T.C DOĞUŞ UNIVERSITY

FACULTY OF ENGINEERING
COMPUTER ENGINEERING

COVID CHART HUB

COME 491 RESEARCH PROJECT

PREPARED BY

Ayberk TAMBAY
202003001029

Bekir Enes ŞİRANLI
20190301036

Nursena BAHADIR
20190301048

Şevval Elif ÇOBAN
20190301065

Zehra GÜNAYDIN
20190301033

ADVISOR Assistant Professor Dr. Aysun GÜRAN
ISTANBUL, February 2024

T.C DOĞUŞ UNIVERSITY

FACULTY OF ENGINEERING
COMPUTER ENGINEERING

COVID CHART HUB

COME 491 RESEARCH PROJECT

PREPARED BY

Ayberk TAMBAY
202003001029

Bekir Enes ŞİRANLI
20190301036

Nursena BAHADIR
20190301048

Şevval Elif ÇOBAN
20190301065

Zehra GÜNAYDIN
20190301033

ADVISOR Assistant Professor Dr. Aysun GÜRAN

ISTANBUL, February 2024

PREFACE

We would like to thank our advisor Assistant Professor Dr. Aysun Güran for helping and supporting us in many subjects throughout our study.

Istanbul, February 2024

AYBERK TAMBAY

BEKIR ENES ŞİRANLI

NURSENA BAHADIR

ŞEVVAL ELİF ÇOBAN

ZEHRA GÜNAYDIN

SUMMARY

The "Covid Chart Hub" project is a website that provides various analyzes and test results to users who want to investigate the multifaceted effects of the COVID-19 pandemic. Adoption of data analysis tools in Python and visualization through Power BI forms the backbone of this project and facilitates a comprehensive examination of global COVID-19 statistics. The aim of the project is twofold: first, to analyze and understand the impact of COVID-19 around the world, and second, to present these analyzes through a user-friendly website. Leveraging Python for data analysis, the project covers visualization of key metrics such as total cases, deaths, immunity, recovery rates and USA vaccination statistics across different countries and continents. Correlation tests, which are an integral part of this analysis, aim to reveal relationships between variables, specifically investigating the impact of vaccination rates on the mortality rate and its proportionality in different countries.The project aims to provide accurate data classification and visualization, using U.S. vaccination rates as a key metric to illuminate relationships between death and case rates in various countries, while setting clear goals. It aims to go beyond understanding the Covid-19 epidemic and provide analysis for effective crisis management in the future.The document also includes definitions related to COVID-19 and Power BI and clarifies key terms. Furthermore, the overview of correlation and the reference to the significance of the p-value underline the statistical basis of the project's analytical approach.At its core, the “Covid Chart Hub” project is a comprehensive study powered by advanced data analysis and visualization tools.

ÖZET

"Covid Chart Hub" projesi, COVID-19 pandemisinin çok yönlü etkilerini araştırmak isteyen kullanıcılara çeşitli analizler ve test sonuçları veren bir web sitesidir. Python'da veri analizi araçlarının benimsenmesi ve Power BI aracılığıyla görselleştirme, bu projenin omurgasını oluşturur ve küresel COVID-19 istatistiklerinin kapsamlı bir şekilde incelenmesini kolaylaştırır.Projenin amacı iki yönlüdür: birincisi, COVID-19'un dünyadaki etkisini analiz etmek ve anlamak, ikincisi ise bu analizleri kullanıcı dostu bir web sitesi aracılığıyla sunmak. Veri analizi için Python'dan yararlanan proje, farklı ülke ve kıtalarda toplam vaka, ölüm, bağışıklık, iyileşme oranları ve usa aşılama istatistikleri gibi temel ölçümlerin görselleştirilmesini kapsamaktadır. Bu analizin ayrılmaz bir parçası olan korelasyon testleri, değişkenler arasındaki ilişkileri ortaya çıkarmayı amaçlamakta, özellikle aşılama oranlarının ölüm oranı üzerindeki etkisini ve farklı ülkelerdeki orantılılığını araştırmaktadır.Proje, net hedefler belirlerken, çeşitli ülkelerdeki ölüm ve vaka oranları arasındaki ilişkileri aydınlatmak için ABD aşılama oranlarını önemli bir ölçüt olarak kullanarak doğru veri sınıflandırmasını ve görselleştirmeyi amaçlamaktadır. Covid-19 salgınını anlamanın ötesine geçerek, gelecekte etkili kriz yönetimi için analizler sunmayı amaçlamaktadır. Belgede ayrıca COVID-19 ve Power BI ile ilgili tanımlar yer almakta ve temel terimlere açıklık getirilmektedir. Ayrıca, korelasyona genel bakış ve p-değerinin önemine yapılan atıf, projenin analitik yaklaşımının istatistiksel temelinin altını çizmektedir.Özünde, "Covid Chart Hub" projesi, gelişmiş veri analizi ve görselleştirme araçlarıyla güçlendirilmiş kapsamlı bir araştırmadır.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SYMBOLS

ρ	The symbol for Pearson's correlation is "ρ" when it is measured in the population.
ρ (rho)	Spearman correlation coefficient

ABBREVIATIONS

API	Application Programming Interface
COVID-19	Coronavirus Disease 2019
Power BI	Business Intelligence,
WHO	World Health Organization

REQUIREMENTS ANALYSIS DOCUMENT

1. Introduction

COVID-19 is a global pandemic caused by the SARS-CoV-2 virus. This pandemic emerged in Wuhan, China in December 2019 and spread rapidly towards the end of 2019. The World Health Organization (WHO) declared a state of emergency on 30 January 2020 and classified it as a pandemic on 11 March 2020. The pandemic has had far-reaching impacts not only on the health system, but also on economies, education systems and everyday life. In this context, we are embarking on a project with data analysis to understand the multifaceted effects of COVID-19.

