**Some Market Research**

**Ways in which diabetes is detected:**

**Laboratory based:**

**A1C:**

* Measures average blood glucose over past two or three months.
* Used to diagnose type 1 and type 2 and check whether diabetes is in control if you are already living with it.

Advantage(s):

* No fasting needed
* Helps to track diabetes

Disadvantage(s):

* Not affordable to everyone (~$10 to $51)
* Unreliable and not easy to detect diabetes

**Fasting Plasma Glucose (FPG):**

* Uses fasting of 8 hours.
* Measures in mm hg.
* Done before breakfast

Advantage(s):

* Done quicker that other tests
* Usually used to detect diabetes

Disadvantages:

* Doesn’t look at the factor of time, and makes it difficult to track diabetes

**Oral Glucose Tolerance test (OGTT):**

* 2 hours test
* Used to process how your body processes sugar.
* Uses sweet drink

Advantage(s):

* Quick two hours test
* Shows whether your body is in a state of processing glucose well or not.

Disadvantage(s):

* Expensive compared to other options (~$10 to $ 97)

**App detection:**

**Fooducate:**

* Suggests diet for diabetes
* Free
* Helps track food

**MySugr:**

* Contains dashboard
* Shows graph
* Allows input of information from user.
* Can help predict chance of diabetes
* Can help provide a rudimentary A1C

**DiabetesM:**

* Tracking solution for diabetes
* Also tracks nutrition information

**Use of Diabetes-Related Applications and Digital Health Tools by People with Diabetes and Their Health Care Providers:**

* ∼500 million people are using mobile apps for diet, exercise, and chronic disease management
* Consumers worldwide spent $120 billion on apps in 2019, including $1.5 billion on health and fitness apps, which was up 130% from 2017. One health app (Fitbit) was the sixth most downloaded app in the United States in 2019. There are now >40,000 health care apps available online from both the App Store and Google Play.
* Diabetes apps focus on one or more diabetes self-management tasks such as blood glucose monitoring, medication or insulin dosing, obtaining diabetes or general health education, and tracking nutrition or physical activity.

**Prediction Model for diabetes:**

* Prediction of diabetes at an early stage can lead to improved treatment.
* In this research paper, diabetes is predicted using significant attributes, and the relationship of the differing attributes is also characterized.
* Our findings indicate a [strong association](https://www.sciencedirect.com/topics/computer-science/strongest-association) of diabetes with [body mass index](https://www.sciencedirect.com/topics/medicine-and-dentistry/body-mass-index) (BMI) and with glucose level, which was extracted via the Apriori method.
* [Artificial neural network](https://www.sciencedirect.com/topics/computer-science/artificial-neural-network) (ANN), [random forest](https://www.sciencedirect.com/topics/computer-science/random-decision-forest) (RF) and K-means clustering techniques were implemented for the prediction of diabetes. The ANN technique provided a best accuracy of 75.7%, and may be useful to assist medical professionals with treatment decisions.

**Estimation of HbA1c value using artificial neural networks:**

* Diabetes is a life-long disease that occurs because of ineffectiveness or lack of the insulin hormone. Although the blood sugar, fructose and haemoglobin A1c (HbA1c) values are commonly used for diagnosis, the latter give more accurate results. The HbA1c value gives information about the blood sugar levels over the past 2 to 3 months, which is required for treating diabetes. Follow-up data of diabetic patients have been used in this study. In the classification phase, a feed-forward artificial neural network (ANN) was used to estimate the factors affecting HbA1c. The designed ANN has 26 features used as input parameters. The output layer comprises two outputs: normal (HbA1c < 6.5) and high (HbA1c ≥ 6.5). An accuracy rate of 90.33% was obtained with the proposed method. The results, which show accurate estimation of the HbA1c level parameters, will be used in future studies to investigate which parameter affects the HbA1c levels, and in what way.
* Keywords: Neural network, haemoglobin A1c, diagnosis of diabetes disease
* The fact of high blood sugar levels in the body has increased the risk of cardiovascular and other diseases, resulting in the death of 2.2 million people annually
* Although the role of insulin in diagnosing diabetes is great, the HbA1c value is used for more accurate results. This is because the HbA1c value gives information about the past 2 to 3 months of blood sugar, which is required in the treatment of diabetes. Thus, this value has started to be used increasingly in recent years.
* It has been emphasised that the normal range of this value is between 3% and 6%, while 6.5% is chosen as the diagnostic criterion

|  |  |  |  |
| --- | --- | --- | --- |
| Logo | Apps | Features | Disadvantages (Doesn’t contain our app feature) |
|  |  |  |  |

* <https://www.diabetes.org/a1c/diagnosis> (Different Diabetes Detection Methods)
* [https://www.healthline.com/health/diabetes/top-iphone-android-apps#fooducate](https://www.healthline.com/health/diabetes/top-iphone-android-apps) (Different Diabetes detection and tracking apps.)
* <https://www.frontiersin.org/articles/10.3389/fendo.2019.00135/full>
* <https://www.youtube.com/watch?v=v6VJ2RO66Ag>
* <https://play.google.com/store/apps/details?id=com.mydiabetes&hl=en&gl=US>
* <http://tb.test.woza.work/> (Similar app where we got the idea related to TB)
* <https://www.kaggle.com/mathchi/diabetes-data-set> (Data set from national institute of diabetes on Kaggle)
* <https://data.mendeley.com/datasets/wj9rwkp9c2/1> (Another dataset regarding diabetes)
* <https://play.google.com/store/apps/details?id=com.mysugr.android.companion&hl=en_IN&gl=US>
* <https://levelup.gitconnected.com/random-forest-regression-209c0f354c84>
* <https://blog.quantinsti.com/random-forest-algorithm-in-python/?source=google&medium=cpc&campaign=dsaindia&gclid=EAIaIQobChMIhZzOqNvE9AIVCZhmAh3tuAHmEAAYASAAEgIUB_D_BwE>
* <https://clinical.diabetesjournals.org/content/38/5/449> (Use of Diabetes-Related Applications and Digital Health Tools by People with Diabetes and Their Health Care Providers)
* <https://www.sciencedirect.com/science/article/pii/S2352914819300176> (Prediction Model for diabetes)
* <https://www.sciencedirect.com/science/article/pii/S1877050918308548> (Classification algorithm for diabetes)
* <https://www.researchgate.net/publication/321336992_Estimation_of_HbA1c_value_using_artificial_neural_networks> (HbA1C using Artificial Neural Networks)
* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8258057/> (Random forest approach for determining risk prediction and predictive factors of type 2 diabetes: large-scale health check-up data in Japan)