

Recapitulation of Machine Learning Algorithms in Diabetic Detection



Prashant Johri, Lalit Kumar, Avneesh Kumar, Vivek Sen Saxena

Abstract. Diabetes mellitus is one of the major non-transmittable infections, which have extraordinary impact on human life. Due to dynamic work culture and dormant way of life-style of 21st century, approximately 62 million Indian families are diabetic. By applying prescient examination on clinical enormous information, the gigantic volume of information is produced in the human services frameworks, and this will be utilized to make therapeutic insight, which drive medicinal expectation & anticipation. A lot of information is accessible with respect to the malady, manifestations and their impact on well-being. Since this information isn't legitimately investigated to foresee or to examine an infection. The objectives of paper is summarized as to give a point by point adaptation of prescient models for computational investigation from condition of workmanship, depicting different reasons for diabetes procedure, for extricating information from diabetes patients and describing different predictive models with their applications in Healthcare, particularly in the field of diabetes.

Keywords: Diabetes, Computational analytics, Predictive analytics, Machine learning, Healthcare

I. INTRODUCTION

Diabetes is a perpetual ailment, which happens when the pancreas does not create enough insulin (type 1 diabetes), or when the body can't adequately utilize the insulin it produces (type 2 diabetes). This promptly raises blood glucose (sugar) level and after some time, genuinely harm to significant number of the body's frameworks, particularly the nerves and veins. Around 422 million individuals worldwide have diabetes. India has more than 60 million diabetics out of a population of 135 billion. The diabetic patient in India will increase to stunning 109 million cases by 2035 out of an expected population of 1.5 billons.

The World Health Organization (WHO) extends that; diabetes will be the seventh driving reason for death by 2030.

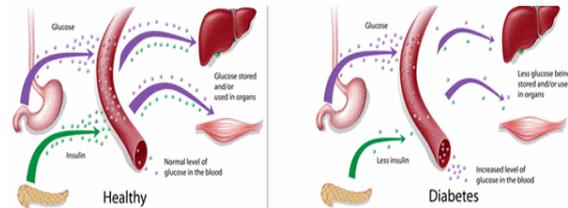


Figure 1: Healthy vein and diabetic vein

The World Health Organization (WHO) extends that; diabetes will be the seventh driving reason for death by 2030. The NCD Profilesx 2014, by WHO uncovers that major reason of mortality is because of NCDs. In India, an expected 7.8% of the people more than 18 years of age has raised blood glucose level and are on treatment for diabetes. In fasting state the body keeps up blood glucose by breakdown of set away glucose especially from the liver [1].The delicate change of blood glucose kept up absolutely by the movement of insulin all through 24 hours which is secreted from the beta cell of the pancreases free of the eating structure and physical progression. An additional central determinant of keeping up blood glucose is the affectability of the insulin advancement on the muscle, fat and liver tissues.

II. CAUSES OF DIABETES

Maturing populaces, monetary improvement, urbanization, undesirable eating methodologies, expanded sugar utilization, low natural product, low vegetable admission and diminished physical movement are for the most reason of diabetes. These are flexible components, inflexible portions which are the origin of diabetes. They combine the running with hereditary inclination

- Obesity
- Central obesity
- Sedentary way of life
- Diet
- Mental stress
- Gestational Diabetes mellitus
- Multiple time pregnancies

A. Stages of Diabetes

Diabetes creates and advances on account of loss of beta-cell work. United Kingdom Prospective Diabetes Study(UKPADS) obviously demonstrates loss of half of beta-cell work at the time conclusion, which kept on declining, advance and compound diabetes which is shown in Figure 2 [2][3]. In the beginning stage of diabetes, higher than normal blood level of insulin is due to increased insulin secretion (Phase1).

Revised Manuscript Received on October 30, 2019.

