Project idea: Health diagnosis application

Overview:

This health application will perform a broad range of services that are usually separated into different applications. These services will involve health advice, health tracking, and discussion forums, which will provide benefits to the user and consulted medical professionals. Health advice will offer preventative and reactive medical advice which enables the user to improve health whilst preventing and treating illnesses. To provide the high-quality advice, artificial intelligence and cloud computing services will be used to store and analyse medical data which advises based on the latest medical standards. Additionally, forums will be used to discuss health, fitness, and general topics which will provide a social and engaging atmosphere. The application is intended as a tool to be used in conjunction with the appropriate healthcare professionals should be consulted about the information provided by the application.

Motivation:

Health is a foundation for happiness and productivity, as well as a major economic concern, it shows a strong reason for developing tools that assist with the promotion of individual health. The health industry is growing every year, and with the increased growth and availability of information, it is becoming more difficult to make an optimal choice to improve and manage our health. This lack of certainty and increased complexity creates a need for the simplification and streamlining of medical information to the individual.

To alleviate the concerns with choosing from many health options, technologies such as cloud computing, artificial intelligence, and health tracking devices are allowing for improvements in the provision of health-related services. Currently there are applications which provide symptom checking services by utilising artificial intelligence, however the scope of these could be expanded. Expanding the scope health applications to advise based on medical history and monitored health data, in addition to symptoms, will provide more accurate health advice resulting in better health outcomes.

Description:

The proposed health application has a large scope of services that provides the user with more tailored health advice than previous health application iterations whilst also encouraging social interact through online forums. This will allow the user to make more informed decisions about preventative health measures such as exercise, medication, and lifestyle; or treatments related to their diseases and how their diseases, medication and current health data interacts. The user will benefit from this advice which should result in a better quality of life and less time spent waiting on medical professionals. This tailored advise is achieved by using both medical history and monitoring current health data through user devices, whilst utilising both cloud servers and artificial intelligence technology.

By using cloud technology, it makes it possible for the user to always stay connected to the cloud and have their data accessible from anywhere. Staying connected to the cloud is important for many devices as it prevents the loss of data associated with storing information locally. In addition to providing storage benefits, it will allow for the cloud computing services to manage computationally

intensive tasks relating to artificial intelligence that will be needed to analyse the data and offer advice. The cloud will be used to store previous health data, such as medical records, and current monitored health data. Types of monitored data can include heart rate, steps walked each day, temperature, respiratory rate, ingested smart pills, and detection of falls. This monitored data will be processed by artificial intelligence.

Using artificial intelligence, the application will sort through vast amounts of medical information, analyse it, and offer advice that is specific to the individual's situation. Artificial intelligence has the benefit of being able to learn from this data and improve upon future advice. With the increasing data collection from users, the advice will improve over time. Previous health diagnosis applications utilising artificial intelligence would offer advice based on described symptoms – such as fever, insomnia or pain -- which would potentially provide diagnoses not specific to the user. The proposed application will provide a more specific diagnosis by using the user's medical history and current monitored health data in addition to the described symptoms.

Cloud services and artificial intelligence providing the foundation for the application, but it is important to assist the users in achieving an understanding of ideal health. The application will allow users to create a profile and input data relating to their physical health. This data will be compared to ideal health data in categories such as weight, blood pressure, heart rate, diet, and nutrition in blood test results. The data provided could cause the application to give warnings about any health issues that may arise from the user's current health data, such as their weight contributing to the likelihood of diabetes, or their blood pressure being higher or lower than normal.

This data can also provide additional specificity in relation to any other health conditions that the user might be suffering from. For example, if the user inputs the data of being overweight and having diabetes, the application will provide a message detailing the health interaction between the user's weight and how it may affect diabetes. In addition to the information provided about the interaction it will also give preventative treatments.

Although diabetes is an example that is usually a slow progression, there are uses of this application that assist with more immediate concerns such as an elderly person falling. The health application would work alongside third-party devices to alert the appropriate people of accidents. An example of a third-party device is a belt worn by the elderly that assists with falls. To protect the user, this belt has a range of features. The belt will protect the user by inflating if they fall, alerting the caregiver, and recording metrics on their balance and proprioception. In addition to the main functions of the belt, this health application would notify the user's designated health professionals of the incident. Also, the data from the belt would be used to provide a more comprehensive health record for the user. And in this case, the metrics about balance will certainly provide more accurate health recommendations for the future. This data relating to balance could be used to diagnose proprioceptive related illnesses such as Meniere's disease.

