IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

ISO 3297:2007 Certified ⁜ Impact Factor 8.102 ⁜ Peer-reviewed / Refereed journal ⁜ Vol. 12, Issue 5, May 2023

DOI: 10.17148/IJARCCE.2023.12525

FETAL HEALTH CLASSIFICATION USING MACHINE LEARING

Ms. Swarna Lakshmi[1], Abinaya S[2], Eswari S [3], Keerthana B[4]

Assistant Professor, DMI College of Engineering, Chennai, Tamil Nadu[1]

Students, DMI College of Engineering, Chennai, Tamil Nadu[2-4]

Abstract: Health complications during the gestation period have evolved as a global issue. These complications sometimes result in the mortality of the fetus, which is more prevalent in developing and underdeveloped countries. The genesis of machine learning (ML) algorithms in the healthcare domain have brought remarkable progress in disease diagnosis, treatment, and prognosis. Around 800 women die every day due to pregnancy and childbirth-related issues. Maternal health and fetal health are closely associated with each other Every year approximately 3 million new born babies die because of miscarriage So there is a need for proper care including the prediction of risk levels before, during pregnancy for the safety of both mother and child. Data mining is a commonly used technique for processing enormous data. Researchers apply several data mining and machine learning techniques to analysis huge complex data, helping health care professionals to predict fetal health. In this project we used different algorithms are compared and the best model is used for predicting the fetal health.

Keywords: Machine learning, Fetal health

I. INTRODUCTION

Machine learning is to predict the future from past data. Machine learning (ML) is a type of artificial intelligence (AI) that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of Computer Programs that can change when exposed to new data and the basics of Machine Learning, implementation of a simple machine learning algorithm using python. Process of training and prediction involves use of specialized algorithms. It feed the training data to an algorithm, and the algorithm uses this training data to give predictions on a new test data. Machine learning can be roughly separated in to three categories. There are supervised learning, unsupervised learning and reinforcement learning. Supervised learning program is both given the input data and the corresponding labelling to learn data has to be labelled by a human being beforehand. Unsupervised learning is no labels. It provided to the learning algorithm. This algorithm has to figure out the clustering of the input data. Finally, Reinforcement learning dynamically interacts with its environment and it receives positive or negative feedback to improve its performance.

II.METHODOLOGY

Among the machine learning techniques fetal heath classifier, XGboost, k-nn, and MLP classifier are powerful supervised learning models. Both are applicable and used for classification problems. the heath of fetal algorithm is approximately 100 times faster than other algorithms and best working for classification problems

Dataset Collection

The data set collected for predicting given data is split into the Training set and the Test set. Generally, 7:3 ratios are applied to split the Training set and Test set. The Data Model which was created using fetal heath, logistics, XGBoost algorithms, and Support vector classifier (SVC) are applied to the Training set and based on the test result accuracy, Test set prediction is done...

Data Pre-processing

The data which was collected might contain missing values that may lead to inconsistency. To gain better results data needs to be preprocessed to improve the efficiency of the algorithm. The outliers have to be removed and also variable conversion needs to be done.

Data visualization

Data visualization is an important skill in applied statistics and machine learning. Statistics does indeed focus on quantitative descriptions and estimations of data. Data visualization provides an important suite of tools for gaining a qualitative understanding. This can be helpful when exploring and getting to know a dataset and can help with identifying

DOI: 10.17148/IJARCCE.2023.12525

patterns, corrupt data, outliers, and much more. With a little domain knowledge, data visualizations can be used to express and demonstrate key relationships in plots and charts that are more visceral and stakeholders than measures of association or significance. Data visualization and exploratory data analysis are whole fields themselves and it will recommend a deeper dive into some of the books mentioned at the end

XGBOOST

The XGBoost (eXtreme Gradient Boosting) is a popular and efficient open-source implementation of the gradient-boosted trees algorithm. Gradient boosting is a supervised learning algorithm that attempts to accurately predict a target variable by combining an ensemble of estimates from a set of simpler and weaker models. It performs well in machine learning competitions because of its robust handling of a variety of data types, relationships, distributions, and the variety of hyperparameters that you can fine-tune. You can use XGBoost for regression, classification (binary and multiclass), and ranking problems. You can use the new release of the XGBoost algorithm either as an Amazon SageMaker built-in algorithm or as a framework to run training scripts in your local environments. This implementation has a smaller memory footprint, better logging, improved hyperparameter validation, and an expanded set of metrics than the original versions. The current release ofSageMaker XGBoost is based on the original XGBoost versions 1.0, 1.2, 1.3, and 1.5.