* Correspondence Author

Prashant Johri, SCSE, Galgotias University, Greater Noida, India, Email: johri.prashant@gmail.com

Lalit Kumar*, SCSE, Galgotias University, Greater Noida, India, Email: lalitsharmalkce@gmail.com

Avneesh Kumar, SCSE, Galgotias University, Greater Noida, India, Email: avn119@rediffmail.com

Vivek Sen Saxena, Department of IT, INMANTEC Institutions, Ghaziabad, India. Email: sensvivek@gmail.com

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Insulin obstruction at the appropriate time has a tendency to intensify so postprandial hyperglycaemia creates in spite of increased insulin (Phase2). Over the time as the pancreatic beta cells get drained, it's discharging limit diminishes. This results in lesser insulin discharge and diabetes matures (Phase 3). As blood glucose rises, this supplementary brings down insulin discharge (glucotoxicity). Existence of insulin resistance, diminished insulin discharge and glucotoxicity creates a decompensate condition of glucose digestion prompting Diabetes Mellitus.

B. Classification of Diabetes

Diabetes is categorised as

- Type 1
- Type 2
- Gestational
- Pre-Diabetes

C. Specifications of Diabetes

The various specifications of each type of diabetes are described below.

D. Type 1 Diabetes

The main characteristic of Type 1 diabetes is, the beta cells of the pancreas are assaulted by the misled resistant framework, which is responsible for insulin creation. It is trusted that the propensity to create strange antibodies in type 1 diabetes is, to some degree, hereditarily acquired, however the subtle elements are not completely comprehended. Type-1 diabetes has a tendency to happen in youthful, lean people, for the age group below 30 years; be that as it may, more seasoned patients do give this type of diabetes very so often. This subgroup is alluded to as inert immune system diabetes in grown-ups. Type 1 diabetes is also termed as LADA (Latent Autoimmune Diabetes in Adults)

E. Type 2 Diabetes

In this diabetes, insulin gets created in patients, but due to common insulin resistance, it is not sufficient for their body's needs. As a result, this implies that pancreas produces higher than ordinary amounts of insulin. The control of gluconeogenesis advances toward getting to be exchanged off. While it is said that type 2 diabetes happens to people more than 30 years of age and the rate increments with age. A large portion of these cases are an immediate after effect of poor dietary patterns higher body weight, and nonappearance of

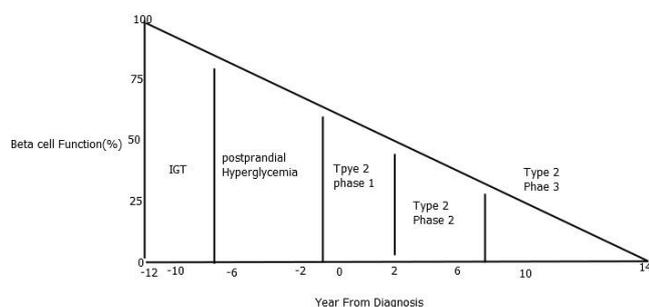


Figure-2: Stages of Diabetes Related to Beta-cell Function

movement. There is a quick association between the dimension of huskiness and the risk of making type 2

diabetes and this remains same for kids and grown-ups. Study shows that after the age of 35 the chance of diabetes is higher regardless of weight.

F. Gestational Diabetes

Diabetes can happen amid pregnancy, temporally. Critical hormonal changes amid pregnancy can prompt blood glucose level. Gestational diabetes settle after the delivery 35% to 60% of ladies with suffers with gestational diabetes, will in the end developed type 2 diabetes over a period of 10 to 15 years, especially in the female who require insulin in pregnancy and the individuals who stay overweight after delivery. Ladies with gestational diabetes are routinely requested to go for an oral glucose resistance test around a month and a half, in the wake of bringing forth decide whether their diabetes has persevered post pregnancy, or if any confirmation, (for example, disabled glucose resilience) is available that might be a piece of information to a hazard for creating diabetes.

G. Prediabetes

The advancement of T2DM finishes diverse stages. Hindered fasting glucose and impaired glucose resistance are the fore-sprinters of future T2DM (altogether named as Prediabetes). These states incorporate an extent of individuals who have a place with the transitional gathering, whose glucose levels, despite the fact that don't meet the criteria for diabetes are, in any case too high to ever be viewed as typical. These patients may create diabetes in future if their glycemic status isn't kept up by alteration of way of life. Debilitated Fasting Glucose is available when the fasting level is $\geq 110\text{mg/dl}$ and $\leq 125\text{mg/dl}$ and the 2 hrs esteem is $< 140\text{mg/dl}$. Impaired Glucose Tolerance is available when the 2 hrs esteem is in the scope of $\geq 140\text{mg/dl}$ - $< 200\text{mg/dl}$ [2].

