Sickle Cell Disease (SCD) Patient/Provider Match Tool

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Problems:
- SCD patients are struggling to find a suitable provider based on their needs due to the disease’s rarity and other complexities

Objective:
- Develop an iOS mobile application that recommends and matches SCD patients to high-value providers based on care scores
- Understand the exact clinical and behavioral situation of SCD patients

Requirements:
- Analysis of local hospitals to determine the care data related to SCD treatment
- Apply data model capable of scraping and ingesting treatment data from hospitals and providers to empower patients to understand care details

Objectives & Requirements

- Employee & live alone
- Frequent pain crises and hospitalizations
- Educational interruptions, Social isolation
- Goal: Dream university

Patient Persona

2 Representative patient models:
- Jasmine Brown
  - Student & Support by families
  - Frequent pain crises and hospitalizations
  - Educational interruptions, Social isolation
  - Goal: Dream university
- Michael Thompson
  - Employee & live alone
  - Frequent pain crises and hospitalizations
  - Educational interruptions, Social isolation
  - Goal: Long-term job

UX/UI: Figma
Frontend: React Native & Firebase
Backend: Flask & MangoDB
Functions/Pages: Signup/Login, Match, Community, Favorite, Account

User Flow

Signup/Login & Favorite & Account

Creating Account:
- Basic info (name, gender, age)
- Contact info (email/phone)
- Personality (MBTI)
- Symptoms
- Pain level

Favorite:
- Store interested doctors, hospitals and posts

Manage Account:
- Manage users’ profile (above)

Match

Search:
- A search bar permitting users to input keywords, provider names, or city names.
- Enhances the ability to quickly locate specific hospital providers.

Filtering:
- Filter results based on distance to provider, and care scores.

Sorting:
- Sort results by relevant parameters such as proximity, care scores, and other pertinent attributes.

Community

Post Publishing and Browsing:
- Freely publish posts about their experiences with SCD, treatment insights, or other relevant information.
- Browse the latest posts from other community members, ensuring timely interaction and engagement.

Interactive Functions: Like, Save, & Comment

Synthetic Data Creation: in Machine Learning

- Incorporate critical attributes such as personality and pain level to enhance the relevance and accuracy of the synthetic profiles.

Recommender System Model in Machine Learning

Model Development through XGBoost [2]

Care Score Generation:
- Assign weights to Personality, Distance, and Pain level.
- Implement weighted sums to generate final care scores.

4-state Matching Algorithm based on Care Score
- Default: Equal weights
- Personality: Prioritize personality matching
- Distance: Prioritize the shortest distance
- Pain level: Higher pain levels ➔ More experienced doctors

Output:
- Top 5 doctors best suited for the patient based on the Matching Algorithm

Explanation using ChatGPT API:
- Provide a detailed explanation of the care score and the reasons behind each doctor-patient match to ensure transparency and trust in the recommendations

Future Work & References

- Online appointments, telemedicine meetings
- Update users on news that is happening within the SCD world
- Chat with a chatbot to find solutions to symptoms when providers are not available
- More personalized matches with doctors considering more features
- Provide community resources such as study/job opportunities, etc. to give supports
- Upgrade the ML model with a more advanced and interpretable architecture.

[1] Sickle Cell Disease_FINAL_ComprehensiveDeck_3.29.22, Novo Nordisk