Support Vector classifier

A support vector machine (SVM) is machine learning algorithm that analyzes data for classification and regression analysis. SVM is a supervised learning method that looks at data and sorts it into one of two categories. An SVM outputs a map of the sorted data with the margins between the two as far apart as possible. SVMs are used in text categorization, image classification, handwriting recognition and in the sciences. A support vector machine is a supervised learning algorithm that sorts data into two categories. It is trained with a series of data already classified into two categories, building the model as it is initially trained. The task of an SVM algorithm is to determine which category a new data point belongs in. This makes SVM a kind of non-binary linear classifier.

AdaBoost

AdaBoost is a type of algorithm that uses an ensemble learning approach to weight various inputs. It was designed by Yoav Freund and Robert Schapire in the early 21st century. It has now become somewhat of a go-to method for different kinds of boosting in machine learning paradigms. AdaBoost also presents a particular philosophy in machine learning – as an ensemble learning tool, it proceeds from the fundamental idea that many weak learners can get better results than one stronger learning entity. With AdaBoost, machine learning experts are often crafting systems that will take in a number of inputs and combine them for an optimized result. Some take this idea to a further extent, talking about how AdaBoost can command "armies of decision stumps" that are essentially less sophisticated learners employed in large numbers to crunch data where this approach is seen favorably over using a single classifier.

III. MODELING AND ANALYSIS

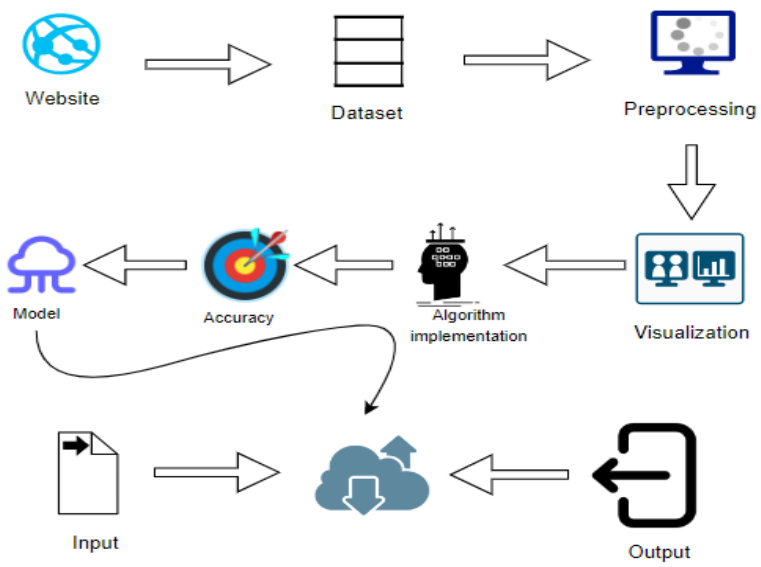

Figure 1: System architecture.

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

ISO 3297:2007 Certified ⁜ Impact Factor 8.102 ⁜ Peer-reviewed / Refereed journal ⁜ Vol. 12, Issue 5, May 2023

DOI: 10.17148/IJARCCE.2023.12525

IV. RESULTS AND DISCUSSION

The analytical process started with data collection and processing, analysis, and finally model building and evaluation. The best accuracy on a public test set of higher accuracy score algorithms will be found. The founded one is used in the application which can help to find the Fetal health