H. Traits of Diabetes

The traits for detecting the diabetes are not directly available in 70% of the cases where the level of blood glucose is higher. Generally, the detection of diabetes is coincidental and it is discovered when the test for a normal health is performed. It may be discovered during the medical test performed for employment or during test for Life Insurance application, etc. the common symptoms of diabetes are as follows

Raised urinal level

- Skin problems
- Excessive Hunger
- Weight loss
- Fatigue
- Excessive thirst
- Slow healing wounds
- Blurred vision

III. REVIEW WORK

Diabetes has influenced more than 246 million individuals worldwide with a lion's share of them being ladies. As per the WHO report, by 2025 this number will hope to ascend more than 380 million [4]. In one of the exploration paper Mukesh kumari and et al.



anticipating diabetes utilizing information mining strategies [5]. Veena Vijayan V. also, Aswathy Ravi kumar worked with information digging calculations for forecast and finding of diabetes mellitus [4] for distributed calculations we need multiple processors and large storage ,for that we have need of IAAS(This service demonstrate is not quite the same as the multi-occupancy display, as it goes for changing application programming engineering so various examples from different cloud clients can keep running on a single application [6] which provides these tools in cloud form. This paper talked about the Machine Learning systems to foresee diabetes chance.

A. Prognostic Steps

The indication of the diabetes is an increase in the level of blood glucose. This way a decision is made by deduction of glucose level in the bloodstream. If the level of fasting blood sugar is more than or equal to 126 mg/dl then it is an indication of diabetes. Otherwise, if an unordered sample of blood sugar is more than or equal to 200 mg/dl for more than one samples, then also it is an indication of diabetes.

Fasting Blood sugar level: If there is an increase in the level of fasting blood sugar then it can be deduced that a patient is suffering from diabetes. It is more reliable and reproducible than postprandial plasma glucose in light of the fact that there are more factor in the last mentioned, for example, timing and sugar stack. FPG might be less demanding to control with solutions than PPG. A medium-word fasting that is applicable for a range of 8 hours to 12 hours, is viewed as attractive. The level of Fasting blood sugar is specified to be more than or equal to 126 mg/dl by Standard health organisations, as indication of the diabetes and the level of 110 – 125 mg/dl have been named as disabled fasting blood sugar that refers to pre-diabetic state.

B. PP (Postprandial) blood sugar level

Here, the term PP refers to ‘after a supper’ and subsequently it alludes to blood sugar fixation postern nourishment admission. The suitable time to estimate the level of PP blood sugar is 2 hours after the starting of supper. The suggested PP blood sugar level of treatment is an estimation of <160mg/dl.

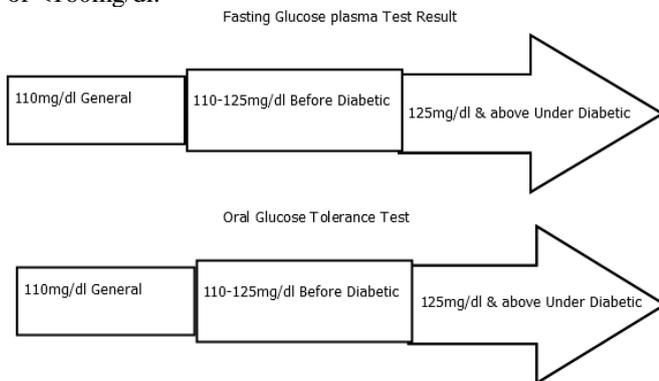


Figure 3: Identifying Traits by Blood Sugar Readings

C. .Test for oral sugar level range (OGTT)

This check-up is performed with fasting of 8 to 12 hours of break and the person might drink water only. The test for finding the level of fasting blood sugar is performed prior to feeding glucose. The person takes glucose (75 gm) mixed in water (250 to 300 ml). This level of glucose might take

approximately five minutes to dissolve. Another test can be performed after a period of two hours.

