Medical Appointment Booking Platform

Applied Database Technologies (DSCI - D532)

Project Proposal

by

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1. Project Summary

The Medical Appointment Booking Platform will serve as a portal for patients to book medical appointments with available doctors and clinicians from a database created by utilizing data from The Centers for Medicare & Medicaid Services (CMS). The platform will also help patients decide which doctor to choose based on factors such as education, experience, specialty, and location, among others. This will be achieved by visualizing the data present in the database on the dashboard before booking an appointment.

2. Project Description

2.1 Team

Name	Course	Role
Ameya Dattaram Parab	M.S. Data Science	Developer
Trishna Patil	M.S. Computer Science	Developer

2.2 Objectives

The project aims to implement a platform to assist patients in selecting a suitable doctor or clinician for their consultation. The data gathered for this purpose will be normalized into several tables, and a schema will be defined in the RDBMS. Some new tables will also be created to handle patient and appointment information.

The platform will feature a dashboard to visualize the data of doctors' education, experience, specialty, location, and other relevant factors. Additionally, the site will include search, sort, and filter features to segregate the results retrieved through the database. The analytics performed on the database will ultimately help patients select a doctor with the necessary specialty and ideal experience.

2.3 Usefulness

Currently, there are various websites and applications on the market that patients use to reserve medical appointments. For example, Docon and Sminq are mobile-based applications that provide doctor search, clinic addresses, and appointment booking features. However, these applications do not provide detailed information about the doctors and only focus on the functionality of booking and tracking appointments.

There are several negative reviews of these two applications regarding payment issues and finding an appropriate doctor. Some users have suggested adding filters for the doctor's specialty and location. Additionally, the Docon app requires payment in advance for booking an appointment, which may make patients hesitant to use such applications as they may be uncertain about the doctor's complete information and expertise.

Although these two applications are patient-oriented, neither provides analytics on the education, experience, and specialty of the doctors, which can help patients make an appropriate decision before booking an appointment. The users who will be using the site will be patients trying to get an appointment with doctors belonging to a specific specialty and location. This platform, through its visualization feature and detailed display of information on doctors and clinicians, will provide a better way for patients to compare and analyze before booking medical appointments with suitable doctors. Furthermore, it will be easier for users to find doctors through filters for location, specialty, and other similar attributes.

2.4 Dataset

The National Downloadable File, along with Physician-Facility Affiliations, contains all the raw data in CSV format that will be utilized for this project. These datasets are taken from the Doctors and Clinicians section of The Centers for Medicare & Medicaid Services website, a U.S. government website for obtaining healthcare-related data about health services, physicians, Medicare services, hospitals, and facilities.

The Provider Enrollment, Chain, and Ownership System (PECOS) is the primary source of information about physicians and clinicians in the Provider Data Catalog and on Medicare Care Compare profile pages. It is updated every two months with the latest possible information about physicians, incorporating changes such as the attribute for telehealth services and additional facility types.

The raw dataset of Doctors and Clinicians file contains 31 columns which are described as below:

Variable Name	Variable Label	Description	Length	Values
Sec_spec_all	All secondary specialties	All secondary medical specialty reported by the individual clinician in the selected enrollment	200	string
Medical Practice				
Telehlth	Telehealth	Indicator for whether clinician offers telehealth services over video and/or audio Y = Medicare fee-for-service claims indicate that clinician offers telehealth services	1	Y
Org_nm	Organization legal name	Legal name of the group that the individual clinician works with – will be blank if the address is not linked to a group	70	string
Org_PAC_ID	Group PAC ID	Unique group ID assigned by PECOS to the group that the individual clinician works with – will be blank if the address is not linked to a group	10	string
num_org_mem	Number of group members	Total number of individual clinicians affiliated with the group based on Group Practice PAC ID	8	numeric
adr_ln_1	Line 1 Street Address	Group or individual's line 1 address	55	string
adr_ln_2	Line 2 Street Address	Group or individual's line 2 address	55	string
ln_2_sprs	Marker of address line 2 suppression	Marker that the address as reported may be incomplete	1	Y
cty	City	Group or individual's city	30	string
st	State	Group or individual's state	2	string
zip	ZIP code	Group or individual's ZIP code (9 digits when available)	9	string
phn_numbr	Phone Number	Phone number is listed only when there is a single phone number available for the address	20	string
Medicare Assignment				
ind_assgn	Clinician accepts Medicare Assignment	Indicator for whether clinician accepts Medicare approved amount as payment in full Y = Clinician accepts Medicare approved amount as payment in full M = Clinician may accept Medicare Assignment	1	Y/M

grp_assgn	Group accepts Medicare Assignment	Indicator for whether group accepts Medicare approved amount as payment in full Y = Group accepts Medicare approved amount as payment in full M = Group may accept Medicare Assignment	1	Y/M
Reference				
adrs_id	Address ID	Unique identifier for the practice location; offices within the same building, but varied by suite or floor, will have the same Address ID aside from the final two characters	25	string

The Facility Affiliations file can also be utilized which is a publicly collected data reported in the Provider Data Catalog. It contains 9 attributes which are described below:

Variable Name	**Variable Label**	**Description**	**Length**	**Values**
NPI	NPI	Unique clinician ID assigned by NPPES	10	string
Ind_PAC_ID	PAC ID	Unique individual clinician ID assigned by PECOS	10	string
lst_nm	Last Name	Individual clinician last name	35	string
frst_nm	First Name	Individual clinician first name	25	string
mid_nm	Middle Name	Individual clinician middle name	25	string
suff	Suffix	Individual clinician suffix	10	string
facility_type	Facility Type	Facilities can fall into the following type categories: Hospitals Long-term Care Hospital Nursing Home Inpatient Rehabilitation Facility Home Health Agency Hospice Dialysis Facility	200	string
facility_afl_ccn	Facility Affiliations CCN	Medicare CCN of facility type or unit within hospital where an individual clinician provides service	6	string
parent_ccn	Facility Affiliations Parent CCN	The Medicare CCN of the primary hospital where individual clinician provides service, should the clinician provide services in a unit within the hospital	6	string

2.5 Communication and Sharing

As both of us belong to the residential master's program, we can arrange in-person meetings in the focus or study rooms available at the University. However, the majority of our communication and work will be done remotely through the use of Microsoft Teams whenever necessary. To manage code sharing and version control, we will create a private GitHub repository. This will help us collaborate and keep track of the progress of the implementation. Additionally, we can revert back to the previous working code committed in the repository in case of issues and errors.

2.3 Milestones

Date	Milestone	Description
03/05/2023	Project Proposal	A brief overview of the application to be implemented outlining the objectives and details of the use case.
03/12/2023	Database Design	Understanding the dataset and devising a normalization strategy. Designing a schema considering various constraints and data types.
03/19/2023	Database Creation	Creation of the database from the raw data and insertion of sample data in the new tables.
04/02/2023	Web Application Design	Creating of the mock front end application to display the data.
04/09/2023	Visualizations	Adding visualization dashboard to the web application.
04/16/2023	Integration with DB	Integrating the front end with database by implementing the logic for various functionalities.
04/23/2023	Testing	End to End testing of the application considering various scenarios.
04/28/2023	Final Demo	Presentation of the working application.