In this project with Power BI, we will visualize the total number of cases, number of deaths, number of immunized people, current case and death statistics, and vaccination rates by country and continent. We will also seek answers to questions with correlation tests: Does mortality increase when vaccination rates increase in a country? Is the increase in mortality proportional across countries? These analyses will help us understand the impacts of the pandemic more deeply and provide valuable insights for future pandemic management. We will publish these analyses on our website to make it easier for users to access them.

1.1.Purpose of the system

The purpose of the system is to analyze the impact of Covid-19 on the world and publish it on a website. It is to conduct a comprehensive analysis of the multifaceted impacts of COVID-19 through data analysis using Python and to richly visualize this data using Power BI. Correlation tests using COVID-19 data aim to contribute to a deeper understanding of the impacts of Covid-19.

1.2.Scope of the system

In the data analysis of COVID-19 data using python, we reached the total number of deaths, cases, immunity and vaccination rates of countries and continents and visualized these data through Power BI. Correlation tests showed us the effects of vaccination status on the number of deaths in countries and whether there is a significant result between the increase in deaths between countries.

1.3.Objectives and success criteria of the project

The main objectives of the project are to analyze the multifaceted effects of COVID-19 and present these analyses to the user through the website.

Success criteria include accurate classification and visualization of COVID-19 data. The USA vaccination rates provide clear insights into the relationships between countries' mortality rates and case rates. The project also aims to investigate whether there is a proportional increase in mortality rates across countries. The ultimate achievement of the project is to understand the past pandemic.

1.4.Definitions, acronyms, and abbreviations

Covid-19: It is an infectious disease that emerged in 2019 and is caused by the SARS-CoV-2 virus. Symptoms include fever, cough, shortness of breath and muscle aches. It is spread by droplets, contact and airborne. Masks, social distancing, hygiene rules and vaccinations are important for control. It has become a global pandemic and various measures have been taken around the world.
Power BI: Microsoft's data visualization platform. It enables data extraction, analysis, visualization and report generation.
Correlation Overview: The correlation coefficient is a statistical measure quantifying the strength and direction of the relationship between two variables. Ranging from -1 to 1, it signifies positive, negative, or no relationship. A correlation coefficient of 0.5, for instance, suggests a moderately strong positive relationship.
P Value Significance: The p value assesses the statistical significance of the correlation. If below 0.05, the relationship is deemed statistically significant and not random. This metric aids in evaluating the reliability of data analysis results.
The correlation test is a widely used tool for understanding and analyzing the relationship between data. It plays a critical role in measuring the strength of the relationship between two variables and determining whether that relationship is statistically significant.

1.5. References

References are given in the subsequent "REFERENCES" section.

1.6.Overview

Our project examines the global repercussions of the COVID-19 pandemic using data analysis tools in Python. We added rich visualization to the data analysis using Power BI. Users can look at total cases, deaths, immunizations and USA vaccination rates with Power BI. There are two correlation tests on the website, the first gives us the relationship between the increase in mortality due to an increase in the vaccination rate in the selected country, and the second chorealization test answers the question: is the increase in mortality significant in the countries selected by the user?

2. CURRENT SYSTEM

The following rival analysis tables were made by looking at the data and subject headings used in the analysis research. While headlines such as the number of cases, number of deaths, and vaccination rates in countries are used in most analyses, ours is also. We created the analysis of these headings. Below, a competitor analysis was made with other research data on the internet. The analyzes we targeted are stated in the rightmost column.

2.1.Competitor Analysis

This table compares three entities involved in COVID-19 data analysis

Table 2.1 Competitor Analysis

Metrics and Analysis	Your Project	Johns Hopkins University	ECDC
Scope	Global	Global	Europe
Data Sources	COVID-19 datasets, Global Health Organizations	Multiple sources (WHO, CDC, etc.)	European health agencies
Key Metrics	COVID-19 Variants in Europe, Global Death Data, Global Recovery Data, Death Risk, Hospital Cases Reports, etc.	Global and country-specific cases, deaths, recoveries	European-focused reports, epidemiological updates, risk assessments
Analysis Approach	Data Analysis and Statistical Modeling	Data Aggregation and Visualization	Epidemiological Analysis and Reporting
Time Frame	Real-time updates	Real-time updates	Real-time updates
Collaborations	Collaborates with various health organizations	Collaborates with various health organizations	Collaborates with European health agencies
Challenges	Data Quality, Variability in Reporting Standards, Model Accuracy	Varied Data Sources, Global Data Standardization	Ensuring Consistency in European Data

3.PROPOSED SYSTEM

3.1. Overview

Our project uses Python for global COVID-19 impact analysis enhanced with Power BI. Users explore cases, deaths, immunizations and US vaccination rates. Correlation tests compare vaccination rates in selected countries with mortality rates across countries, and allow us to better analyze COVID-19. Through visualizations, we aim to make it easier to understand past pandemics on our website.

3.2. Functional Requirements

The user should be able to access the website without logging in. On our Landing Page, they can browse short summaries and access the analyzes they want with a single click. On the website, the user can view the analysis of the Covid-19 research in the "Data Charts" and "Test Results" sections.

3.3. Nonfunctional Requirements

3.3.1. Usability

Researchers use the data provided to monitor and analyze the global impacts of Covid-19 in a multidimensional manner. By providing easy access to this data through the website, usability was prioritized.