The detection of diabetes is done in the following manner: If the fasting blood sugar level is more than or equal to 126 mg/dl or 2-hour plasma glucose is ≥ 200 mg/dl, then it is an indication of diabetes.

Test-A1c: Check for Hemoglobin (HbA1c) [7]

RBCs are diffused alive in our body, approximately for a duration of 3 months. When glucose gets bounded intensely to the proteins (Haemoglobin), this is termed as glycosylated hemoglobin or hemoglobin A1c (HbA1c).

The deduction of the HbA1c contents, it is possible to find the level of sugar in the circulatory structure as far back as three months. The standard may be differ from 4%-5.6 % in different labs.The level of HbA1c is more than or equal to 8%, in case of deficiently abridged diabetes. This level is below 7%, in case of abridged diabetes, which could be less than 6.5% if properly monitored. The analysis of this level could prove beneficial because of information availability for duration of three months. Hence, this could lead to a rational and abiding deduction. In comparison to the previous estimations that are based on sugar level, this is a more reliable piece of information. Although, currently no fixed schemes are available to use this information for deductions about diabetes, but it gives a clear view of the status of the patient. Currently, this data is used like a standard device to make deductions for sugar level monitoring of a patient suffering from diabetes.

D. Prognosis for Diabetes- Gestational

a. Method based on 1-step

This method is used with fasting sugar level calculations (75 grams OGTT) for one/two hours at an interval of 24 to 28 weeks. This test is carried out for women and this can predict

Table 1: Specified values of the levels for Type-2 diabetes

| Level | Specified Value |
|-----------------|-----------------------------|
| General | 4.5% to 5.6% |
| Before Diabetic | 5.7% to 6.4% |
| Under Diabetic | Equal to and More than 6.5% |

Table 2: GDM (Gestational diabetes mellitus) determination made if PG esteems meet

| Duration | Quantity of Glucose in mg/dL | Quantity of Glucose in mmol/L |
|----------|------------------------------|-------------------------------|
| Fasting | 92 | 5.1 |
| 1 hour | 180 | 10.0 |
| 2 hour | 153 | 8.5 |

beforehand the cases of diabetes. This is performed with OGTT calculations, towards the beginning of the day.

b. Method based on 2-step

This method is used with non-fasting sugar level calculations (50 grams OGTT) for one hour at an interval of 24 to 28 weeks. This test is carried out for women and this can predict beforehand the cases of diabetes.



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This is performed with sugar level calculations (one hour duration) and if the level is more than or equal to 140 mg/dL (7.8 mmol/L). This test is further carried out for 100-g OGTT (Second stage), during fasting.

c. Diabetes screening technique

If you can test your blood sugar level yourself, this method could be a strong check and screening way for controlling diabetes. This is very useful for the patients who need insulin for remedy. This could give you a clear picture of blood sugar level and helps in controlling the effects of increase and decrease in the level.

Checking likewise empowers more tightly glucose control, which diminishes the long haul dangers of diabetic complications.

There are set of specifications and framing of schemes for checking blood sugar levels, the specific data useful for you could be collected from samples you have with your doctors or individual responsible for your care. It is advised not to share the devices, needles etc. with anyone, since it could transmit other diseases.

Table-3 GDM finding made when something like two Plasma Glucose levels meet

| Duration | Quantity of Glucose in mg/dL | Quantity of Glucose in mmol/L |
|----------|------------------------------|-------------------------------|
| Fasting | 95 or 105 | 5.3/5.8 |
| 1 hour | 180 or 190 | 10.0/10.6 |
| 2 hour | 155 or 165 | 8.6/9.2 |
| 3 hour | 140 or 145 | 7.8/8.0 |

Table 4: Routine monitoring blood Glucose screening checks while visiting the hospital/Laboratory for diabetes

| Parameter (%) | Controlled | Uncontrolled | Period |
|---------------|------------|-------------------------------|----------------------------|
| ($P_1 < 7$) | Yes | No | Every 3 months |
| ($P_1 < 7$) | No | Until target sugars achieved. | Every 2 weeks |
| ($P_1 < 7$) | Yes | No | 6-12 months |
| ($P_1 < 7$) | No | Until target sugars achieved. | Quarterly during 12 months |

(P_1 refers to the value of HbA1c.)

