2024 Girl Hackathon Ideathon Round: Solution Submission

Project Name: Medical Assistant (SymptoDoc)

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ReadMe File Links (Eg: Github):
Github link: https://github.com/aanchalg06/SymptoDoc
Figma link (App flow):
https://www.figma.com/file/sRxwwYE8WDXadskWcQgq5I/SymptoDoc_AppFlow?type=whiteboard&node-id=875%3A1085&t=IBFmMZ9K4HurE3Iw-1

Brief Summary:

Problem Statement:

In the current scenario, patients experiencing health concerns often face difficulty in efficiently identifying the most appropriate medical professional for their specific symptoms. This challenge stems from a combination of factors:

- **Limited medical knowledge:** The average patient may lack a comprehensive understanding of medical specialities and corresponding symptoms to make an informed decision.
- I**nformation overload:** The abundance of healthcare information available online can be overwhelming and difficult to navigate, leading to confusion and potentially inaccurate self-diagnosis.
- **Inefficient doctor search:** Traditional methods of searching for doctors can be time-consuming, requiring manual research through online directories or healthcare provider websites. This process often fails to consider the specific alignment between patient symptoms and doctor expertise.

Solution Statement:

We propose a healthcare recommendation system that combines user-reported symptoms and doctor databases available. Users enter their symptoms, and the system uses AI to analyse the data and recommend doctors with matching specialities; then our application provides the list of respective doctor specialists and provides the users with the facility of booking appointments according to their convenient schedules and also doctors in a sorted manner according to the ratings. This can help users get the supervision they need faster and easier without surfing lots of the web.

Problem Statement

What: This project is helping people find the right doctor (specialist) quickly and easily from anywhere.

Why: The inability to identify the right doctor can lead to:

- **Time Wastage:** Many people need help identifying the right doctor for their condition. If they need to know a specialist for their condition, this can lead to unnecessary appointments and delays in treatment. This system can get people to the right specialist faster by recommending doctors based on symptoms.
- **Misdiagnosis and mistreatment:** Incorrect initial diagnoses can result in inappropriate treatment plans, potentially worsening a patient's condition.
- **Empower patients:** Feeling lost and frustrated when navigating the healthcare system can discourage people from seeking help. This recommendation system aims to make finding a doctor smoother and more efficient, encouraging people to get the care they need.

Whom: This project targets anyone who needs to see a doctor. This could be people with new or ongoing health concerns, those simply looking for a new physician, those who are new in a city who need to know nearby physicians or those whose financial conditions are not good and they don't want to waste money by running unneccessary health tests.

Design Idea and approach

Technologies Used: The project utilizes Jetpack Compose UI Kits for Android development, creating intuitive interfaces. Gemini AI recommendation engine processes symptom data for personalized specialist recommendations. New Components Developed: Specialized ViewModels manage user inputs; recommendation system matches symptoms with specialists. Robust network error handling ensures smooth operation and user experience reliability. Rollout Strategy: For the future it is planned that incremental updates will ensure stability and gather user feedback for continuous improvement. User input guides iterative enhancements to meet evolving needs and preferences. AI Algorithm Implementation: AI analyzes symptoms, extracts keywords, and matches them with specialist data for accurate recommendations. Integration with Gemini AI enhances intelligence and optimizes healthcare recommendations. (Please refer to readme file in github and figma chart for further explanation)

Impact

Societal Impact

The proposed healthcare recommendation system with AI addresses the significant societal challenge of ensuring **efficient access to the proper medical care**. It does this in several ways:

- **Potential cost savings:** By optimising doctor selection, the system can contribute to overall healthcare cost reduction by minimising unnecessary procedures and tests.
- **Reduced Disparities in Access:** The AI system can help bridge gaps in healthcare access. Providing an objective and data-driven recommendation platform can ensure that geographically isolated communities or those with limited resources have a better chance of finding qualified specialists.
- **Improved Public Health Outcomes:** Early and accurate diagnosis is crucial for preventing the spread of diseases and managing chronic conditions. The system can contribute to earlier interventions and improved public health outcomes by streamlining access to specialists.
- **Streamlined Healthcare Workforce Management:** Doctors can spend less time managing patient inquiries about their specialisations and focus on consultations with patients who truly need their expertise. This can lead to better use of physician time and improve overall healthcare workforce efficiency.

Potential Scale of Impact:

A widely used system could significantly improve efficiency and outcomes within the healthcare system. Like if we imagine a scenario where:

- Patients find the right doctor quickly and easily, reducing frustration and anxiety.
- Doctors see patients needing their expertise, leading to more focused consultations and better treatment plans.
- Healthcare resources are used more efficiently, reducing overall costs.

