

## **Predictive Data Analytics Framework Based On Child And Pregnant Women Health Care Systems**

Mahesh Ashok Mahant<sup>1</sup>, P. Vidyullatha<sup>2</sup>

<sup>1</sup>Research Scholar, Department of Computer Science and Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, AP, India. maheshamahant@gmail.com

<sup>2</sup>Associate Professor, Department of Computer Science and Engineering, Koneru Lakshmaiah Education Vaddeswaram, AP, India. pvidyullatha@kluniversity.in

### **Abstract**

A potent technique for enhancing healthcare outcomes is predictive data analytics, especially for vulnerable groups like children and pregnant women. A strong framework that makes use of this technology can greatly improve the efficacy and efficiency of healthcare systems that are devoted to their welfare. The creation and use of such a framework are examined in this article, with an emphasis on how it might enhance resource allocation, preventative care, and general health equity. A predictive data analytics framework has great potential to enhance the healthcare of expectant mothers and children. In order to ensure responsible and successful implementation—which will ultimately result in improved health outcomes including a more equal healthcare system—it is imperative that the related difficulties and ethical issues be addressed. Proactive intervention and precise prediction are critical components of effective treatment. Timely and focused interventions are essential for improving health outcomes and lowering death rates for vulnerable groups, such as children and pregnant women. The creation and use of a predictive data analytics framework aimed at improving the efficacy and efficiency of healthcare systems catering to these populations is examined in this article. The framework forecasts possible dangers and optimizes resource allocation by utilizing easily accessible data. A potent tool for enhancing the health of expectant mothers and their unborn children is provided by this predictive data analytics system. The framework facilitates proactive risk assessment, tailored treatments, and efficient resource allocation by utilizing widely available data and cutting-edge machine learning techniques. In order to increase accuracy and generalizability across a range of populations, future research will concentrate on developing the prediction models and broadening the framework to include more data sources. The ultimate objective is to help lower rates of maternal and pediatric morbidity and mortality in order to create healthier communities.

**Keywords :** SVM Algorithm, NLP Algorithm, Machine Learning, Child Disease Identification, Alert Message to Pregnant Women.

### **Introduction**

India is World's second populated nation, about a fifth of global population. It is a huge challenge and a complex task to provide quality healthcare to everyone. According to World Health Organization (WHO) reports, a projected 5.2 million underneath five years expired in 2019, the vast majority of whom died from treatable and preventable diseases. Promoting good health and health for persons of any age is the United Nations' Sustainable Development aims. By the end of 2030, one exploit point for that aim is to lessen maternal deceases to 70 per millennium live births. Despite the development of health methods and global

advances in technology, some countries, particularly emerging countries, struggle to provide proper prenatal care.

This planned system provides information about the child and women's healthcare system, including vaccination timetables for their children, disease identification based on the child's symptoms, doctor detail information to the child's parents, and alter messages (healthy diet, exercise, physical activity; malaria and HIV prevention; blood tests, how much weight she should carry?, What fruits She should eat and avoid?) to pregnant women about their health.

It uses Aadhaar Verification to authenticate users, allows them to schedule vaccine appointments, and sends them timely updates and reminders about upcoming vaccinations.

The application of predictive data analytics provides a potent instrument that has the potential to improve healthcare for children and pregnant women. Machine learning algorithms are able to identify individuals who are at a high risk, predict probable problems, and optimize the utilization of resources by utilizing previous data[1-9]. This ultimately results in improved health outcomes and a reduction in death rates. This article provides an overview of a structure that can be used to create such a system.

### 1. The procedure of acquiring and integrating data:

Any predictive model that is going to be successful will have data that is both extensive and of high quality as its base. For this purpose, it is necessary to incorporate data from a variety of sources, including:

- Electronic Health Records(EHRs), are a source of information that includes a variety of data including patient demographics, medical records, diagnoses, treatments, and laboratory findings. To conduct an efficient analysis, it is essential to standardize the various electronic health record systems[10-15].
- Registries of births: These contain crucial facts on births, such as the gestational age, birth weight, and Apgar scores, and they provide valuable insights into the health of newborns.
- Health Surveys Conducted at the National and Regional Levels: The data collected from surveys at the population level can indicate patterns and risk factors within particular communities, which can then be used to inspire focused actions[16-19].
- Mobile Health (mHealth) Data: The data that is acquired through smartphone applications and wearable devices can provide real-time insights into the behavior and health state of patients. This is especially helpful for monitoring pregnant women at home[20-23].
- According to socioeconomic data, factors such as levels of education, financial hardship, and access to medical treatment all have a substantial impact on health outcomes. A more comprehensive picture of risk can be obtained through the incorporation of socioeconomic data.