E. Logistic Regression (LR)

Strategic relapse is a sort of probabilistic measurable grouping model for investigating a dataset in which there are at least one free factor that decide the result. In calculated relapse, the reliant variable is parallel or dichotomous, that implies it just contains information coded as 1 (TRUE, achievement, pregnant, and so forth.) or 0 (Not True, hopelessness, not pregnancy, etc.). The calculated relapse produces the coefficients of an equation, to foresee a log containing changes in the likelihood of the quality of the normal intrigue[8][9].

F. Support Vector Machine (SVM)

It is a technique of machine-learning to get information regarding a hyper-plane and a group of a hyper-planes in high dimensional space. This hyper-plane can be utilized for

depiction. It is a type of directed-learning strategies, and extraordinary separation can be refined by the use of hyper-plane that has the best division to the closest preparing information which simulates stances of any class[10] At certain times, these sets are not directly distinguishable. A suitable strategy based on enhancing the SVM which is appropriate to handle dimensional and over fitting issue, should be designed [7, 8].

G. IBK

In Weka, closest neighbour characterization calculation is known as IBK (the IB remains for Instance-Based, and the K enables us to determine the quantity of neighbours to look at). IBK is a helpful information mining method, which enables us to use past information occurrences with known yield esteems to foresee an obscure yield estimation of another information pattern. It predicts exceptionally exact, however, regularly perform moderate, and in most of the cases, it performs well for a vast esteem value of K [11].

H. OneR

OneR, another way to say "One Rule", is a basic order calculation that creates a one-level choice tree. OneR can derive commonly straightforward, yet precise, characterization rules from an arrangement of occasions[12]. This is for building and utilizing a OneR classifier; at the end of the day, utilizes the base blunder property for forecast, undermining numeric qualities. It is observed that a basic arrangement rules strategy performs well on most of the regularly utilized datasets.

IV. MATERIALS AND METHODS

Diabetes has impacted in excess of 246 million people worldwide with a lion's offer of them being women. According to the WHO report, by 2025 this number will plan to climb in excess of 380 million [4]. In one of the investigation paper Mukeshkumari. envisioning diabetes using data mining systems[4]. Veena Vijayan V. additionally, AswathyRavikuma worked with data burrowing computations for estimate and finding of diabetes mellitus [10]. This paper discussed the Machine Learning frameworks to predict diabetes shot[10]

V. RELATED WORK

In literature, there are numerous ways of portraying prescient examination. It is inductive [10], it contains information, however, it permits the information lead the way. It utilizes neural registering, statics, machine-learning, computational science and man-made consciousness to investigate all information and find important connections and case studies. Prescient investigation is an arrangement of business insight (BI) advancements that reveal relationships and patterns inside vast volumes of information, which can be utilized to anticipate behaviour and occurrence. To make the things more clear, observe the Fig. 1. Machine-learning utilized by prescient investigation, is a strategy to prepare calculation which can foresee a yield in view of a few input esteem. This is based on connections and not on conclusions [13].



A. Predictive analytics

The previous studies show that there are broadly two main categories of discerning examination, for example, Controlled learning and Unsupervised learning [8, 10]. Controlled learning is a method of making farsighted models utilizing a course of action of recorded information and make prudent outcomes. Depictions are assembling, fall away from the faith and time-strategy examination where as in unsupervised learning does not utilize the ahead of time acknowledged outcome to assign attributes in a framework. This method uses illimitable principles of science. This is based upon processing information for packaged data or community information [10].

B. Application of predictive analytics

The applications of predictive analytics are Crime prevention, Intelligent transportation, Text mining, Fraud detection, Health care, Bio-informatics, Web based life and choice help [14], Credit card, Credit scores, Misrepresentation location, Sorting mail, Weather forecasting [5].

