

Diagnostic Analysis using Python

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Table of Contents

<i>Background and Context of the Business Scenario</i>	<i>3</i>
<i>Analytical Approach</i>	<i>4</i>
<i>Visualisation and Insights</i>	<i>6</i>
Line Plot of Number of Appointments per Month by Service Setting:.....	6
Bar Plot of Top Trending Hashtags:.....	8
Line Plot of Number of Monthly Visits:	9
Line Plot of Monthly Capacity Utilisation:	10
<i>Patterns and Predictions</i>	<i>11</i>

Background and Context of the Business Scenario

This report presents an overview of the analysis of healthcare data provided by England's National Health Service (NHS). The NHS is a publicly funded healthcare system that incurs significant costs when patients miss their general practitioner (GP) appointments. The primary objective of this analysis is to identify trends and insights that can aid in reducing or eliminating missed appointments, which would be advantageous both financially and socially.

Moreover, my team and I addressed the NHS's two primary concerns: whether there was adequate staffing and capacity in the networks, and how resources were utilized. Finally, based on the insights derived from the data analysis, we provide potential recommendations.

Analytical Approach

We imported, cleaned, and analysed the healthcare data provided by England's National Health Service (NHS) using a comprehensive and organized approach. The analysis's primary purpose was to identify trends and insights that could help minimize or eliminate missed appointments, resulting in financial and societal advantages.

The initial step was to import the datasets through the Pandas library, which allowed us to efficiently handle and analyse the data. We used several Pandas functions to clean the data and convert it into a more readable format, ensuring that it was suitable for analysis.

For exploratory data analysis (EDA), we used the Matplotlib and Seaborn tools to acquire a deeper understanding of the data. This method enabled us to detect patterns and trends in the data and provided insights into the variables that may lead to missed appointments.

To address the NHS's concerns about network staffing and capacity, we examined the number of appointments by service setting, context type, and national category. We also looked at appointment statuses to determine why people missed appointments. We analysed the number of appointments each month and compared it to the available capacity in each network to acquire insight into resource use.

We used Matplotlib and Seaborn to build line and bar plots to highlight monthly and seasonal trends, which helped us find patterns in the number of appointments for each service setting, context type, and national category. We also examined the distribution of appointments across time to see whether there were any trends that could be attributed to seasonal causes.

In addition to data analysis, we used Twitter's API to extract information on the top popular healthcare-related hashtags (#) in the UK. This data gave insight into popular opinion and highlighted themes that were on the minds of the UK population.

Throughout the analysis, we made various judgments about which libraries, functions, and variables to employ. For instance, we utilized the Pandas library for data manipulation, Seaborn and Matplotlib for visualization, and the Twitter API to extract social media data. We also included a variety of factors in our research, such as appointment statuses, service settings, and context types.