### 2. The preprocessing of data and the engineering of features:

In order for raw data to be utilized for predictive modeling, it is frequently necessary to perform extensive preprocessing on it. This entails the following:

- The process of handling missing numbers, outliers, and irregularities in the data is called as "data cleaning."
- Transformation of data denotes to the procedure of translating data into formats that are suitable for ML algorithms (for example, normalization and standardization).
- To improve an accuracy of a model, feature engineering involves the creation of additional features based on current ones. Creating a composite risk score for preterm birth, for instance, in which numerous variables are combined to form the score[24-27].

### 3. The Process of Developing and Selecting Designs:

The prediction of medical results in pregnant women and children can be accomplished with the support of a number of different ML methods. The precise prediction task at hand and the qualities of the data both play a role in determining which method should be used[28-31]. Possible candidates include the following:

- When doing binary classification problems, such as predicting preterm birth, logistic regression is the method of choice.
- Support Vector Machines (SVM): For jobs involving classification as well as regression.

- There is a robust ensemble method known as Random Forest that frequently performs well in high-dimensional data scenarios.
- An additional powerful ensemble method that is well-known for its high level of accuracy is called Gradient Boosting Machines (GBM).
- Neural networks are capable of managing intricate relationships within the data, but they need to be tailored with great care.
- When selecting a model, it is important to do a thorough review using appropriate measures like accuracy, precision, recall, and F1-score. For the purpose of preventing overfitting and ensuring that model generalizes well to fresh data, cross-validation procedures are absolutely necessary.

#### 4. The Deployment and Monitoring of the Model:

It is necessary to implement the model into a clinical environment once it has been determined that it is appropriate. As a result, this may include incorporating the model into pre-existing electronic health record systems or developing a decision support tool on its own. To guarantee that the enactment of the model will continue to be dependable throughout time, continuous monitoring is essential. For the purpose of preserving accuracy and adapting to shifting patterns, it is required to perform regular updates with fresh data[32-36].

#### 5. Considerations of an Ethical Nature:

It is necessary to give significant consideration to the ethical implications before putting into action a framework for predictive analytics:

- Protecting privacy and security of patient info is of the highest importance. In order to ensure compliance with applicable legislation, such as HIPAA, it is necessary to implement stringent security measures.
- For example, models can inherit biases that are present in training data, which can possibly lead to inequities in healthcare access or outcomes. This phenomenon is known as algorithmic bias. To reduce the impact of bias, careful attention should be paid[37-40].
- Explainability and transparency: It is vital to have firm indulgent of the process by which the model generates its predictions. Techniques that utilize Explainable AI (XAI) have the possibility to improve clinical decision-making and build confidence [41-44].

The implementation of a predictive data analytics framework dedicated to the healthcare of pregnant women and children has the prospective to greatly enhance the outcomes of medical care. We are able to harness the power of data to establish a healthcare system that is more equitable and efficient for this vulnerable group if we take the time to thoroughly address the issues of data gathering, creating models, installation, and ethical considerations. It is undeniably essential for clinicians, data analysts, and policymakers to work together to fully realize the promise of this strategy[45-48].

#### **Literature Review**

Nita Syahputri, et al[49] says that, from birth onwards, infants then under age of five undergo continuous changes in their growth and progress. Due to parents' lack of knowledge, they frequently encounter obstacles when it comes to monitoring their children's growth and development. This System assists parents in observing the development of toddlers and makes it easier for parents to obtain information about infant health. Android serves as the foundation for this system. To improve the development of this system, it is suggested that video and photo features be added to support the application's complete information menu and development note menu. The system should be developed in a manner that allows it to run on a variety of mobile operating systems.