C. Type of Predictive Models

In last few years many types of predictive models have been proposed that are useful in different types of problem as Sparing expense, utilize a prescient model for enhancing income, returning venture and chance administration [5].

a. Business Rules

A business regulation is a regulation that characterizes or obliges some part of business and dependably sets out to either obvious or false[13]. Business rules are expected to affirm business structure or to control or impact the conduct of the business.

b. Classification and Decision Trees

A decision tree is one of the supporting tools that can be used in graphs as well as their all possible results, including outcomes, value of resource and utility. It is one the mechanism for displaying an algorithm.

c. Naive Bayes

In machine-learning, Bayes classifiers are a group of clear probabilistic classifiers in perspective of applying Bayes' speculation with strong flexibility suppositions between the features. The framework builds classifiers: models that distribute class names to issue cases, addressed as vectors of feature regards, where the class marks are drawn from some restricted set.

d. Linear Regression

A linear approach to model a relationship between dependent variable and independent variable.

| | | |
|-------|----------------------------|-----------|
| (vi) | Diabetes pedigree function | Numerical |
| (vii) | Age(years) | Numerical |

e. Logistic Regression

In insights, calculated relapse, or log it relapse, or log it display is a relapse demonstrate where the needy variable (NV) is all out or binary.

f. Neural Networks (NNs)

An Artificial Neural Network (ANN) is information dealing with perspective that is pushed by the way natural tangible frameworks, for instance, the brain, process information.

g. Support Vector Machines (SVMs)

SVM is a supervised learning model with related learning computations that analyse data used for request and backslide examination. A SVM maps input information vectors into a higher dimensional space, where an "ideal hyper plane" that isolates the information is developed. A SVM is a discriminative classifier formally characterized by an isolating hyper plane.

h. Natural Language Processing (NLP)

A field of artificial intelligence related with the interactions between computers and natural languages, i.e. how to program computers to process and analyze natural language.

D. Existing Predictive models

In [5] discussed the existing predictive models and their use

- **Optum Predictive Model (OPM):** The model is utilized for anticipate worker of the organization, willing to join optimum wellbeing administration programs.
- **Match.com:** Conduct demonstrating calculation as it gains from the conduct of comparative clients and factors and prescribes those locales to new clients who for a similar point on the web.
- **Netflix:** This type of algorithm calculates which movie enjoyed by viewer.
- **Santa Cruz's predictive policing program:** This calculation will break down and distinguish examples of past years wrong doing information and predicts regions and windows of time that are high in danger [15]
- **VISA:** This algorithm predicts the behaviour of the person.

Table-5 The Prima Indian datasets attributes

| S.NO | Name of Attribute | Type |
|-------|---|-----------|
| (i) | Plasma glucose focus a 2 hours in an oral glucose resistance test | Numerical |
| (ii) | Number of times pregnant | Numerical |
| (iii) | Diastolic blood pressure(mm Hg) | Numerical |
| (iv) | Triceps skin crease thickness(mm) | Numerical |
| (v) | 2 hour serum insulin(mu U/ml) | Numerical |

VI. CONCLUSION & FUTURE WORK

Diabetes is an incurable and fierce disease and if one suffers with it then it is not easily absolved. In this paper we have given causes, types, symptoms, healing-methods, and predictive models for the disease. A disease may not always be of the same category, some diseases are easy to cure and some are not. Thus these require additional time and effort for medication. This work is helpful to a team of Doctors in decisions making. Although, it is always not possible to confiscate the disease completely.



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In future machine learning techniques discussed above could be designed and extended using MATLAB, for prediction and preventing diabetes.

