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Predicting Daily Patient Hospital Visits Using Machine Learning

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Abstract : The study aims to build user-friendly software to understand patient arrival patterns and compute the number of potential patients who will visit a particular health facility for a given period by using a machine learning algorithm. The underlying machine learning algorithm used in this study is the Support Vector Machine (SVM). Accurate prediction of patient arrival allows hospitals to operate more effectively, providing timely and efficient care while optimizing resources and improving patient experience. It allows for better allocation of staff, equipment, and other resources. If there's a projected surge in patients, additional staff or resources can be allocated to handle the influx, preventing bottlenecks or delays in care. Understanding patient arrival patterns can also help streamline processes to minimize waiting times for patients and ensure timely access to care for patients in need. Another big advantage of using this software is adhering to strict data protection regulations such as the Health Insurance Portability and Accountability Act (HIPAA) in the United States as the hospital will not have to share the data with any third party or upload it to the cloud because the software can read data locally from the machine. The data needs to be arranged in. a particular format and the software will be able to read the data and provide meaningful output. Using software that operates locally can facilitate compliance with these regulations by minimizing data exposure. Keeping patient data within the hospital's local systems reduces the risk of unauthorized access or breaches associated with transmitting data over networks or storing it in external servers. This can help maintain the confidentiality and integrity of sensitive patient information. Historical patient data is used in this study. The input variables used to train the model include patient age, time of day, day of the week, seasonal variations, and local events. The algorithm uses a Supervised learning method to optimize the objective function and find the global minima. The algorithm stores the values of the local minima after each iteration and at the end compares all the local minima to find the global minima. The strength of this study is the transfer function used to calculate the number of patients. The model has an output accuracy of >95%. The method proposed in this study could be used for better management planning of personnel and medical resources.

Keywords : machine learning, SVM, HIPAA, data
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