According to Gloren S. Fuentes, Grace Lorraine D. Intal [50] there are distinct stages of development that children go through as they grow up. Their health and safety are of the utmost importance at this time because they will have a significant impact on their formative years in the years following. There has always been a high volume of pediatric patients visiting the hospital for various reasons, including physical exams, immunizations, or even hospitalization. Child Health Monitoring System to secretive hospital to offer more efficient method of monitoring the health of children. This system uses SMS

notifications, health tips, electronic medical records, and report generation to keep track of patients' health. Notification via text message, health tips, electronic medical records, and the generation of report documents. In the future, we could develop an app for monitoring the health of children.

Anita Raj ,et al[51] India has highest proportion of minor girl's married than any other country in globe, growing societal and health risks to both spouses and their kids. While the measure of very young wives wedding has sloped down, further work is desired to hasten this sloping down and negative effects of rehearsal. Expanded intervention targets necessitate a more thorough identification of these targets. Least Absolute Shrinkage and Selection Operator or L-1 regularized Logistic Regression models; L2 regularized Logistic Regression or ridge models; and Neural Network models are used in this system.

Shirin Hasan, et al[52] India has a lot of children die because they don't have enough medical treatment. Developing countries like ours face big issues when it comes to making assured that children have way in to suitable healthcare and vaccination against disease that might be kept from taking place by vaccines. This illuminates the need and importance of having a cleverer system to enhance the circumstances. This system based on an Android device. This present application offers a system to store records, provide info and comfort paternities schedule vaccination schedules for their toddlers. The present application was implemented in Java. E-Vaccine was deliberate by Firebase which offers various services like database, authentication and storage etc. Every module contains a separate configuration for data storage on to server, for keeping handler data to a database, this application uses Firebase Firestore and for OTP verification Firebase authentication was used. With the swiftly growing use of Smartphone and internet, by such app is very appropriate way to handle immunization programs. In future, it might be enhanced to incorporate not only to child vaccinations, but also to adult vaccinations. Rendering to the desires of the healthcare system, improvements can be made to this app.

According to Mehrab Shahriar, et al [53] Malnutrition might be regarded as a major issue in a developing country such as Bangladesh. The prevention of child undernourishment is the most important investigation because today's children have a direct impact on Bangladesh's economic development. This system predicts malnourishment prominence of a 0-59-months old juvenile by a deep learning method of prognostic modeling on noteworthy malnutrition features. This system employs Artificial Neural Network (ANN) [54]. Future research will be more in-depth, and new knowledge might be learned, which is noval anxiety as a forthcoming emphasis in the arena of Artificial Intelligence.

Angelo M. & Yara Rodrigues [55] According to the United Nations (UN), lessening in Infant Mortality Rate(IMR) poses a defy for emerging countries and it represents one of the goals for this millennium. The objective of this research was to get through knowledge of the risk issues to which kids are unprotected in the first year of living that may leads to their expiry. The inspiration for their study is to suggest such methodology centered on AI to minimize IMR and relate this approach to information that had been proposed in May-2019 for Brazil Brazilian UHS collects data on birth and mortality in two separate repositories, therefore pretense defy in terms of associating the mortality of child to her or his birth. The goals of that article was: to introduce technique named RIGOR to pool these separate data sets, to apply KDD for the assortment and position of the sorts of newborns and to relate ML algorithm to forecast the life span of a newborn and so lessen Brazilian IMR. This system is important because it can help state of being healthy expert to make better decision, for example, conducting new test, giving medicines and performing physical therapy on new born infants. In prospect, they think to expand the usage of C5.0 algorithm to progress adaptive version; for instance, with every new record in database, the model will be retrained and retested.

Cristina Ardura-Garcia,et al[56] Globally, for children below age of 5 years, rotavirus infection is main cause of diarrhea-related illness and death. Rotavirus vaccination is present, yet many national immunization plans, particularly in more developed countries; do not include it in their plans. The objective this present systematic review is to examine the incidence and prevalence of health centers use for rotavirus gastroenteritis or RVGE for children below age of 5 years in more developed nations without presence of routine rotavirus vaccination. We look in Embase and MEDLINE from 1<sup>st</sup> January 2000 to 17<sup>th</sup> December 2018 for publishing report on prevalence and incidence about RVGE rotavirus gastroenteritis health center for children below age of 5 years: hospitalizations, emergency department visits or primary care, deaths and nosocomial infections. This present system only includes laboratory confirmed rotavirus infection, assumed

in highly developed countries without presence of rotavirus vaccination plan. Using a random effects model, this study was conducted. This present system summarized proportions of RVGE disease and incidence rates among all level of health center use from primary center to hospitalizations, deaths and nosocomial infections. This present system provides complete overview of the significance or load about rotavirus gastroenteritis in more developed nations without RV vaccination routine programs. By implementing standardized prospective methods over different countries, Researchers evaluate rotavirus related health center in future might get more robust result.