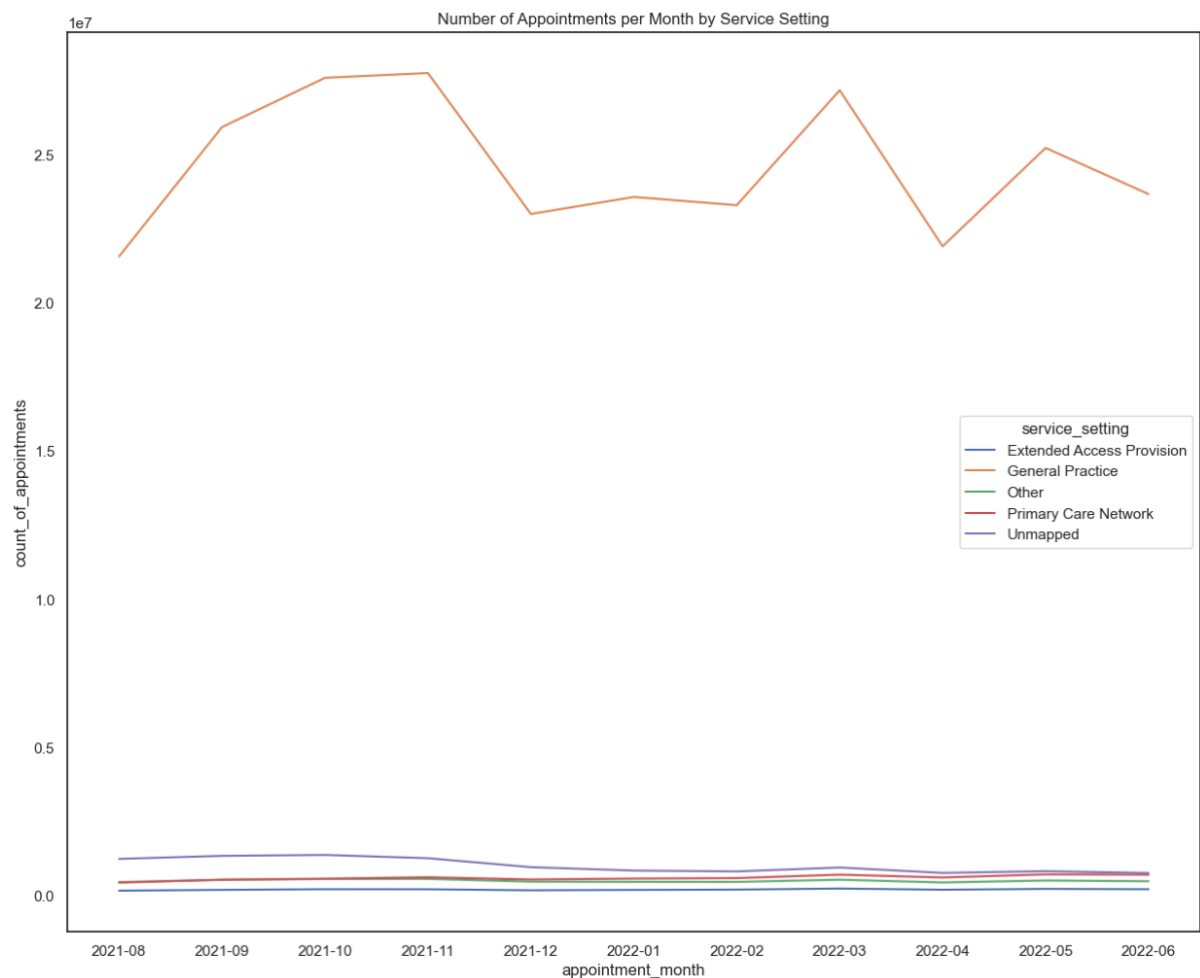
Overall, the analytical approach taken to import, clean, and analyse the healthcare data provided by the NHS was thorough and effective in identifying trends and insights that could help reduce or eliminate missed appointments. The use of Python libraries such as Pandas, Seaborn, and Matplotlib allowed us to manipulate and visualize the data in a way that was both insightful and easily digestible.

Visualisation and Insights

After reviewing the visuals developed, I have chosen the following as the best visualisations to convey insights and satisfy business objectives:

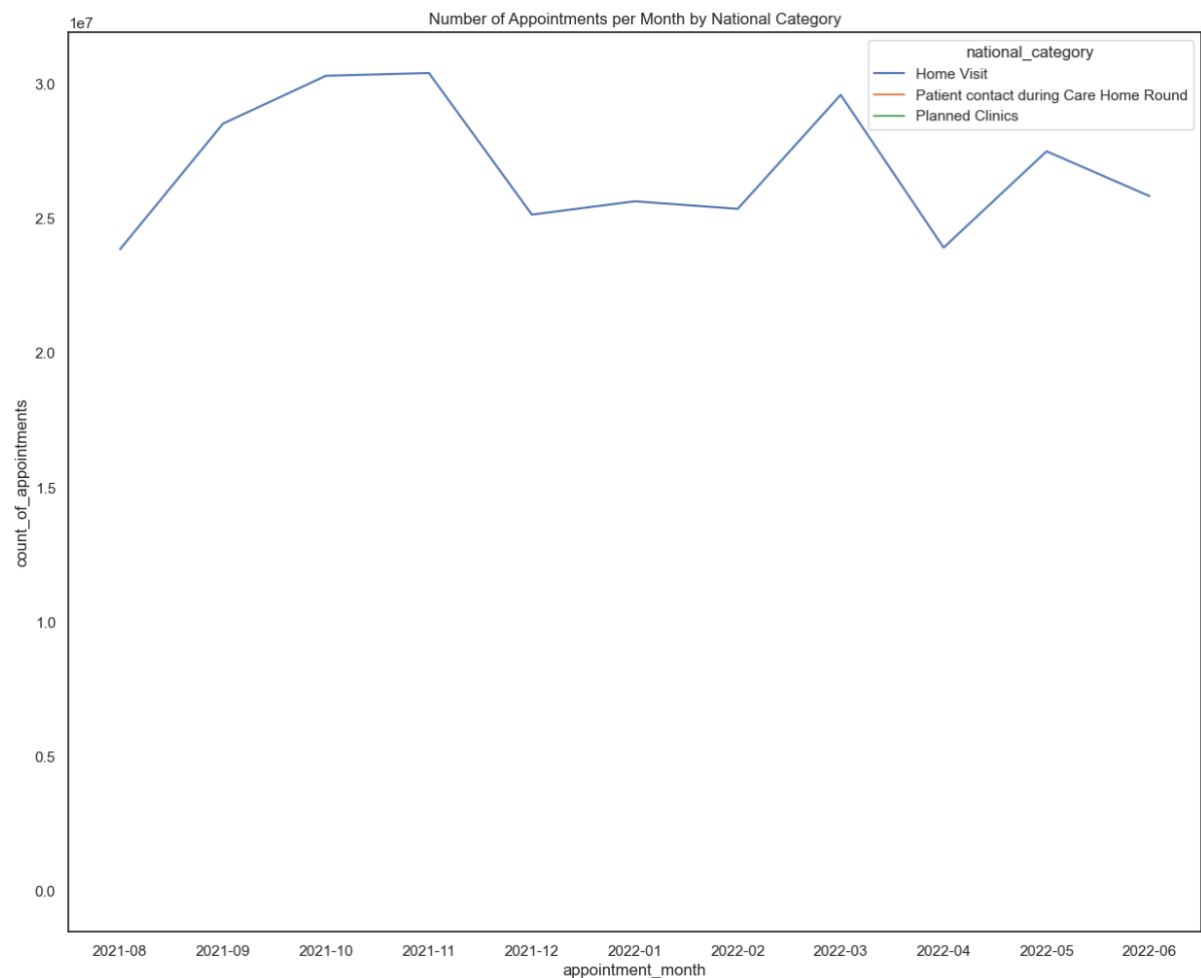
Line Plot of Number of Appointments per Month by Service Setting:

This visualisation shows how many appointments were made by each service setting in each month. It helps identify trends over time and provides insights into which service settings are more popular during seasons of the year. This data can be used to plan and allocate resources for each service setting. For instance, if the number of appointments for a specific service setting significantly increases each month, the healthcare provider might dedicate extra resources to that setting to ensure that patients receive timely care.