3.3.2. Reliability

The data used in the research are accurate data from Google Health and these data have not been modified through csv files. This ensures the reliability of the data.

3.3.3. Performance

Researchers accessing the website can easily access all the data. This aims to provide an effective user experience in terms of performance.

3.3.4. Supportability

Accessibility of the website through any browser provides support to a wide range of users. Supportability aims to work smoothly on various browsers.

3.3.5. Implementation

The analysis will be made available on the website. This platform, which does not include any membership system, allows users to access the data quickly and easily.

3.3.6. Interface

Taking into account the designs and templates of other competing analyses, the page designs have been carefully designed to be easily accessible and usable for users.

3.3.7. Packaging

Users of the website can access Covid-19 analyses through our website. These analyses show case, death, immunity, people recovered and usa vaccination rates, for which a power bi visualization is used. The correlation tests available on the website allow us to analyze vaccination-related mortality in countries and compare mortality rates between countries, making them open to interpretation. The website provides users with access to the analysis.

3.3.8. Legal

Modification of the data by users is not possible.

3.4. System Models

3.4.1. Scenarios

As a seasoned researcher in global health, Dr. Ömer Akalın has been conducting research to understand the intricate details of the COVID-19 pandemic. Dr. Akalın is greeted by the "Covid Chart Hub" website, enriched with data analysis tools and robust visualizations. During this discovery and data analysis process, Dr. Akalın discovers the platform's user-friendly navigation and data-driven insights. Once on the website, he is greeted with an uncluttered interface and Power BI-enhanced visualizations present COVID-19 statistics in a vivid panorama. Using correlation tests on the website, Dr. Akalın meticulously examines the relationship between vaccination rates and mortality in selected countries. Interacting with Power BI visualizations, Dr. Akalın dynamically explores trends in case, mortality, immunity and recovery rates and makes comparisons across different countries and continents. He takes advantage of the interactive nature of the visualizations to tailor the analysis to specific research objectives. Finally, armed with rigorously analyzed data and enriched visualizations, Dr. Ömer Akalın publishes a paper on COVID-19 analyses.

3.4.2 Use Case Model

The Covid Chart Up project aims for a user-friendly web-based platform targeting a wide range of users and offering various use case models to suit different needs. The use case models envisioned in the project appeal to various profiles, from general users to analytical users. General users visiting the project can easily access the website and get instant access to Covid-19 statistics. Through interactive graphs, they can visually examine case, death and vaccine data across countries and continents, and follow the overall course of the pandemic by accessing up-to-date data. On the other hand, the platform has more advanced features for analytical users. These users can deeply analyze Covid-19 impacts across countries using correlation tests and advanced data analysis tools. They can also study the relationship between vaccination rates and mortality rates, work on various scenarios and create customized reports. This diversity provided by the Covid Chart Hub project aims to provide easy access to comprehensive information on the pandemic.

3.4.3. Object model

The Object model is not used in this project.

3.4.4. Dynamic mod

The Dynamic mod is not used in this project.

3.4.5. Database Model- ER diagram

The Database model is not used in this project.

3.4.6. User interface - navigational paths and screen mock-ups

3.4.6.1. Landing Pages

3.4.6.1.1. Landing Page

Landing page opening screen of Covid Chart Hub Website.

Figure 3.4.6.1.1. Landing Page

3.4.6.1.2. Landing Page

Landing page opening screen of Covid Chart Hub Website.

Figure 3.4.6.1.2. Landing Page

3.4.6.1.3. Landing Page

Landing page opening screen of Covid Chart Hub Website.

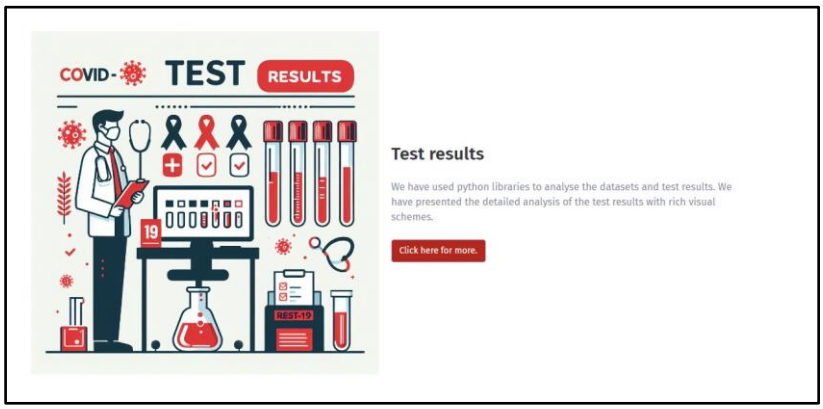

Figure 3.4.6.1.3. Landing Page

3.4.6.1.4. Landing Page

Technologies that we used.

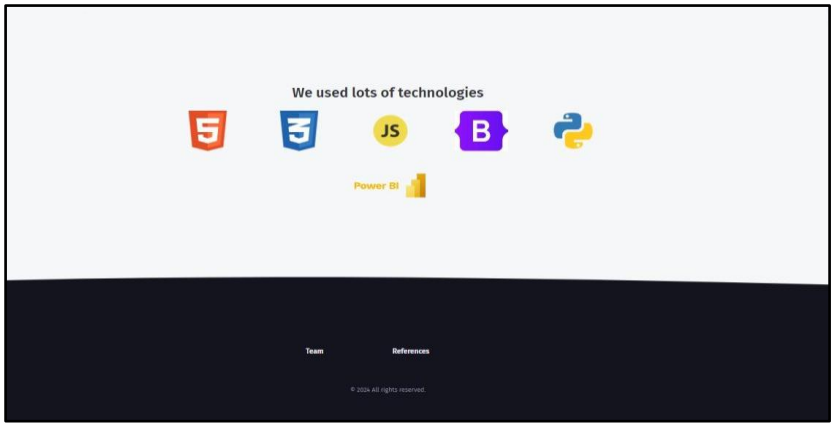

Figure 3.4.6.1.4. Landing Page

3.4.6.2. Home Page

This page gives information about our mission, our vision and about the project section.