Joel Jaskari, et al[57] Preterm birth raises the risks of various complications; it is the main cause of deaths in kids below age of five. Low gestational age and low birth weight are connected with improved risk of deaths. In this study, we implement ML for estimation of prenatal deaths and prenatal morbidities of necrotizing enterocolitis, retinopathy of prematurity and bronchopulmonary dysplasia among low birth weight toddlers. This study presented systematic analysis of nine different classifier in the work of prenatal deaths, ROP detection NEC, and BPD using NICU dataset. This preprocessed datasets consist of time series of dissimilar lengths, regularized and irregular time series and time series with first six hours of interpretations excluded. This research uses logistic regression, linear discriminate analysis, quadratic discriminate analysis, K-NN, three different Gaussian processes, SVM, and random forest classifiers[58]. This study has some limitation. The dataset gathered in the same hospital, may be introduce challenges to generalization to another hospital settings with another devices for physiological signal measurements. This algorithm is evaluated in a retrospective way after the quantifies for a specific time are taken.

MirzaBalaj, et al[59], the higher the education level of parents, specifically women, the less likely their children are to die. They tried to figure out total reduction in below 5 mortality that are connected with increased motherly and of a father education, during separate age recesses. This present study is all-inclusive meta-analysis and global systematic review of all the previous research on effects of parents education on prenatal, below 5 mortality and infant, merged with fundamental analyses of DHS data. That study was using new mixed-efforts meta-regression models. In systematically measure the trans generational contribution of education for infant life span across the global level, this study is first effort to our knowledge. As per the result, lower parents and maternal education both are risk factor for child deaths, in spite of controlling for another family socioeconomic status maker. To accomplish Sustainable Development Goal target 3.2 of minimizing prenatal and child death, this present study gives robust proof for universal quality education.

From Kristina and Evgeniia [60], a learning of Russian arcade revealed that there were no systems in place that allows a pregnant woman's condition to be monitored outside of the territory of medicinal institutions. As a result, it is critical to develop an automatic system that permits doctor to obtain a pregnant woman's health status in real time and answer speedily when serious conditions arise. That proposed system for distant nursing of health condition of pregnant women composed of components-Server, knowledge sources, knowledge engineer, expert group, physician, physician's PC, prenatal woman and her smart phone. To access present health condition of that pregnant woman, automated questionnaire contains following four set of questionnaires. The first step called as registration step consists of questions-Individual information, prenatal period experience, Illnesses and heredity and Wicked habits. Decision tree based support tool that is employed to recognize logical uniformities in data. That proposed system is vital for patient who are living in the rural area and remote areas when to visit the prenatal hospital is impossible. This system helps to minimize the probability of critical cases and to improve the effectiveness of the medical service.

Ruyi Wang, et al's[61] study explains the need of concentrating to mental health of prenatal female, then built robot model which can monitor mental health of antenatal women and provides supportive advice. Prenatal mental health(PMH) issues are disorders that develop during pregnancy time and within 24 months of child's birth. A chatbot is a useful piece of technology. It can monitor medical health status of prenatal women in real time while collecting user health data via human-robot interaction. To trained the learning model, it employs SVM to analyzes the possibilities of anxiety, hypomania and depression of prenatal women. The major function of this chatbot is to examine the three main problems of prenatal mental health: anxiety, hypomania and depression which have the major influence on maternal and family relations, and also the more prevalence. Many psychological issues are possible to appear during the antenatal period. The

mother-child rapport is very important that was not focused in the design. In future design, those factors might be focused and optimized. In future development, robot can have video and voice analysis capabilities.

