**"**Kidney disease Classification using Deep Learning**"**

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Problem Statement**:**

A major health concern that affects millions of people globally is kidney disease. To stop progression and enhance patient outcomes, early detection and management are essential. Conventional diagnostic techniques can be costly, time-consuming, and intrusive. Because early-stage kidney disease has modest symptoms and no identifiable biomarkers, it can be challenging to diagnose. The current diagnostic instruments might not possess sufficient sensitivity or specificity to evaluate individual risks. It's still difficult to forecast how a disease will progress and to provide tailored treatment regimens.

**I have 3 types of images in my ct scan images of kidney dataset. Three types of images are Normal, which is healthy one and unhealthy one images are image which are having stone and tumor images in kidney. I want to do a deep learning project in which I want to run my models on these images and classify these images according to their labels. The system should classify the images into three categories: "Normal", "Stone", and "Tumor". This system will be integrated into a web or mobile application, allowing users to upload CT scan images of kidneys and receive instant diagnosis regarding the health status of the kidneys.**

This project proposes a **Convolutional Neural Network (CNN)-based deep learning model** to address the limitations of conventional kidney disease diagnosis. By leveraging the model's ability to learn complex patterns from medical data, we aim to:

* **Improve the accuracy and efficiency of early-stage kidney disease detection.**
* **Reduce the reliance on expensive and intrusive diagnostic procedures.**
* **Develop a framework for personalized risk assessment and treatment planning.**

This approach holds the potential to revolutionize kidney disease diagnosis and management, leading to improved patient outcomes and a more sustainable healthcare system.

**Key Challenges:**

 **Model Challenges:**

* Choosing the right model architecture for complex medical data.
* Handling missing values and feature engineering.
* Balancing interpretability with accuracy.

 **MLOps Challenges:**

* Tracking experiments and model versions.
* Reproducing results and deploying the model effectively.

Expected Outcome**:**

So we want to develop a deep learning-based system for the early detection, prognosis, and personalized management of kidney disease. This system should:

**Accurately detect kidney disease** at early stages using various data sources like images..

**Predict disease progression** and risk of complications for individual patients.

 **Accurate prediction:**

* Develop a model that achieves high accuracy and generalizability on unseen data.
* Compare different model architectures and identify the best performing one.

 **Interpretable results:**

* Understand the factors contributing to kidney disease predictions.

 **Robust and reliable pipeline:**

* Implement a reproducible workflow using MLflow for experiment tracking and DVC for version control of code and data.
* Demonstrate easy deployment and monitoring of the model in a production environment.