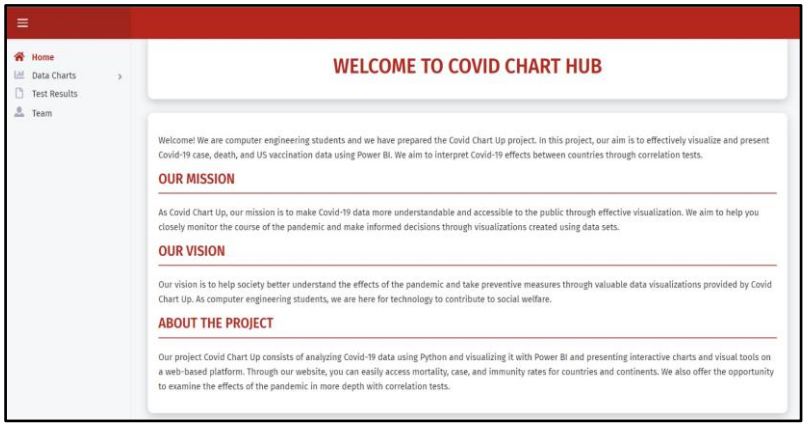

Figure 3.4.6.2. Home Page

3.4.6.3. Test Results Pages

3.4.6.3.1. Test Results Page

Covid-19 Daily Deaths Increase Correlation. In this chart we compared two countries daily death increase.

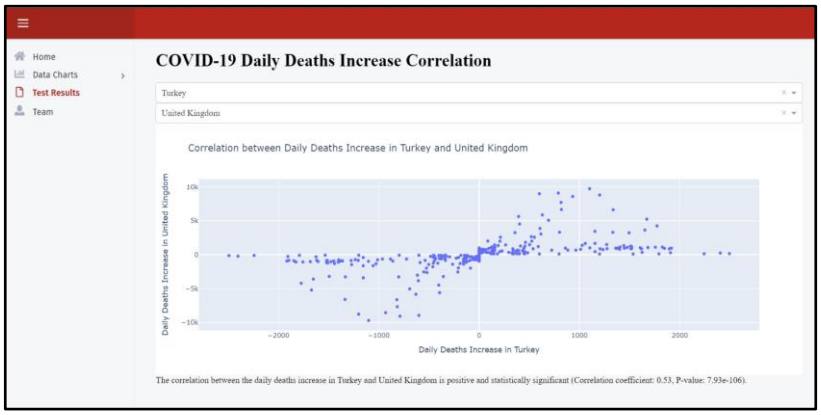

Figure 3.4.6.3.1. Test Results Page

3.4.6.3.2. Test Results Page

Covid-19 Fully Vaccinated per Hundred and New Deaths Correlation. In this chart we took one country and we compared fully vaccinated per hundred and new deaths for correlation test. For the results if the correlation coefficient is less than 0 that means the correlation between fully vaccinated per hundred and new deaths is negative correlation. If it's bigger than 0 the correlation between vaccinated per hundred and new deaths is positive correlation. A P value of less than 0.05 represents a statistically significant result, a statistically significant result represents an insignificant result, and a P value of 0.00 represents irrelevant.