REFERENCES

1. M. Kumar, S. Arora, A. Pal, ... P. J.--A. I. J. of, and undefined 2016, "A Survey of Big Data Analytics in Healthcare," *indianjournals.com*.
2. World Health Organization., *Diet, nutrition, and the prevention of chronic diseases : report of a joint WHO/FAO expert consultation*. World Health Organization, 2003.
3. G. C. Weir and S. Bonner-Weir, "Five stages of evolving beta-cell dysfunction during progression to diabetes," *Diabetes*, vol. 53, no. suppl 3, pp. S16–S21, 2004.
4. J. Lee, B. Keam, E. Jang, M. Park, ... J. L.-O. public health and, and undefined 2011, "Development of a predictive model for type 2 diabetes mellitus using genetic and clinical data," *Elsevier*.
5. N. Jayanthi, B. Babu, N. R.-J. of B. Data, and undefined 2017, "Survey on clinical prediction models for diabetes prediction," *Springer*.
6. J. K. Verma and C. P. Katti, "Study of cloud computing and its issues: a review," *SmartCR*, vol. 4, no. 5, pp. 389–411, 2014.
7. W. H. Organization, "Use of glycated haemoglobin (HbA1c) in the diagnosis of diabetes mellitus. Abbreviated report of a WHO consultation 2011," *Geneva World Heal. Organ.*, 2013.
8. W. H. Organization, "Definition and diagnosis of diabetes and intermediate hyperglycemia. Report of a WHO/IDF consultation. 2006," *WHO Libr. Cat. Data*, 2016.
9. A. D. Association, "Standards of medical care in diabetes—2015 abridged for primary care providers," *Clin. diabetes a Publ. Am. Diabetes Assoc.*, vol. 33, no. 2, p. 97, 2015.
10. Y. Lee, H. Bang, D. K.-E. and Metabolism, and undefined 2016, "How to establish clinical prediction models," *synapse.koreamed.org*.
11. P. Johri, T. Singh, S. Das, S. A.-I. C. on, and undefined 2017, "Vitality of big data analytics in healthcare department," *ieeexplore.ieee.org*.
12. P. Johri, S. Arora, and M. Kumar, "Privacy Preserve Hadoop (PPH)—An Implementation of BIG DATA Security by Hadoop with Encrypted HDFS," 2018, pp. 339–346.
13. P. Leeflang, D. W.-I. journal of research in marketing, and undefined 2000, "Building models for marketing decisions: Past, present and future," *Elsevier*.
14. M. Ward, G. Grinstein, and D. Keim, *Interactive data visualization: foundations, techniques, and applications*. 2015.
15. P. Johri, T. Singh, ... A. Y.-I. T. and, and undefined 2017, "Advanced patient matching: Recognizable patient view for decision support in healthcare using big data analytics," *ieeexplore.ieee.org*.

AUTHORS PROFILE



Dr. Prashant Johri is working as Professor in School of Computing Science & Engineering, Galgotias University, Greater Noida, India. He completed his M.C.A. from Aligarh Muslim University and PhD in Computer Science from Jiwaji University, Gwalior, India. He has also worked as a Professor and Director (M.C.A.), Galgotias Institute of Management and Technology, (G.I.M.T.) and worked as a Professor and Director (M.C.A.), Noida Institute of Engineering and Technology, (N.I.E.T.) Gr. Noida. He served as Chair in many conferences and affiliated as member of program committee of many conferences in India and Aboard. He has supervised 2 PhD students and many M.Tech. students for their thesis. He published Number of research paper in Conferences and Journals and as a Book Chapters. He published Edited book in Springer. His area of research interests includes big data, data analytics, data retrieval and predictive analytics, information security, privacy protection, big data open platforms, Software Reliability, etc. He is actively publishing in these areas.



Mr. Lalit Kumar has MCA, M.Tech in Information Technology in his account. He is currently working as Assistant Professor in School of Computing Science & Engineering, Galgotias University, India. Earlier he worked as Assistant Professor in Lord Krishna College of Engineering and Institute, Professional & Excellence Management. He is pursuing PhD from School of Computing Science & Engineering, Galgotias University. His research area is Issues of big data in healthcare industry, Machine Learning, Big Data Analytics, Artificial Intelligence.



Dr. Avneesh Kumar is working as Associate Professor in School of Computing Science & Engineering, Galgotias University, Greater Noida, India. He completed his M.C.A. from Uttar Pradesh Technical University Lucknow and PhD in Computer Application from Jiwaji University, Gwalior, India. He has also worked as a Assistant Professor at INMANTEC Institutions, Ghaziabad. His research area is, Machine Learning, Big Data Analytics, Artificial Intelligence Software Reliability, etc. He served as Chair in many conferences and affiliated as member of program committee of many conferences in India and Aboard.



Mr. Vivek Sen Saxena is B-Tech and M-Tech. Currently Working as Assistant Professor at INMANTEC Institutions, Ghaziabad. He is pursuing PhD from School of Computing Science & Engineering, Galgotias University. His research area is Machine Learning implementation in healthcare industry, Big Data Analytics, Artificial Intelligence.