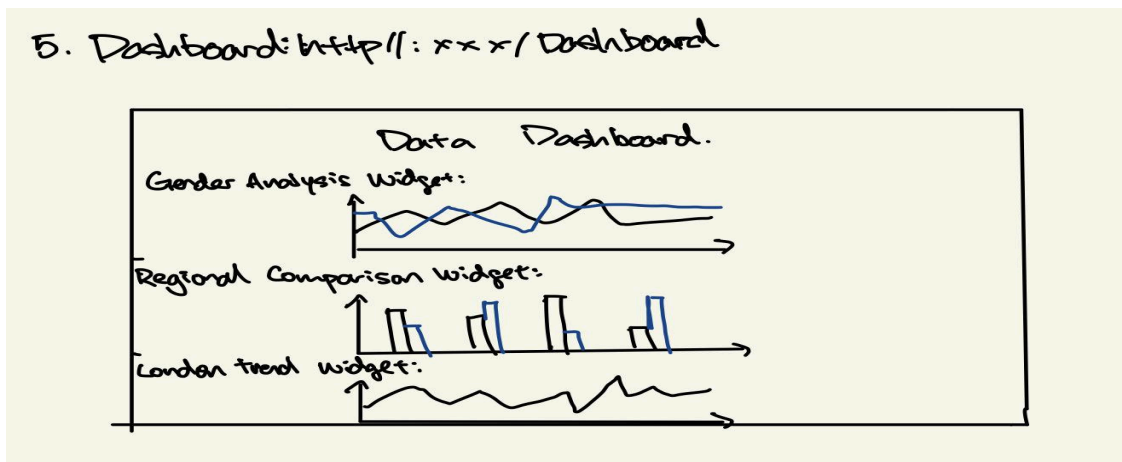
- Provides navigation to all four major sections/wireframe 2,3,4,5: Dashboard, Gender Analysis, Regional Analysis, London Focus. These can be reached by clicking the section buttons.
- There is also content which introduces users to the purpose of the web app, and introduction to each sub section.

Wireframe 2,3,4, (Gender, Regional, London):



- These are the subsections, where there is visualization of unemployment trends.
- Includes detailed periodic data, allowing comparison whether it is between gender, region, or overall London trend.
- All includes the top right tool bar allowing users to use the different features provided: download, zoom, hover...
- Includes a small introduction section which talks about an overview of each section.

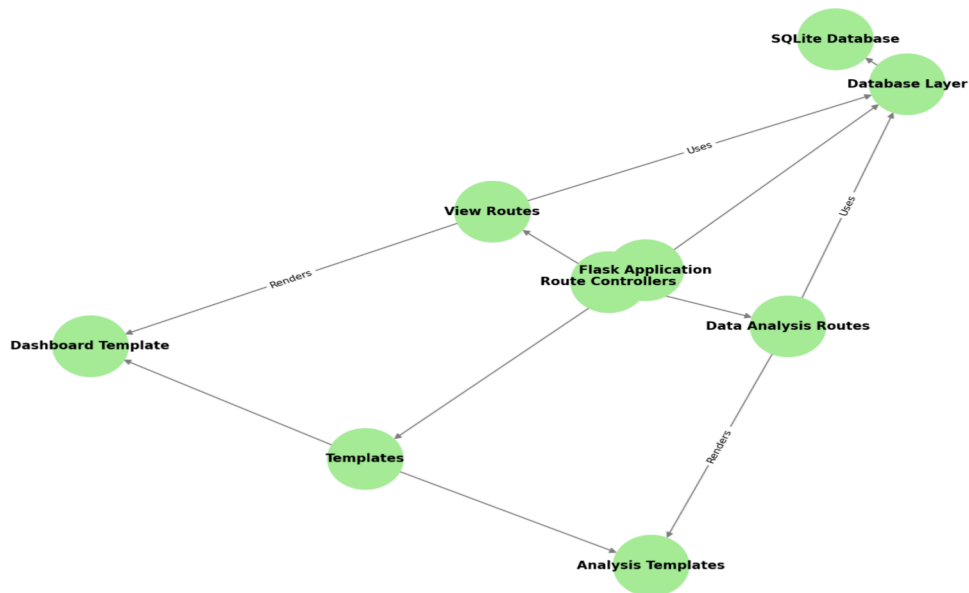
Wireframe 5, Dashboard:



- Combines key insights from all other three analysis
- Provides quick overview and comparison for important metrics, acts as a summary page.
- Tool bar also included on top right for each visualization.

Section 2.2 Application design:

Main Flask Application Architecture



Core Packages:

Flask Application: Acts as the central hub connecting all components. It manages requests, routing, and overall application logic.

Sqlite3: Handles data base operations

Pandas: Manages data processing, Excel files handling

Additional dependencies: -Jinja2: Template engine. -Standard library modules: os,datetime.