John Mark et al.[62] the dearth of health specialists, high-quality healthcare, and health centers that in countryside and isolated regions has led to high motherly and fetal death proportions in Philippines, particularly high-quality maternal and newborn kid healthcare facilities are more concentrated in urbanized areas. Four procedures were used for expansion of that proposed ML system – Decision Tree, Random Forest, K-Nearest Neighbor, and SVM.

Friskaktaviana, et al[63] This Android-based system can tell when pregnant women are at jeopardy of inhibiting and give them advice on how to avoid it. Forward-chaining is the algorithm it uses. That proposed risk of stunting with forward-chaining gave high accuracy of 89%. Data is collected from a group of 402 pregnant ladies in period from 2015 to 2019. Various variables were collected associated to risk factors for stunting in pregnant ladies, that is, hemoglobin, maternal age, parity, maternal arm circumference, height, intervals, risk and weight. In future, they can include humanoid in a loop feedback.

Nandita Bhan, et al[64] Due to minimum number of female physician in rural regions women's healthcare pursuing can compromise, where it is most needed. We looked at association between number of female doctor and child and pregnant women health service implementation in India. From the NFHS and India's facility survey and district level household, we examined cross sectional district level data from all 18 states include 256 districts. Evaluate measures involved skilled birth attendance, lady medical officers present at primary health Care ANC, infant post natal care, child immunization and maternal PNC. This research uses Multilevel regression models. In future work, upcoming national survey broad of physician data is able to give more understanding into these problems at national level.

Parisa Farzi, et al[65] Mother's health literacy during pregnancy demonstrates social and intellectual skills, representing their motivation and capability to obtain and apply valuable information to preserve and endorse the own health and their children. The purpose of the study was to see how mobile App-centered training affected health literacy amongst pregnant women. That study makes use of descriptive and inferential statistical methods for the statistical analysis was performed. The step-by-step method was used to implement a multiple regression model.

Sarah Meaney, et al[66] The facility of attention and care through pregnancy is community health anxiety for females' and kids' short and long-term health. Prenatal maternal stress can be elevated due to the transitional nature of pregnancy. That study will add to the levidence that pandemic's limitations had negative impact on social support and enlarged prenatal anguish. That study makes use of for quantitative examines, expressive statistics and multivariate study were used; for open-ended questionnaires, qualitative contents analysis was recommended.

Shivappriya, et al[67] Maternity complications can occur due to a lack of healthcare knowledge among those who are illiterate. Literacy rates and anaemia prevalence in pregnant women will be studied in That research, as well as how these factors influence labour difficulties as well as the health of new-born babies. The population, literacy rate, and number of stillborn children in each state of India were gleaned from the official government website. Case 1 has a literacy rate of more than 75%, while Case 2 has a literacy rate of less than 75%. It's done with two cases in mind: one with a literacy rate above 75%, and the other with one that falls below 75%.

VMethun, et al.[68] Vssarious family, biological, socio-economic and maternal are considered as influencing factors of children morbidity. That present study emphases on showings the issues that manage the occurrences of avoidable outbreaks of symptoms or disease among fewer than five children in Bangladesh. That study usage Logistic Classifier algorithm of Machine Learning. The data is collected from Multiple MICS. That study examines factors of socio-economic that influence under 5 child morbidity in Bangladesh. Limitation of That present learning is that significance of AUC is very low, which show that they needs to train present algorithm more. The most of results were concentrated on self-reports that are recollection of social desirability and vulnerable to prejudices. There is some variation in That analysis, which may be caused by more presence in model of that study of sspecific covariates associated to be found in prior studies. In future, they will train the model on different dataset and will try to increases the accuracy of the algorithm.

Patel, Namita, and Jeby Jose Olickal[69] In India, even though under-5 mortality has reduced, the goal is yet to be accomplished. The aim of that presented study secondary analysis was to discover the affect of child and maternal factors on the probability of mortality among under-5 children. That present study used Multistage clustering sampling. Child and maternal factors were analyzed individually using generalized linear regression analysis. The data is composed from National Family Health Survey-4. They will further implement some mechanisms to deal with retrospective nature of the data.

Bebortta, et al[70] For discovery of pathological syndromes in children, they used a comprehensive classification framework. To examine accuracy in forecast of several classification processes for sympathy of seven unlike pathological situations, they consider a real data set. ML algorithms like the K\_NN, K\*, RV, NN, RBF-SVM classifier, C4.5 Decision Tree algorithms for forecast of syndromes in children. It is useful in handling larger difficult medical records with negligible efforts and assisted timely identification and lessening in medical costs. It will be used for suggesting appropriate precautionary measures and for the early detection of diseases.

