**Problem Statement**: Prediction of Kidney Disease Stage using DM Algorithms.

**Idea**: Kidney Disease Prediction using various Machine Learning Algorithms as Support Vector Machine, Random Forest, Artificial Neural Networks and identifying the accuracy variations for each algorithm.

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**About:**

A global health problem which is steadily growing is [Chronic kidney disease](https://www.sciencedirect.com/topics/medicine-and-dentistry/chronic-kidney-disease) (CKD). It is a chronic condition associated with increased morbidity and mortality, a high risk of many other diseases including cardiovascular disease, and high health care costs. Over two million people worldwide receive dialysis or [kidney transplant](https://www.sciencedirect.com/topics/medicine-and-dentistry/kidney-graft) treatment to stay alive, yet this number may represent only 10% of people who need treatment to live. The majority of the 2 million people who receive treatment for kidney failure are in only five relatively wealthy countries, which represent 12% of the global population. By comparison, only 20% of the world's population is treated in about 100 developing countries, and they represent almost half the global population. Annually, more than one million people in 112 lower-income countries die from untreated kidney failure, due to the huge financial burden of dialysis or [kidney transplantation](https://www.sciencedirect.com/topics/medicine-and-dentistry/kidney-transplantation) treatment .

Thus, there is significant importance in the early detection, controlling, and managing of the disease. It is necessary to predict the progression of CKD with reasonable accuracy because of its dynamic and covert nature in the early stages, and patient heterogeneity. CKD is often described by severity stages. Clinical decisions are influenced by the stage, whether a patient is progressing, and the rate of progression. Also, defining the disease stage is quite crucial as it gives several indications that support the determination of required intervention and treatments.

**Inspiration:**

Machine learning algorithms have been used to predict and classify in the healthcare field. Yu have used the Support Vector Machine Algorithm to classify and predict diabetes and pre-diabetes patients, and the results show that SVM is useful to classify patients with common diseases. Similarly, Magnin have classified Alzheimer's disease by using a Support Vector Machine (SVM) to analyze whole-brain anatomical magnetic resonance imaging (MRI) for a set of patients, and the results shows that SVM is a promising approach for Alzheimer's disease early detection. Dessai have done heart disease prediction using the Probabilistic Neural Network Algorithm, Decision tree Algorithm, and Naïve Bayes Algorithm, and PRNN provides the best results compared with other algorithms for heart disease prediction. Cao have done prediction of HBV-induced liver cirrhosis using the Multilayered Perceptron (MLP) Algorithm and the results shows that the MLP classifier gives satisfactory prediction outputs for liver disease, mostly in HBV-related liver cirrhosis patients.

**Approach:**

Data Mining was utilized in our study because it is a process of identifying novel, potentially useful, valid, and ultimately understandable patterns in data. Supervised and unsupervised learning techniques are used for data mining classification. A “supervised” learning technique requires the building of a model based on previous performance analysis and is used in both medical and clinical research for classification, statistical regression, and association rules. On the other hand, the “unsupervised” learning technique is not guided by prior analysis and does not create a pre-analysis hypothesis. A model can be constructed based upon the results and is useful for clustering.

Three different types of the most used artificial neural network algorithms and support vector machine algorithms have been used for this study, to determine which algorithm will give the best classification results, to identify the stage of chronic kidney disease, based on patient clinical and laboratory data.

**Dataset Sources:**

* Kaggle

**Tools:**

* Jupyter, Google-Colab

**Frameworks:**

* Tensorflow
* Sklearn
* Pandas
* Numpy

**Algorithms:**

* Support Vector Machine
* Artificial Neural Network
* Random Forest

**Data Flow Diagram:**

**Diagram

Description automatically generated**

**Conclusion:**

***To obtain the best fit model which can detect Chronic kidney Disease with maximum accuracy.***