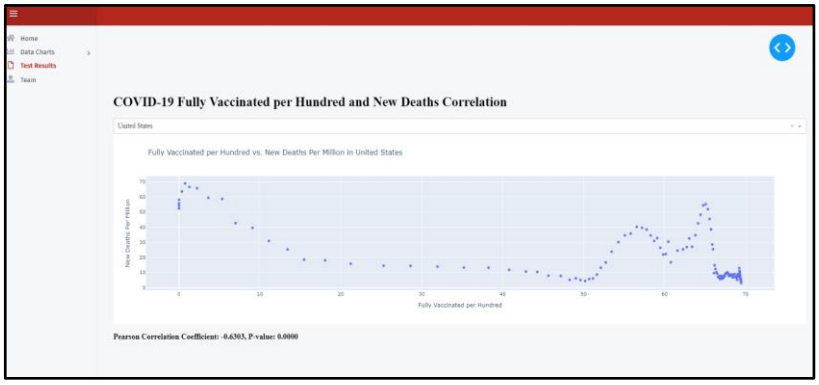

Figure 3.4.6.3.2. Test Results Page

3.4.6.4. Power BI Pages

3.4.6.4.1. Power BI Page

Total Death, Total Infected, Total Recovered , New Cases by Immunity

Figure 3.4.6.4.1. Power BI Pages

3.4.6.4.2. Power BI Page

Daily Cases (7day average) and Vaccination by Date

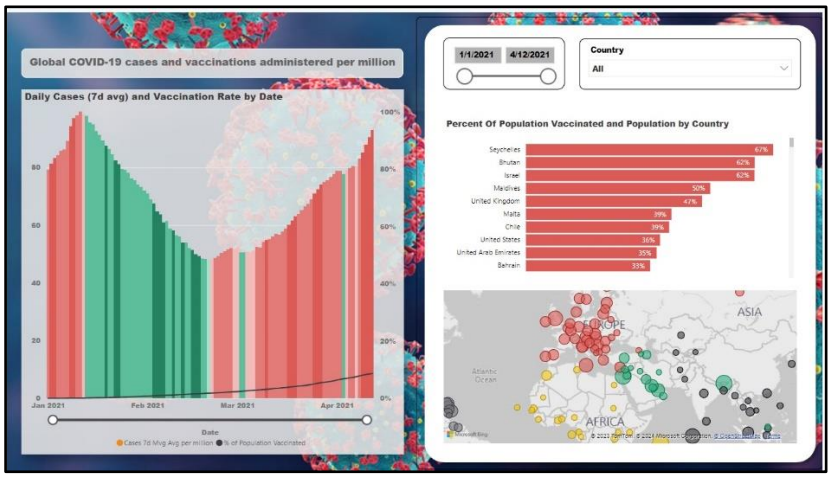

Figure 3.4.6.4.2. Power BI Pages

3.4.6.4.3. Power BI Page

Cases per million 7d avg, Full Vaccinations per hundred by Date and State, Average Temperature by State, Percentage of Partially and Fully Vaccinated People