Chaudhuri, Saswati, and Biswajit Mandal[71] It is shown that a facility for methodical delivery is beneficial, but family unsuccessful to programme for it prominent to life span intimidating risks for both the kid and the mother. On contrary, insufficiency of appropriate post-natal care, lack of utilizations of suitable delivery care and further health corresponding problems could responsible for child mortality. They tend to acquire a dissimilar result when they consider health conclusion and how health responses are employed based on socio-demographic profile. The security of child and mother affects health of future generation. That turns out to predict next generation public health challenges which is healthcare system of economy can be worried with.

Nnodu, et al.[72] In sub-Saharan Africa, children death ratio belonging to sickle cell disease is supposed to be high but is non-quantified. In That present study, we evaluate the percentage of national under-five death attributable to sickle cell illness and in Nigeria the death of toddler with sickle cell illness. That present system used linear regression model and an empirical bayesian linear decomposition approach of machine learning. By identify That mechanism we can create software to find the causing of sickle cell and avoiding or treatment over it.

Rahman, et al [73] Pregnancy might be critical time in female's life and unique set of its own risks associated with every pregnancy. Any of those could influences both child's or mother's health severely. Emergency care, continuous health monitoring, financial and medical aid are very important throughout that stage and only collective work of health workers, doctors, volunteers and many organization could handle that challenge. That system is web application presented in cloud. That system works as mediator among pregnant woman and doctor, donor and children livelihood organizations by offering time reliable, efficient, secured and user-friendly platform. In future work we can automate donation process.

Beri, R., et al [74] A circumstance that happens due to a unexpected rise in blood pressure (BP) throughout 20 weeks of pregnancy is referred as Preeclampsia. It happens in 15-20 female out of 100 and becomes serious reason for child loss or maternal mortality. It is important to avert risks associated to preeclampsia by checking health attribute of individual in real time. That present system concentrate on IoT built health assessment framework to capture BP and other health related attribute of pregnant lady continuously. That present system provides real time propositions to patient for improving health conditions. In future work, technologies might be combined with that projected system to enhance network security.

Troyee, et al[75] Preg Care device is develop to monitor expecting mother's physiological parameter using android smart phones which is cost effective and completely non invasive device. That present system used python centered image processing algorithm for anemia recognition process. Several machine learning algorithm used for training and testing images.

Negash, et al[76] Ignored labor pain has different difficulty for both fetus and mother. Negative attitude and lack of awareness to labor painlessness are main issue to minimize labor pain and enhance normal consequences. The aim of that study was to evaluate attitude, related factors and acknowledgment of labor analgesia between pregnant ladies visited the prenatal center facility. Multivariable and Bivariate logistic regression was evaluated to recognize factors related with attitude and awareness regarding labor analgesia. In future work we try to make a separate study on the labor factor for helping pregnant women in their pregnancy.

Ettiyan, Rajkumar, and V. Geetha[77] In arena of Healthcare, Internet of thing is now increasingly being used. Particularly in nursing vital health related problem of fetuses and pregnant women. Female who are unsure regarding pregnancy may have a private healthcare report system advanced from the information of timeworn medical reports. The present study chosen here develop an effectual monitoring system for improving the privacy of verification of pregnancy or else it is important decisive and emotional factor in married female's life. Data collected from sensor. That system is supposed to be cost effective and user-friendly. There is also a facility in the current system to upgrade the system spontaneously. So That present study based on precise dependable IoT policies would be of support to pregnant ladies and kids too afore and afterward birth.

Rao, D., et al[78] Insufficiency of micronutrients including vitamin A, zinc, iodine and iron insufficiency are a widespread issues in resource constrained countries, especially among, nursing mothers, children under five and pregnant women. That study based on one step of the food value chain. That study evaluates food supply chain multidisciplinary through a case study in Sierra Leone, Makeni with the goal of narrating the potential loss of micronutrients at different step of the food value chain. The aim of that article is to depict potential method for root cause analysis for insufficiency of micronutrients to researchers and practitioners alike. Data is collected from interview, we show that present practices and policies in field like education, health, and indigenous methods of food preparation and economic consequences of widespread insufficiency of micronutrients across mothers and young children .In future work, based on That system we will find the Diets of the mother and children in another country.

