MEDI-SCREEN

Recent advances in health care have led to a surge in people living longer. A societal transformation is taking place whereby healthcare professionals, and patients alike, are shifting from reactive to proactive and predictive health care management. Rather than waiting for health problems to be manifested as serious and potentially life threatening conditions, new technology enables prediction of future health problems through matching large datasets of patient information with unique individual patient histories.

* ***Predict health problems by matching a unique individual patients data with a large dataset of patients data.***

This transformation in health care management, coupled with new machine learning models and frameworks have created an opportunity for your start-up software development company to develop applications for this lucrative medical sector. Your company has been approached by an international healthcare insurer and tasked with the development of a bespoke system which predicts the likelihood of its members contracting a range of serious medical conditions. As part of the negotiations with the company, you have retained the IP and may use it in future projects.

* ***Entire system is developed for an international healthcare insurance company.***
* ***Predicts the likelihood/chance of a client/member of their company contracting type 2 diabetes. Does this mean that the insurance company would be using it to de***

KEY FEATURES:

Medi-Screen system applications:

* From the perspective of the patient, the Patient app (Patient Medi-Screen), enables members to calculate the risk of illness based on their lifestyle and prior medical history
  + ***Apps users are the patients/members of the insurance company.***
  + ***Gives the ability to calculate the risk of contracting type 2 diabetes based on lifestyle and medical history. (***<https://riskscore.diabetes.org.uk/results>***)***
* For medical and insurance professionals, a portal website (Web Medi-Screen), stores all patient records enabling insurers to make decisions and medics to advise based on the patients’ risk profiles.
  + ***Website/Web Portal users are for the insurance professionals and the GPs of the patients.***
  + ***Ability to retrieve all patients records (different information displayed for each user).***
  + ***GPs can advise patients based on the generated risk profile of an individual patient.***
  + ***Insurers can make decisions about the members insurance premium based on the generated risk profile of an individual member.***
* Machine learning models, based on internationally available medical datasets, will be developed to implement the backend AI (i.e. Medi-AI).
  + ***Machine learning models that implement the backend AI.***
  + ***Internationally available medical datasets are used in the models.***

Mobile Application (Patient Medi-Screen) - Basic Features:

* Register/login: email and/or social media login option and accounts.
  + ***Login uses email and password for members with existing account. Brings user to their account home page.***
  + ***Register asks for email, password, name, etc. Brings user to their account home page.***
* Record details of patients GP.
  + ***Include in the registration of account, enter the users GP info (name, medical licence number, practice name/location).***
* Record details of insurance company.
  + ***Ignore as the app is made for the client of a single insurance company so is unnecessary.***
* Payment of insurance premium.
  + ***Users can pay for their insurance premium through the app (using credit/debit or PayPal with a monthly or yearly plan).***
* Medical History: detailed forms capturing the information requirement by the machine learning models in Medi-AI.
  + ***A detailed form can be completed by the user in order to generate a risk profile (if necessary) with information needed by the machine learning models.***
  + ***The form is used to calculate a persons risk of contracting type 2 diabetes.***
* Medi-AI Interface based on the user’s profile, Medi-AI may be called to determine the patient's risk of contracting a range of illnesses.
  + ***If the form determines that the user is of above a certain risk level, then the AI interface will be called to generate a risk profile which determine the likelihood of contracting type 2 diabetes.***
* Request professional ability to call the GP, or insurance company on record, from within the app.
  + ***User can call their GP and the insurance company from within the app. (Opens the android calling application with the number inputted).***
* Support forms to contact the insurance company or medical professional.
  + ***User can enter a form to contact their GP or insurance company with a query instead of calling (via email or text)***
* Ratings & reviews. Capability of rating the quality of the app and leaving reviews of the app’s performance.
  + ***User can review the app with a comment and a rating.***

Website/Web Portal (Web Medi-Screen) - Basic Features:

* Registration of medical and insurance professionals using email and/or social media login.
  + ***Both users can only register via email and password.***
* Access Restrictions: professionals should only be able to see the details of their own patients.
  + ***User can only view their own patients data.***
  + ***GPs can view a full medical history (anything entered by the patient via the app).***
  + ***Insurers can only view certain information entered by the patient via the app such as the gender, race and age (find out what is typically asked when joining a company and what legally you must give in terms of GDPR and identity theft regulations).***
* Medi-AI Interface should allow professionals to view their patient risk profiles.
  + ***Both users can view a patients risk profile.***
  + ***Risk profile includes what?***
* User Profiling should enable insurance professionals to run reports establishing levels of risk for all categories.
  + ***Insurance professionals can create a report of the level of risk of developing diabetes based on an users risk profile.***
* Aggregation of new patient data. Using new patient information, the administrator should have an option to create and export new datasets by extending those used by Medi-AI.
  + ***NOT SURE***

Machine Learning Models (Medi-AI) - Basic Features:

* Simple API linking Medi-AI backend with the Patient Medi-Screen and Web Medi-Screen applications.
  + ***Use TensorFlow to link the mobile and/or mobile application to the machine learning model/’s.***
* Models, using publicly available datasets, which determine patient risk of Cancer, Diabetes and Heart disease.
  + ***Find a publicly available dataset that can determine the risk of developing diabetes.***
* Reporting which displays the accuracy of each of these models.
  + ***Create a mechanism to calculate the accuracy of each prediction.***

Each project group should also incorporate a custom feature which is unique to the group. This custom feature should be implemented in one (or more) of the key components of the project i.e. the Patient Medi-Screen, the Web MediScreen or the Medi-AI.

Technology:

The first application, the patient app (Patient Medi-Screen), involves the development of an android app to interface with the machine learning models developed as part of the backend AI. Development may be carried out using Android studio or a similar development environment.

The second application, the website (Web Medi-Screen), involves developing a web site for medical and insurance professionals. Programming languages for Web Medi-Screen may include Node.js, HTML, Python and PHP. To facilitate rapid development of the site, a CMS such as WordPress or Bootstrap may be used. In-app payments via credit cards may use Paypal.

Both Patient Medi-Screen and Web Medi-Screen will store their data in a centralised database such as MongoDB.

The machine learning models used in Medi-AI will be developed using python, Keras and Tensorflow.

Github or BitBucket must be used for code management and marks will be allocated for their use.

Reference: 1) https://machinelearningmastery.com/tutorial-first-neural-network-python-keras/ 2) https://archive.ics.uci.edu/ml/index.php