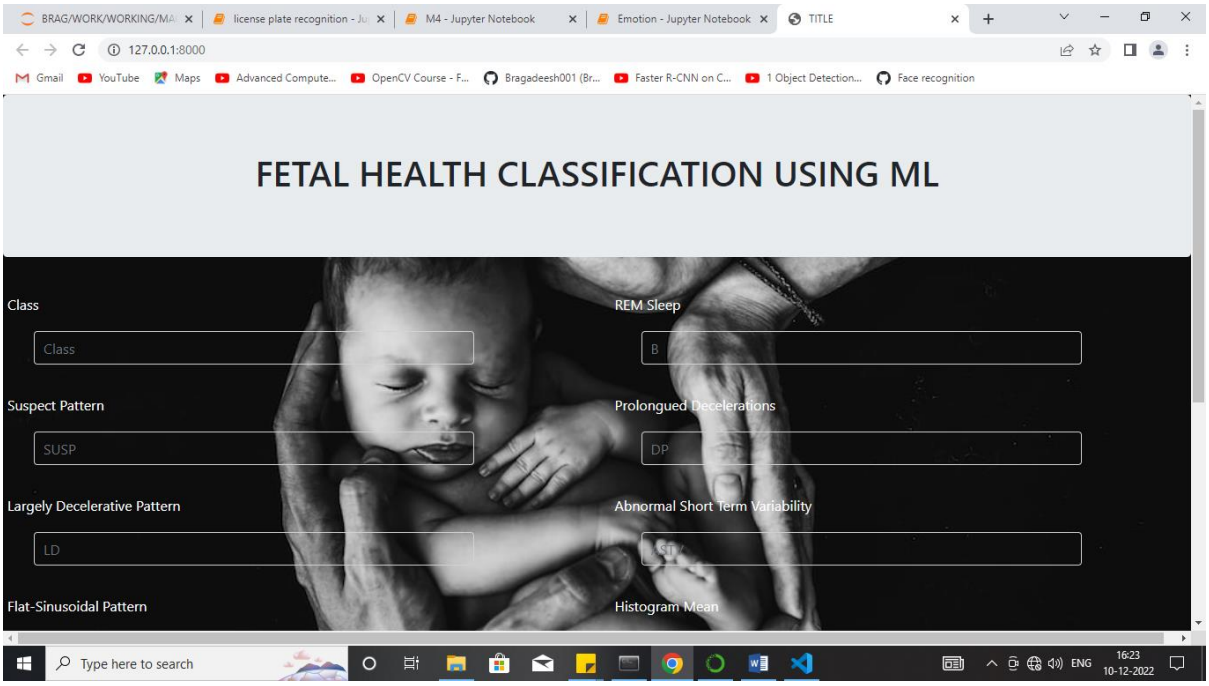

Figure 2: HOME PAGE

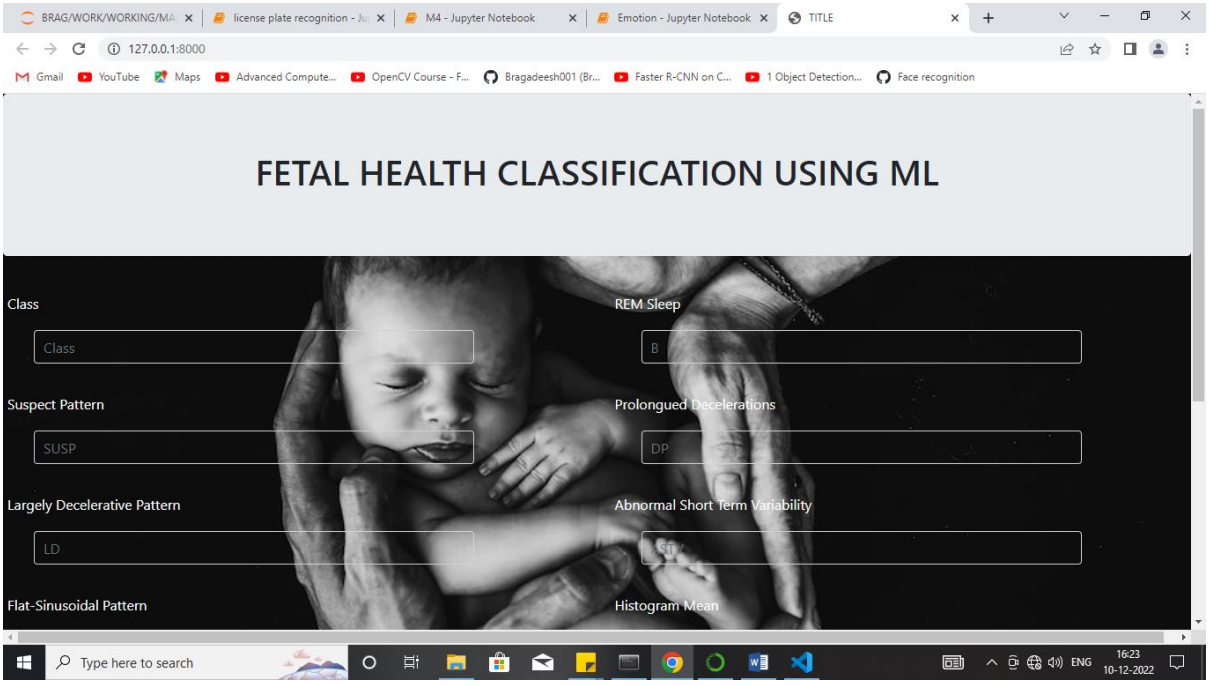

Figure 3: result page

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified ⁜ Impact Factor 8.102 ⁜ Peer-reviewed / Refereed journal ⁜ Vol. 12, Issue 5, May 2023
DOI: 10.17148/IJARCCE.2023.12525

V.CONCLUSION

The analytical process started from data cleaning and processing, missing value, exploratory analysis and finally model building and evaluation. The best accuracy on public test set of higher accuracy score algorithm will be find out. The founded one is used in the application which can help to find the health of the fetal.

FUTURE WORK

In this project's future work, we have Deployed the project in the cloud. and To optimize the work to implement in the IOT system.

REFERENCES

[1] F.-T. Lee, M. Seed, L. Sun, and D. Marini, *Fetal brain issues in congenital heart disease*. 2020.
[2] M. Seed, J. F P van Amerom, S.-J. Yoo, B. Al Nafisi, L. Grosse- Wortmann, E. Jaeggi, M. S. Jansz, and C. K. Macgowan, "Feasibility of quantification of the distribution of blood flow in the normal human fetal circulation using CMR: a cross-sectional study," *Journal of Cardiovascular Magnetic Resonance*, vol. 14, no. 1, p. 79, Nov. 2012.