## Proposed System

### a. System Architecture For Prenatal Care:

As shown in the figure, in prenatal care architecture, the patient information server as input to the system. After login into system details related to prenatal care are checked. Based on the month of pregnancy, alter messages (healthy diet, exercise, physical activity; malaria and HIV prevention; blood tests, how much weight she should carry?, What fruits She should eat and avoid?, are send via SMS or Email.

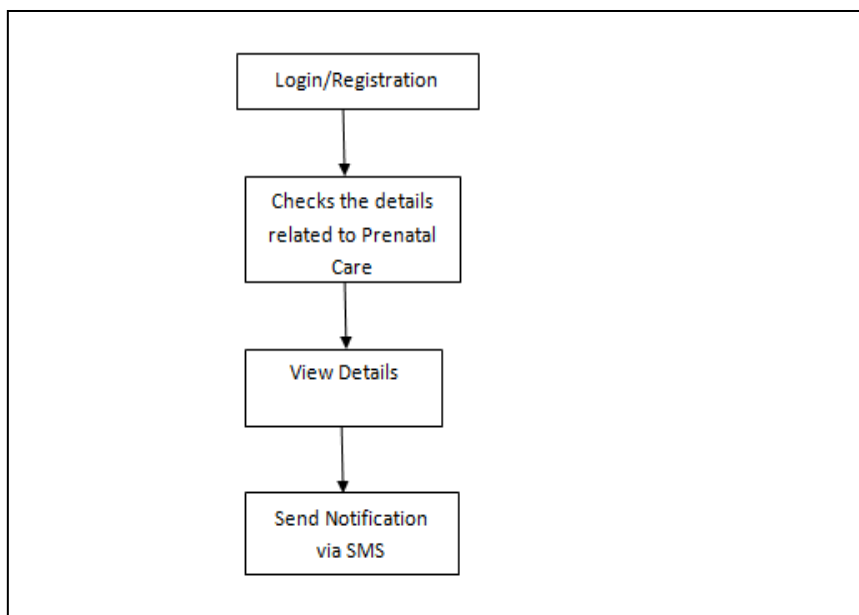
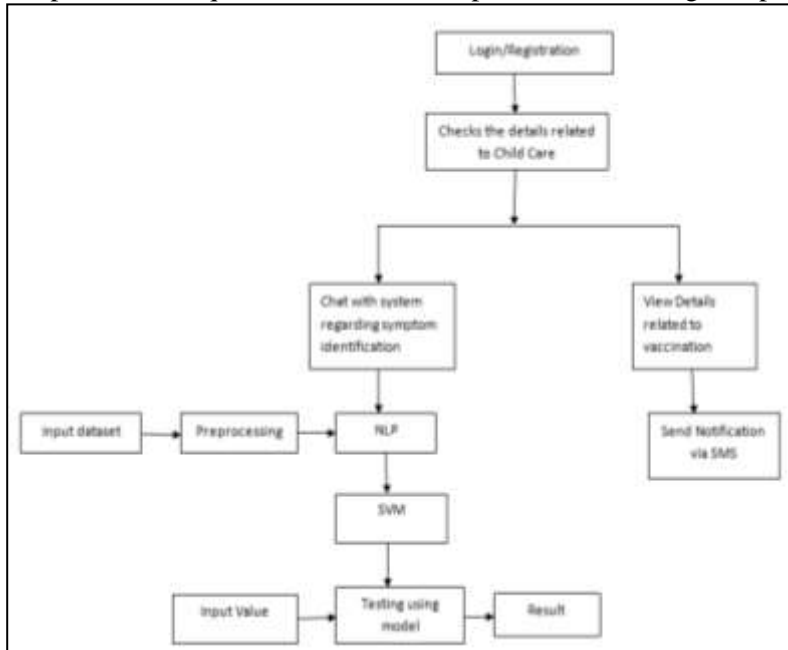


Fig. 1 : Pregnant Women care system

### b. System Architecture For Child Care:

As shown in the Figure 2, in child care architecture, the patient information server as input to the system. After login into system, details related to child care are checked. Based on the age of children, vaccination details are sending via SMS or Email. We're going to use a Chabot to have a conversation with the system

about the symptoms of a child's disease and offer suggestions/medicines. We'll use machine learning algorithms like NLP or SVM to implement Chabot. A Chabot is a text-based conversational agent that can respond to user queries. It also has the potential of serving as a personal medical assistant.