Database Layer:

- Responsible for data storage and retrieval.
- Consists of the SQLite Database and supporting functions such as `init_db` for database initialization.

Route Controllers:

- Define the application's logic for handling user requests.
- Composed of:
 - Data Analysis Routes: Handle data analysis operations and interact with the database.
 - View Routes: Generate user-facing views by retrieving data from the database.

Templates:

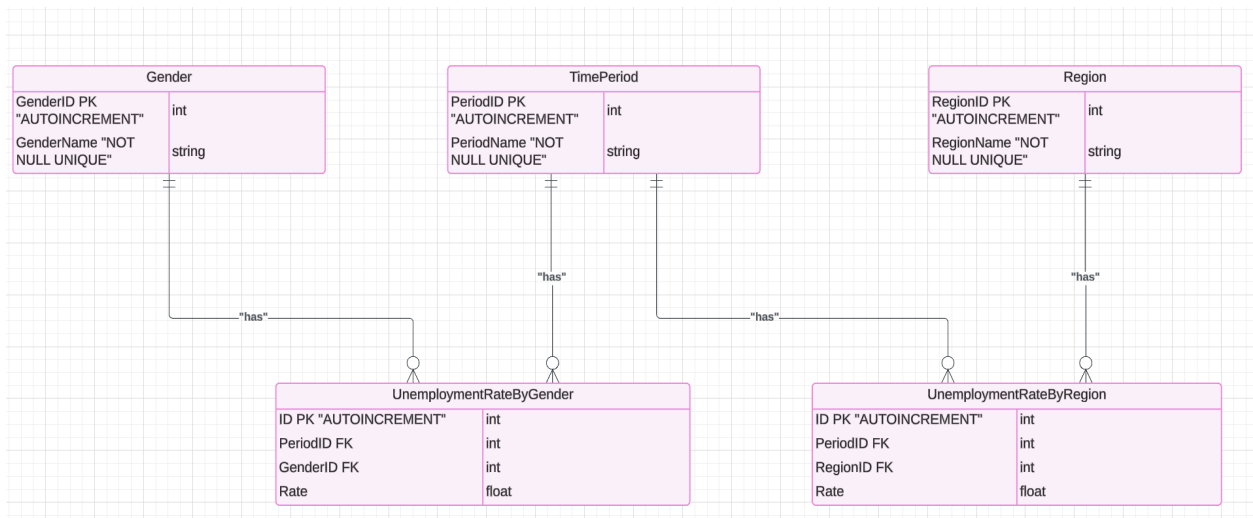
- Represent the user interface, defining how content is displayed to users.
- Include:
 - Analysis Templates: Display results from data analysis.
 - Dashboard Template: Present summarized information in a dashboard format.

Interactions:

- Data Analysis Routes and View Routes utilize the Database Layer to fetch or manipulate data.
- Routes render templates, such as Analysis Templates or Dashboard Template, to deliver dynamic web pages to users.

Section 2.3 Database design:

Current ERD:



Previous Coursework 1:

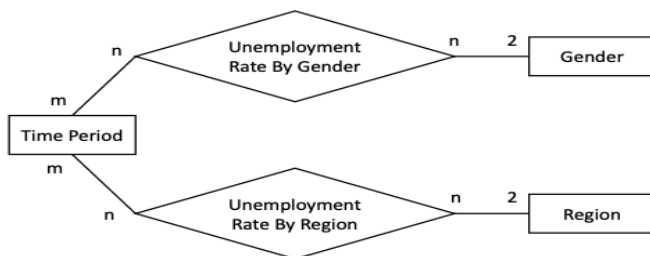


Figure 4: ERD Design

I have decided to remake the ERD so that it more accurately and professionally represents my data tables and its relationships.

Data Attributes:

- The 5 data tables still remain the same.
- Primary/Foreign Keys still remain the same.
- Each table is more clearly defined by its data types, constraints, and keys.

Table relationships: The foundational relationships are the same with Coursework 1, with better annotations, e.g crow foot representation. Where:

TimePeriod and UnemploymentRateByGender:

Each **TimePeriod** can have multiple unemployment rate records for different genders.

Gender and UnemploymentRateByGender:

Each **Gender** can have multiple unemployment rate records across time periods.

TimePeriod and UnemploymentRateByRegion:

Each **TimePeriod** can have multiple unemployment rate records for different regions.

Region and UnemploymentRateByRegion:

Each **Region** can have multiple unemployment rate records across time periods.

Section4 References:

Data: <https://data.london.gov.uk/dataset/unemployment-rate-region>

OpenAI's GPT (ChatGPT4o) was used for refining text, and enhancing the clarity of the report.

GitHub Copilot: The development of certain code components was supported by GitHub Copilot, providing me with code suggestions and solutions.