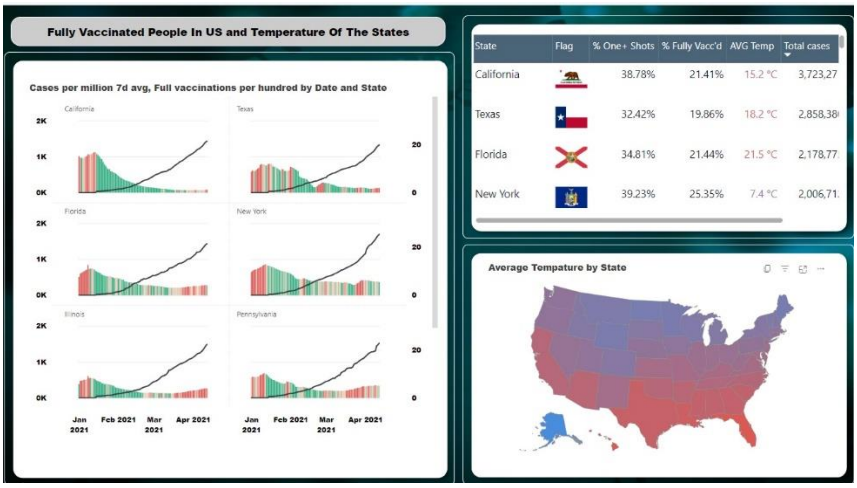

Figure 3.4.6.4.3. Power BI Pages

3.4.6.4.4. Power BI Page

Animation of Fully vaccinated people per hundred from 27/12

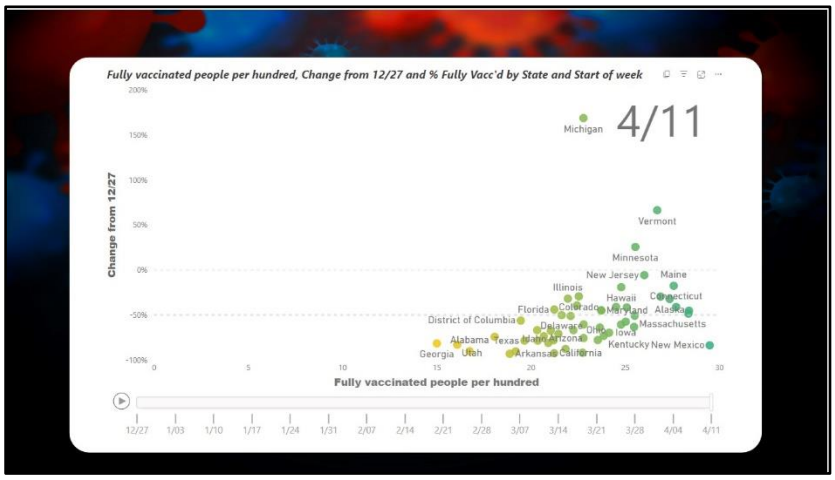

Figure 3.4.6.4.4. Power BI Pages

3.4.6.4.5. Power BI Page

Daily cases by Date

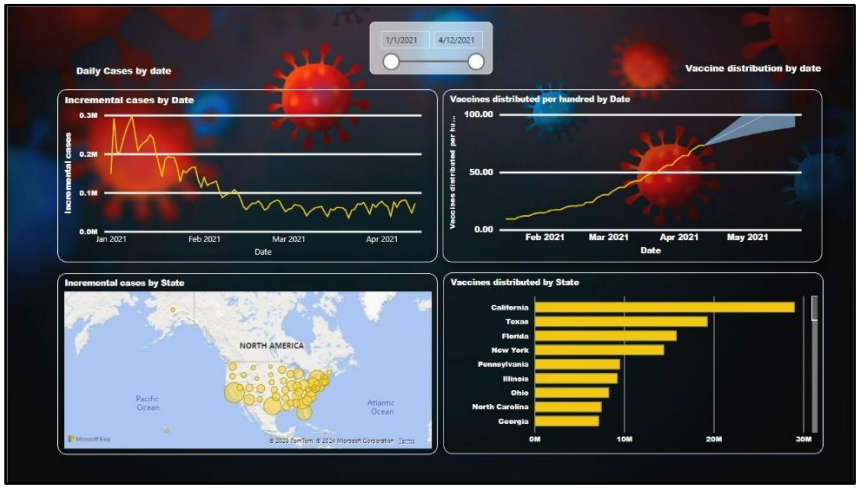

Figure 3.4.6.4.5. Power BI Pages

3.4.6.4.6. Power BI Page

Active Cases and Sum of Critical Cases by Month

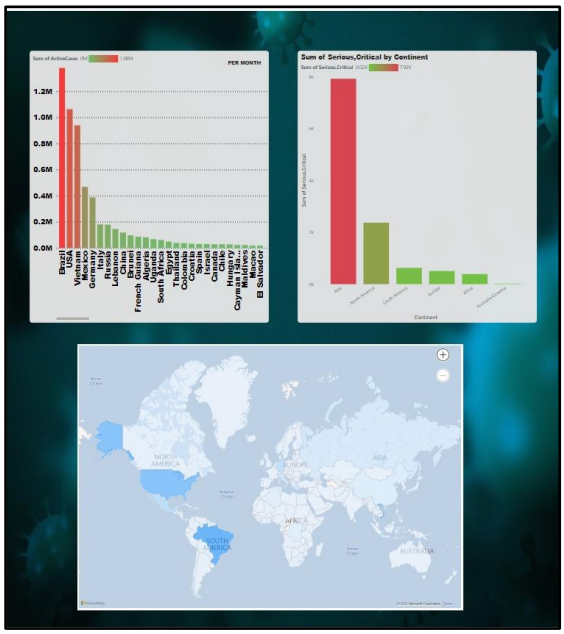

Figure 3.4.6.4.6. Power BI Pages

3.4.6.5. Team Page

This Page information about team members

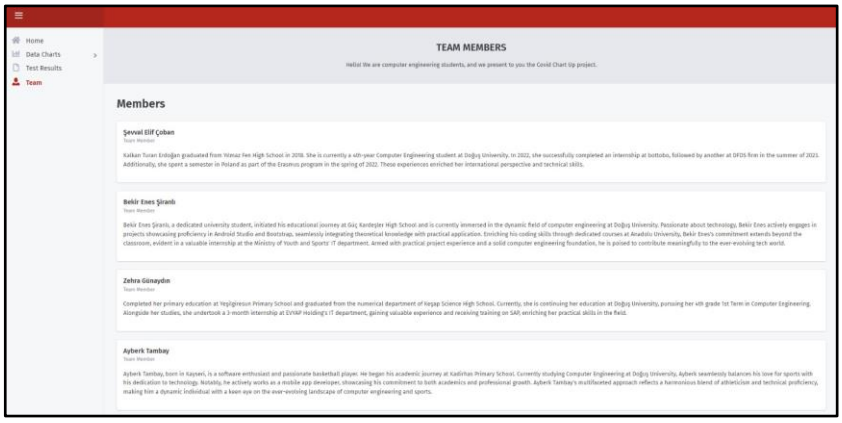

Figure 3.4.6.5. Team Page

4. Glossary

COVID-19: COVID-19 or Coronavirus Disease 2019 is a highly contagious respiratory disease caused by the SARS-CoV-2 virus, leading to a global pandemic.

Power BI: Power BI is a Microsoft business analytics service that offers interactive visualizations and business intelligence capabilities.

Bootstrap: Bootstrap is a free CSS framework for responsive web development. It provides templates for design components, ensuring a consistent and mobile-friendly user interface.

Correlation Test: A statistical method for assessing the strength and direction of a linear relationship between two quantitative variables.

PROJECT BUDGET AND TIMELINE

5. INTRODUCTION

We created a Gantt Chart and Project Budget for our project, so that we could control the delivery process and risks as much as possible. Our Gantt Chart and Project Budget are as follows.

5.1 Gantt Chart

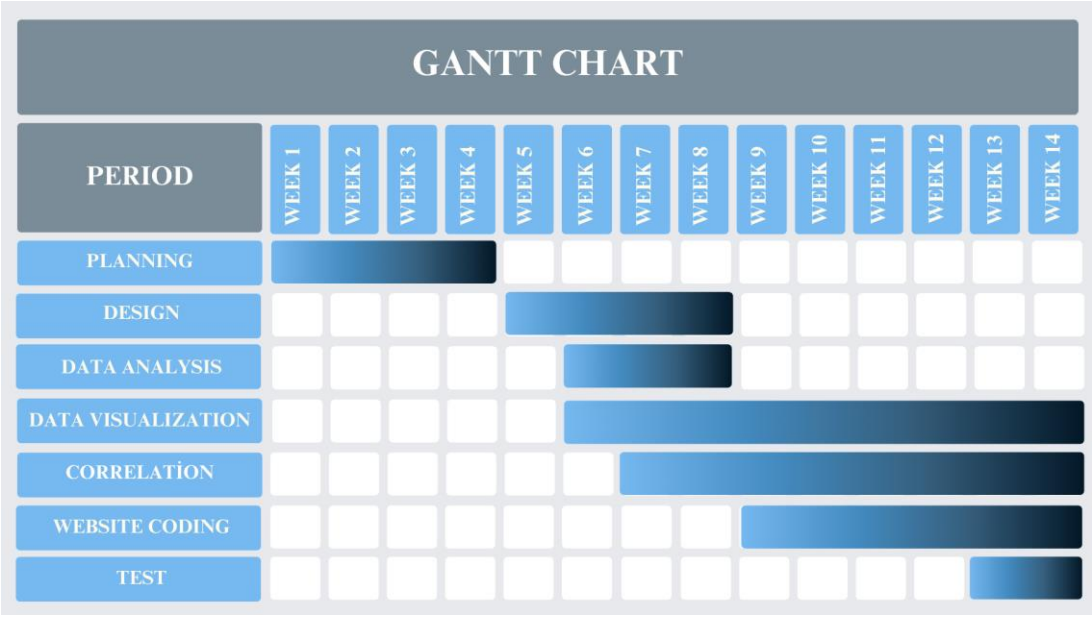

Figure 5.1 Gantt chart

5.2 Project Budget

Table 5.2 Project Budget

	Tahmini			Gerçekleşen
Expenses	**Semester**	**Semester Unit Cost**	**Total Cost**	**Total Cost**
Power BI	1	free	0	0
Visual Studio License	1	free	0	0
		Total Budget	0	0

According to the plan, the estimated project budget was estimated as 0 TL and ended with an actual cost of 0 TL.

