**Machine Learning Based Patient**

**Classification In Emergency Department**

This work contains the classification of patients in an Emergency Department in a hospital according to their critical conditions. Machine learning can be applied based on the patient’s condition to quickly determine if the patient requires urgent medical intervention from the clinicians or not. Basic vital signs like Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Respiratory Rate (RR), Oxygen saturation (SPO2), Random Blood Sugar (RBS), Temperature, Pulse Rate (PR) are used as the input for the patients’ risk level identification. High-risk or non-risk categories are considered as the output for patient classification. Basic machine learning techniques such as LR, Gaussian NB, SVM, KNN and DT are used for the classification. Precision, recall, and F1-score are considered for the evaluation. The decision tree gives best F1-score of 77.67 for the risk level classification of the imbalanced dataset. Index Terms—machine learning, classification, patients, risk level, healthcare, triage.

**Existing System**

The existing system for machine learning based patient classification in emergency department involves the following steps:

1. **Data collection and preparation:** The system collects patient data, including vital signs (e.g., blood pressure, heart rate, respiratory rate, temperature, oxygen saturation), demographic information, medical history, and presenting symptoms. This data can be gathered from various sources, including electronic health records (EHRs), wearable devices, and manual input by medical staff.
2. **Feature selection**: Feature selection involves selecting and preprocessing relevant features from the collected data. Feature selection may include extracting or transforming variables to make them suitable for machine learning algorithms..
3. **Model training**: Train the selected models using the training dataset.Tune hyperparameters using techniques like grid search or randomized search to optimize model performance.
4. **Model evaluation**: The trained model is evaluated on a held-out test set to assess its performance. The evaluation metrics typically include accuracy, precision, recall, and F1 score.
5. **Model deployment**: Once the model is evaluated and deemed to be performing well, it can be deployed to production for patient classification in emergency department prediction.

**Proposed System**

The proposed system employs various machine learning algorithms to build a system that classifies patients into different risk categories based on their basic vital statistics.

We have considered 2 classes according to the patients risk level

Class 1: high risk level and

class 0: low risk level.

**Advantages in the proposed system:**

**Faster Triage:** Machine learning can quickly assess and classify patients based on their critical conditions and urgency, helping medical staff prioritize care for those who need it most urgently. This can lead to faster treatment for high-risk patients.

**Improved Patient Outcomes:** Faster and more accurate patient classification can lead to better outcomes, particularly for critical cases that require immediate attention.

**Patient Safety:** Faster triage and identification of high-risk patients enhance patient safety by ensuring that critical cases receive immediate attention.

**Emergency Planning**: Historical data and insights generated by the system can aid in emergency planning and resource allocation during disasters or crises.

**Scalability:** It can handle a large volume of patient data and adapt to varying patient loads, making it suitable for busy Emergency Departments.

**SYSTEM REQUIREMENTS:**

**HARDWARE REQUIREMENTS:**

* System : Intel Core i7.
* Hard Disk : 1TB.
* Monitor : 15’’ LED
* Input Devices : Keyboard, Mouse
* Ram : 8GB.

**SOFTWARE REQUIREMENTS:**

* Operating system : Windows 10.
* Coding Language : Python
* Tool : PyCharm, Visual Studio Code
* Database : SQLite

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