Application Grounded in Research:

Yes, our application is based on thorough research and data analysis related to the healthcare problem we're addressing. We've looked into various studies that show more people are using the internet to find medical information (source: https://link.springer.com/article/10.1007/s13187-014-0711-1). These type of researches shows us that there is a much need to develop a robust healthcare recommendation system that addresses real-world needs and challenges. Hence, we aim to create a solution that matches users with the right healthcare providers based on their specific symptoms and preferences.

Deployment of AI model:

With the deployment of the AI model, we have a clear plan to implement it for significant real-world impact. Our strategy involves rigorous testing and validation of the AI algorithms using historical and mock symptom data to ensure accuracy and reliability. Once validated, we plan to deploy the AI model within our application framework, continuously monitoring its performance and refining it based on user feedback (working with futur and real-world usage. This iterative approach aims to maximize the effectiveness of our AI model in providing personalized and valuable recommendations to users seeking healthcare guidance.

Expected outcomes include:

1. **Improved Patient Experience:** Reduced frustration in finding doctors, increased patient satisfaction, and a sense of empowerment in managing their healthcare journey.
2. **Enhanced Healthcare Efficiency:** Reduced time spent searching for doctors, improved appointment scheduling by matching patients with specialists' availability, and better utilisation of specialist expertise.
3. **Positive Health Outcomes:** Increased accuracy of initial diagnoses, fewer unnecessary procedures, earlier interventions due to faster specialist access, and improved overall patient health.
4. **Economic Benefits:** Reduced healthcare costs by minimising unnecessary tests, increased workforce efficiency within the healthcare system, and potential cost savings for patients and providers.

5. **Reduced Disparities in Access:** The system can bridge gaps by offering objective recommendations to improve access to specialists for geographically isolated or resource-limited communities.
6. **Potential for Future Advancements:** Integration with electronic health records for personalised recommendations, development of AI chatbots for initial guidance, and expansion to include preventative care suggestions.

By demonstrating these positive outcomes, the project can pave the way for broader adoption and a measurable societal impact on healthcare efficiency and patient well-being.

Feasibility

Yes! The execution of healthcare recommendation systems is something that I have been considering very carefully. Although the details remain fine-tuned, like getting the datasets and education in the technical area, we understand that data quality is needed to ascertain the effectiveness of our AI capabilities. We're looking into different third-party data providers that give hospital and doctor databases access for thorough and integrated data integration. Moreover, we also acknowledge the importance of having such relationships with domain experts (such as various healthcare professionals/specialists) and strategic partners (e.g. data scientists with AI expertise and experts in Android development). In the future, we look forward to interacting with such stakeholders to fine-tune our platform and incorporate valuable suggestions. We will collaborate with these experts, including doctors, researchers and AI specialists, to enhance our system and ensure that we attain the aims for the next stage.

Use of AI

SymptoDoc leverages AI to tackle healthcare recommendation challenges. Its core function is analyzing user symptoms and matching them with suitable doctors using AI algorithms and pre-existing specialist data. AI helps process and interpret user input effectively for accurate, personalized recommendations. AI analyzes user-provided symptoms and identifies critical patterns for better matching with relevant healthcare providers.

In summary, the SymptoDoc proposal harnesses AI technology's power to provide intelligent healthcare recommendations, improve symptom analysis accuracy, personalize user experiences, and generate valuable insights from data.x

Alternatives considered

While the proposed AI-powered doctor recommendation system is a robust solution, here are some alternative design ideas that were considered but ultimately outweighed:

- **Symptom Checker with Manual Doctor Search:** This approach would involve a symptom checker using a decision tree or rule-based system to suggest potential diagnoses. However, this would only account for some individual variations and complexities in medical conditions. Patients still need to manually search for doctors based on the suggested diagnoses, which can be time-consuming.
- **Simple Keyword Matching:** Matching user-entered symptoms with keywords in doctor profiles could be implemented. However, this is a less sophisticated approach and wouldn't capture the nuances of medical terminology and patient history. It could lead to inaccurate recommendations.

These alternatives were outweighed by the benefits of AI-powered recommendations, which offer Scalability, Accuracy, and Efficiency. However, it's essential to acknowledge that this project is still under development in healthcare. Combining AI with human expertise could be a future avenue to explore.

Future Work Plan

- **Enhanced Disease Prediction:** We will leverage pre-existing models specifically designed for medical diagnosis. These models will analyze user-reported symptoms, collaborating with AI to identify a shortlist of potential diseases. This information will be crucial in recommending more appropriate healthcare providers.
- **Mobile Application Features:** We'll securely store user data like symptoms and medical history to provide personalized healthcare recommendations and facilitate future improvements. Users can leverage a secure Gmail login authentication and manage their health history within the app, allowing the system to suggest more suitable healthcare providers. We will also provide users with functionalities to sort and filter doctors based on their location and insurance acceptance, and we will also deploy a functionality to take feedback from users.