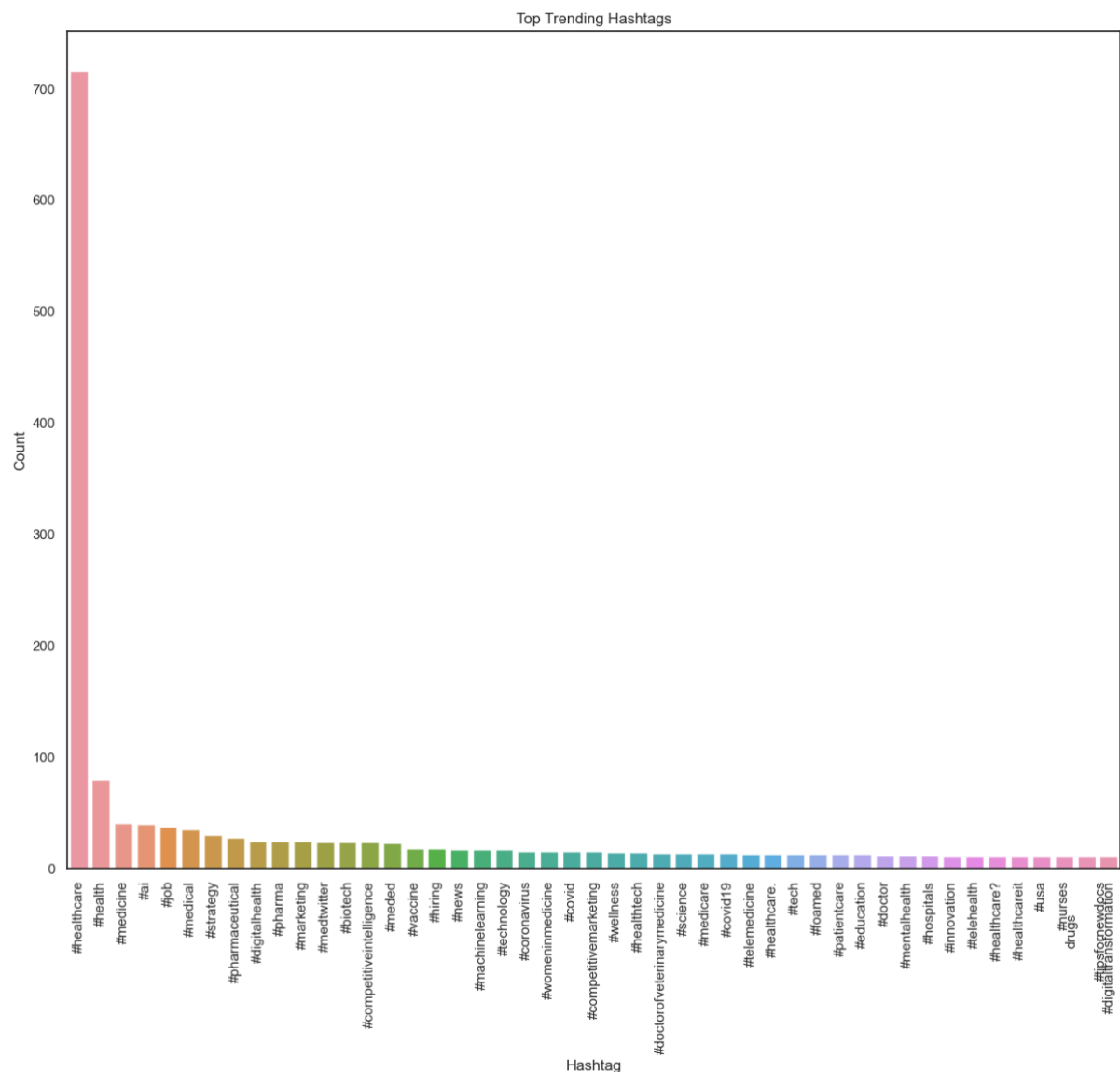
Line Plot of Number of Appointments per Month by National Category:

This visualisation depicts the distribution of appointments across several national categories. It is useful in determining which national categories are more popular and in demand. This information can be important for healthcare professionals to determine which categories of care are most in demand, allowing them to allocate resources accordingly.