Another example of this applications interaction with third-party devices is with the use of Smart pills. Smart pills are a drug that contains sensers in it that activate when the ingested pill comes into contact with stomach fluids. This Smart pill is commonly used to record compliance for medication. Although this example is another third-party device, the proposed health application would record the compliance rates as another form of data. This data could be used in the context of future diagnoses relating to symptoms such as forgetfulness if the user has a low compliance rate for medication. If the compliance issues are related to forgetfulness, then the data could possibly contribute to the diagnoses of Alzheimer's.

By using the large range of health data collection methods, the application will provide preventative treatment advice which can slow the progression of a disease and in some cases prevent it from occurring. Due to the sedentary lifestyle of modern society, lack of physical activity plays a major role in disease. Although there are many preventative treatments that will be provided by the application to the user which are unrelated to fitness, the role of fitness and daily activity are heavily promoted by the application. Daily goals of physical exercise will be monitored and compared to the user's weight, blood pressure, and other data. To add incentive to complete the daily goals there will be a social element of comparing physical exercise for the day to other users. This can be in the form of calories consumed or steps travelled which could be monitored by third party devices such as Smart watches.

Not all health conditions are preventable, and some interfere with preventative treatments. It is also the aim of the application to offer advice for the user to enable them to manage their health in a non-fitness related capacity. The application will use the entirety of its stored health data from methods details above to provide treatment advice while managing additional considerations such as medicine contraindications. An example contraindication is a harmful combination of medications that will cause the application to display warning messages to alert the user to the potential harm. Treatments can be complex and worrying, and even sometimes palliative, even with the assistance of this application, so the application encourages users to discuss the content with others through a discussion forum.

The discussion forum is of great benefit to the application's community and encourages further learning, sharing of health concerns, and participation. It will promote an atmosphere of wellness and allow likeminded individuals to connect and talk about their health concerns. It will have dedicated and general forums to discuss all issues relating to health and links will be provided to the appropriate forum under each of the user's health conditions.

Tools and technologies:

The use of cloud computing technology will be utilised through a provider such as Amazon Web Services. The cloud services will most likely use the more comprehensive service of Software as a Service (SaaS) which provides the hardware infrastructure, operating systems, and software needed. This will result in more flexibility for the early stages of the applications development. In addition, artificial intelligence software will need to be developed for the needs of analysing, diagnosing, and offering advice to the user in relation to medical data. Due to the compute resource intensive nature of artificial intelligence, the cloud will be utilised to offload computing resource constraints of local devices during development. For the current intended iteration, the program will be written entirely in Java, although further consideration is needed to accommodate the use of artificial intelligence.

The project will require a workspace for the employees to create the application. This involves the purchasing of all office and developer related equipment such as the computers, laptops and office supplies for a large group of software developers required to develop the application.

Skills required:

With the use of cloud computing, and artificial intelligence, it will be necessary to employ highly qualified software developers specialising in cloud and artificial intelligence. In addition to these

specialised software developers, a large force of software developers will be needed to develop all parts of the application including facets such as the user interface and the forums required for users to interact with each other. An additional helpful skill would be for the developers to have experience within the healthcare industry or familiarity within it. To add to this, it is expected that regular consultations with medical professions will occur to ensure the validity of the application's health advice.

Outcome:

With the recording of monitored health device data which provide the latest user health data, and the access to previous data such as health records, the application is expected to provide a more comprehensive view of the user's health needs and advise accordingly. This comprehensive approach combined with the continued integration and collecting of information from third party devices will result in more accurate diagnoses than previous technologies.

The capabilities of this application are expected to exponentially increase with future developments in computing resource capabilities, and the continued refinement of the application's artificial intelligence. Through this application's diagnosing ability there will be a reduced demand on the inundated health care system in addition to more accurate diagnoses for users and health care professionals.