[3] M. Prsa, L. Sun, J. van Amerom, S.-J. Yoo, L. Grosse-Wortmann, E. Jaeggi, C. Macgowan, and M. Seed, "Reference ranges of blood flow in the major vessels of the normal human fetal circulation at term by phase-contrast magnetic resonance imaging," *Circ Cardiovasc Imaging*, vol. 7, no. 4, pp. 663–670, Jul. 2014.
[4] M. Markl, A. Frydrychowicz, S. Kozerke, M. Hope, and O. Wieben, "4D flow MRI," *Journal of Magnetic Resonance Imaging*, vol. 36, no.5, pp. 1015–1036, 2012.
[5] A. Piontelli, *Development of Normal Fetal Movements: The Last 15 Weeks of Gestation*. Mailand: Springer-Verlag, 2015.
[6] K. Haris, E. Hedström, S. Bidhult, F. Testud, N. Maglaveras, E. Heiberg, S. R. Hansson, H. Arheden, and A. H. Aletras, "Self-gated fetal cardiac MRI with tiny golden angle iGRASP: A feasibility study:Self-Gated Fetal Cardiac MRI With iGRASP," *J. Magn. Reson. Imaging*, vol. 46, no. 1, pp. 207–217, Jul. 2017.
[7] D. S. Goolaub, C. W. Roy, E. Schrauben, D. Sussman, D. Marini, M. Seed, and C. K. Macgowan, "Multidimensional fetal flow imaging withcardiovascular magnetic resonance: a feasibility study," *Journal of Cardiovascular Magnetic Resonance*, vol. 20, no. 1, p. 77, Nov. 2018.