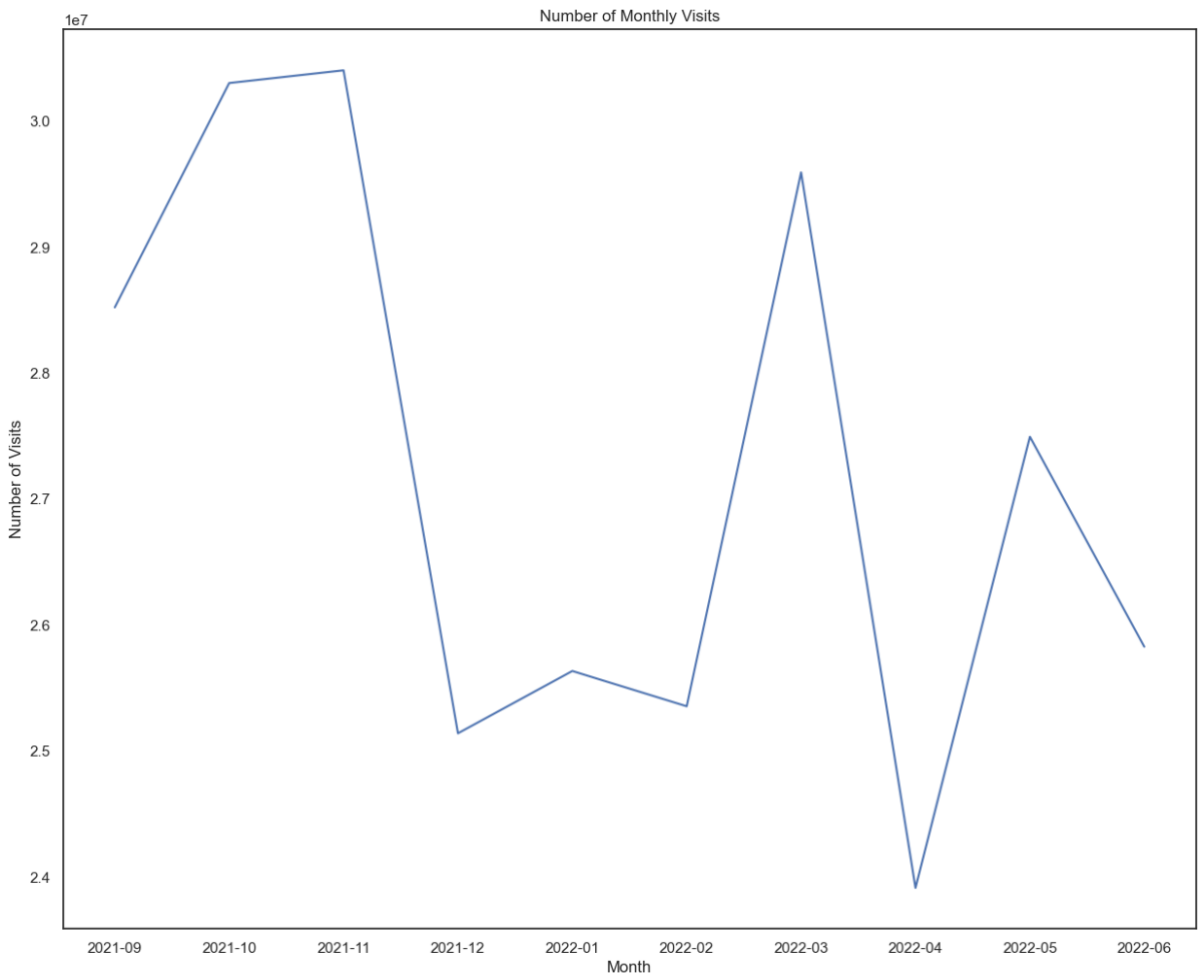
Bar Plot of Top Trending Hashtags:

This bar plot aids in identifying the most popular hashtags and the number of tweets about healthcare. Furthermore, this data can be utilised by healthcare providers to acquire insights into their patients' attitudes, behaviours, and preferences, as well as to highlight any areas of concern or possibilities for improvement.



Line Plot of Number of Monthly Visits:

This visualisation helps identify long-term trends in the number of monthly visits. This data can be used to estimate demand for healthcare services and plan resources accordingly.



Line Plot of Monthly Capacity Utilisation:

This visualisation shows the capacity usage rate for each month. This information may be utilised to discover inefficiencies in resource allocation and to plan capacity to meet demand.



Overall, the visualisations selected provide a comprehensive view of the healthcare provider's operations, patient behaviour, and service use patterns. The insights provided by these visualisations can assist healthcare professionals in making data-driven decisions and optimising their operations to better serve their patients.

Patterns and Predictions

There are various patterns, trends, and insights to discover. To begin with, the NHS provides a wide range of medical services, with General Practice being the most used service setting. Secondly, there is a link between the type of appointment and the service setting, which could be investigated further to gain insight into the types of medical treatments in high demand. Finally, appointment numbers follow a seasonal pattern, with the highest number of appointments recorded in November 2021.

Moreover, there are tendencies in appointment scheduling behaviour. Patients who book appointments on the same day or one day in advance are more likely to miss appointments (DNAs) compared to those who book appointments further in advance. DNAs are also more common during evening and weekend appointments, as well as among younger patients.

The most popular hashtag for healthcare-related topics on social media is #healthcare, followed closely by #health and #medical. Studying the relationship between hashtag usage and tweet engagement could provide insights into how the healthcare sector can use social media to promote patient participation.

Further research could investigate correlations between appointment duration or waiting periods and the parameters used to categorise appointments. It would also be useful to investigate the reasons for DNAs in different service settings and appointment contexts, and to identify methods that can be implemented to reduce them.