5.3 Project Phase Distribution

In this section, calculate the percentage from Gantt chart.

Table 5.3 Project Phase Distribution

Planning and Analysis	Design	Practice	Test
%50	%28	%8	%14

5.4 Other Tables

We met with our advisor on the days shown in blue in the figures below.

On November we met on 16 and 20.

Figure 5.4.1 advisor table for November

On December we met on 25.

Figure 5.4.2 advisor table for December

On January 4 and 31, we met with our advisor.

Figure 5.4.3 advisor table for January

On February 1 and 6, we met with our advisor.

Figure 5.4.4 advisor table for February

PROJECT-SPECIFIC CONTENT

6. INTRODUCTION

6.1. ACCESSIBILITY

Anyone who visits our website can access Covid-19 analyses.

6.2. USER MANUAL

Covid Chart Hub has a user-friendly interface that provides easy access to COVID-19 analytics. The home page offers a quick introduction to available analysis. The "Data Charts" section visualizes current case, death and vaccination data across countries and continents with interactive charts. The "Test Results" tab provides access to detailed results of correlation tests. There is also a "Team" section on the home page that introduces the team members involved in the project.

The Data Charts section gives users quick access to case, death and vaccination data. The desired analysis can be easily accessed through the links on the home page. In the Test Results tab, it is possible to access the details of correlation. The Team section contains information introducing the team members involved in the project.

To explore Covid Chart Hub and understand COVID-19 analysis, you can use the links on the home page and examine each section separately. Access to the analysis results and profiles of the team in the project aims to enrich the users' experience of accessing information.

6.3. TEST PLAN

Checking the results of data analyzes and correlation tests.
Testing the accessibility features of the website.
Testing the usability features of the website.
Checking the reliability of the project.

6.4. MAINTENANCE PLAN

Data on total cases, deaths, immunity and recovered people are pulled from an up-to-date API. In the USA, vaccination rates are taken from updated data sets. The software developer checks whether the analyzes are up-to-date every morning at 07:00.

CONCLUSION AND DISCUSSION

The “Covid Chart Hub” project serves as an impactful initiative that dives into the complex aspects of the global impacts of the COVID-19 pandemic using advanced data analysis tools in Python and visualization through Power BI. Providing comprehensive information on critical metrics such as total cases, deaths, immunity, recovery rates, and US vaccination statistics across various countries and continents, the project appeals to a broad audience seeking a nuanced understanding of the crisis that is past but whose effects we are still seeing. The inclusion of correlation tests adds depth to analyzes by disentangling relationships between variables such as vaccination rates and mortality rates

REFERENCES

1. HTML & CSS: Design and Build Web Sites Book by Jon Duckett

2. Data Mining: Concepts and Techniques Book by Jiawei Han

3. Bootstrap documentation: https://getbootstrap.com/docs/5.1/getting-started/introduction/

4. Power BI documentation: https://docs.microsoft.com/en-us/power-bi/

5. Power BI community: https://community.powerbi.com/

6. Data Analysis with Python:

6.1. Pandas documentation: https://pandas.pydata.org/docs/

6.2. Matplotlib documentation: https://matplotlib.org/stable/contents.html

6.3. Seaborn documentation: https://seaborn.pydata.org/tutorial.html

6.4. Plotly documentation: https://plotly.com/python/

7. Johns Hopkins University (JHU) COVID-19 Dashboard:

Website: https://coronavirus.jhu.edu/

Johns Hopkins University provides one of the most widely used and respected COVID-19 dashboards. It offers global, regional, and country-level data on cases, deaths, recoveries, testing, and vaccination.,

8. COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at JHU:

GitHub Repository: https://github.com/CSSEGISandData/COVID-19

This repository maintained by the CSSE at JHU provides raw data in CSV format, including daily time series data on cases and deaths by country and region.

9. European Centre for Disease Prevention and Control (ECDC):

Website: https://www.ecdc.europa.eu/en/covid-19/data

The ECDC provides comprehensive data on COVID-19 cases, deaths, testing, and vaccination for European countries.

10. COVID-19 Data API:

Several organizations provide APIs for accessing COVID-19 data programmatically. For example:

The COVID-19 API by Kyle Redelinghuys: https://covid19api.com/

The COVID Tracking Project API: https://covidtracking.com/data/api

11. World Health Organization (WHO):

Website: https://covid19.who.int/

The WHO provides global data on COVID-19 cases, deaths, testing, and vaccination.