**Fig. 2 : System Architecture for Child care**

## Algorithm

### SVM Algorithm

SVM or Support Vector Machine is a general supervised learning process which is employed for regression and classification complications. However, it is mainly employed in ML for Classification problems.

The SVM algorithm will be used in the proposed system to classify diseases based on given symptoms.

SVM algorithm's goal is to make decision boundary or best line for classifying n-dimensional space into classes in way that in future easily place fresh data points in the true category. This best line is known as hyperplane.

We put every observation as point in n-dimensional space, in Support vector algorithm. Our task is to search an optimal decision boundary or hyperplane that effectively distribute the data elements into their classes respectively.

We will explain the two basic concepts used in the algorithm Hyperplane and the support vector.

### Support Vectors:

The data points that are closest to hyperplane and influence the orientation and position of hyperplane are support vectors. One has to pick hyperplane, for whom the margin, that is the distance between support vectors and hyperplane is concentrated. Even a small interference in the place of support vectors can change the hyperplane.

### Hyperplane:

It is decision boundary that separates 2-classes in SVM. A data point presents on each side of the hyperplane may be featured to another classes. The number of input attribute in the dataset is the dimension of the hyperplane. The hyper-plane will be a line if we have two input attribute. Similarly, it can converted into two-dimensional plane if the number of attribute is three.

**NLP:**

NLP or Natural Language Processing is a computer "programme" that reads, analyses, understands, and derives meaning from human language. NLP is the way when it comes to understanding human language.

NLP will be used to analyze the user's input text. This is, in fact, a user-initiated conversation or statement. Prior to being fed to the chatbot, text will be processed by this layer.

In NLP, human language is split into pieces in a way that the meaning of word and grammatical structure of sentences can be analyzed and understood in context. This assist computer understands and read spoken or written text in the similar way as humans.

Following are some NLP fundamental pre-processing tasks data experts require to do before NLP tools may make sense of humanoid language:

- **Tokenization:** split down text into tokens, single clauses or smaller semantic units
- **Part-of-speech-tagging:** marking up words as verbs, nouns, adverbs, pronouns, adjectives, etc
- **lemmatization and Stemming :** standardizing words by minimizing them to their root forms
- **Stop word removal:** filtering out similar words that add few or no unrepeatable information, for example, articles and prepositions (to, at, the, a).

**Advantages**

The main advantage of this system is, we are trying to reduce death ratio of Childs as previously described by WHO. We try to make aware about child and pregnant women healthcare system in rural areas and in urban areas. So that they become literate and should the take care of their baby child. By using child health care system we try to give some remedies and doctor specifies info to parentages of child, specific about the disease of the child. So that child gets proper treatment from the medical agencies. This is most efficient framework system which is of low cost effective.

**Disadvantages**

This framework is having least performance and more time consuming. More memory space is required for storing pregnant women and child health care system database. More human efforts are required to bring this framework in the real life health care system. More efforts are required to upgrade the child health care system for new symptoms and prediction of new disease.

**Applications**

This framework can be installed in every hospital and provide health care services to the every child and pregnant women in the society. Pregnant women should take number of benefits from this framework. Parents of the child take the right information from this health care framework and take proper treatment on their child disease.

**Conclusion**

In this paper, we design and develop a system for continuously observing health of pregnant women from first month of pregnancy to childbirth. We also provide better child health care and child monitoring. This study will employ a machine learning approach to address a problem in existing health systems caused by insufficient hospital innervations as well as high mortality rates among children under the age of five. In both rural areas and urban areas, we are attempting to reduce the rate of death. This proposed system is used to make the vaccination management method easier for authorities, to identify the child disease centered on given symptoms, to provide the doctor with information details of that disease to the child's parent and to provide precautionary care to pregnant women based on monthly instructions.

**Future Scope**

In future work we can implement same framework for healthcare of senior citizen.

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