12. Government Health Departments:

Many countries' government health departments provide official COVID-19 data on their websites. Examples include:

Centers for Disease Control and Prevention (CDC) in the United States: https://www.cdc.gov/coronavirus/2019-ncov/index.html

Public Health England (PHE) in the United Kingdom: https://coronavirus.data.gov.uk/

Health Canada: https://health-infobase.canada.ca/covid-19/

APPENDIX

1. Owid Covid Data Set

Delimiter: ,

	continent	location	date	total_cases	new_cases	new_cases_smoothed	total_deaths	new_deaths	new_c
3313	Europe	Albania	2020-12-26	52004.0	0.0	734.429	1066.0	0.0	
3314	Europe	Albania	2020-12-27	55380.0	3376.0	482.286	1134.0	68.0	
3315	Europe	Albania	2020-12-28	55380.0	0.0	482.286	1134.0	0.0	
3316	Europe	Albania	2020-12-29	55380.0	0.0	482.286	1134.0	0.0	
3317	Europe	Albania	2020-12-30	55380.0	0.0	482.286	1134.0	0.0	
3318	Europe	Albania	2020-12-31	55380.0	0.0	482.286	1134.0	0.0	
3319	Europe	Albania	2021-01-01	55380.0	0.0	482.286	1134.0	0.0	
3320	Europe	Albania	2021-01-02	55380.0	0.0	482.286	1134.0	0.0	
3321	Europe	Albania	2021-01-03	58723.0	3343.0	477.571	1186.0	52.0	
3322	Europe	Albania	2021-01-04	58723.0	0.0	477.571	1186.0	0.0	
3323	Europe	Albania	2021-01-05	58723.0	0.0	477.571	1186.0	0.0	
3324	Europe	Albania	2021-01-06	58723.0	0.0	477.571	1186.0	0.0	
3325	Europe	Albania	2021-01-07	58723.0	0.0	477.571	1186.0	0.0	
3326	Europe	Albania	2021-01-08	58723.0	0.0	477.571	1186.0	0.0	
3327	Europe	Albania	2021-01-09	58723.0	0.0	477.571	1186.0	0.0	
3328	Europe	Albania	2021-01-10	62378.0	3655.0	522.143	1230.0	44.0	
3329	Europe	Albania	2021-01-11	62378.0	0.0	522.143	1230.0	0.0	
3330	Europe	Albania	2021-01-12	62378.0	0.0	522.143	1230.0	0.0	
3331	Europe	Albania	2021-01-13	62378.0	0.0	522.143	1230.0	0.0	
3332	Europe	Albania	2021-01-14	62378.0	0.0	522.143	1230.0	0.0	
3333	Europe	Albania	2021-01-15	62378.0	0.0	522.143	1230.0	0.0	
3334	Europe	Albania	2021-01-16	62378.0	0.0	522.143	1230.0	0.0	
3335	Europe	Albania	2021-01-17	66635.0	4257.0	608.143	1265.0	35.0	
3336	Europe	Albania	2021-01-18	66635.0	0.0	608.143	1265.0	0.0	
3337	Europe	Albania	2021-01-19	66635.0	0.0	608.143	1265.0	0.0	
3338	Europe	Albania	2021-01-20	66635.0	0.0	608.143	1265.0	0.0	

Figure 1. Appendix

BIOGRAPHY

AYBERK TAMBAY

He born in Kayseri, is a software enthusiast and passionate basketball player. He began his academic journey at Kadirhas Primary School. Currently studying Computer Engineering at Doğuş University, Ayberk seamlessly balances his love for sports with his dedication to technology. Notably, he actively works as a mobile app developer, showcasing his commitment to both academics and professional growth. Ayberk Tambay's multifaceted approach reflects a harmonious blend of athleticism and technical proficiency, making him a dynamic individual with a keen eye on the ever-evolving landscape of computer engineering and sports.

NURSENA BAHADIR

She born and raised in Istanbul, is currently pursuing a degree in Computer Engineering at Doğuş University. Having completed her primary and high school education in Istanbul, she is passionate about contributing to the dynamic field of computer engineering. Nursena is an avid learner, always seeking opportunities for personal and professional growth. Beyond her academic endeavors, she enjoys exploring the ever-evolving realms of technology, reading books, and immersing herself in cultural experiences. With a love for travel and a penchant for literature, Nursena continues to embrace new adventures and expand her horizons.

ŞEVVAL ELİF ÇOBAN

Kalkan Turan Erdoğan graduated from Yılmaz Fen High School in 2018. She is currently a 4th-year Computer Engineering student at Doğuş University. In 2022, she successfully completed an internship at bottobo, followed by another at DFDS firm in the summer of 2023. Additionally, she spent a semester in Poland as part of the Erasmus program in the spring of 2022. These experiences enriched her international perspective and technical skills.

BEKİR ENES ŞİRANLI

Bekir Enes Şiranlı, a dedicated university student, initiated his educational journey at Güç Kardeşler High School and is currently immersed in the dynamic field of computer engineering at Doğuş University. Passionate about technology, Bekir Enes actively engages in projects showcasing proficiency in Android Studio and Bootstrap, seamlessly integrating theoretical knowledge with practical application. Enriching his coding skills through dedicated courses at Anadolu University, Bekir Enes's commitment extends beyond the classroom, evident in a valuable internship at the Ministry of Youth and Sports' IT department. Armed with practical

project experience and a solid computer engineering foundation, he is poised to contribute meaningfully to the ever-evolving tech world.

ZEHRA GÜNAYDIN

She completed her primary education at Yeşilgiresun Primary School and graduated from the numerical department of Keşap Science High School. Currently, she is continuing her education at Doğuş University, pursuing her 4th grade 1st Term in Computer Engineering. Alongside her studies, she undertook a 3-month internship at EVYAP Holding's IT department, gaining valuable experience and receiving training on SAP, enriching her practical skills in the field.