🧬 Chronic Kidney Disease (CKD) Predictor App - Case Study

An interactive machine learning web app using **Streamlit** to predict Chronic Kidney Disease (CKD) from medical features.

You can View it on Github: GitHub Link CKD

You can also View the Live Demo on Streamlit app: Streamlit App

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About Dataset

Overview

This dataset contains detailed health information for 1,659 patients diagnosed with Chronic Kidney Disease (CKD). The dataset includes demographic details, lifestyle factors, medical history, clinical measurements, medication usage, symptoms, quality of life scores, environmental exposures, and health behaviors.

Table of Contents

- Patient Information
- Medical History
- Clinical Measurements
- Medications

- Symptoms and Quality of Life
- Environmental and Occupational Exposures
- Health Behaviors
- Diagnosis Information

Patient Information

- **PatientID:** Unique identifier (1–1659)
- **Age:** 20–90 years
- **Gender:** 0 = Male, 1 = Female
- **Ethnicity:** 0: Caucasian, 1: African American, 2: Asian, 3: Other
- **SocioeconomicStatus:** 0: Low, 1: Middle, 2: High
- **EducationLevel:** 0: None, 1: High School, 2: Bachelor's, 3: Higher

Lifestyle Factors

- BMI (15–40)
- Smoking: 0 = No, 1 = Yes
- AlcoholConsumption: 0–20 units/week
- PhysicalActivity: 0–10 hrs/week
- DietQuality: 0–10
- SleepQuality: 4–10

Clinical Measurements (Examples)

- SystolicBP: 90–180 mmHg
- DiastolicBP: 60–120 mmHg
- FastingBloodSugar: 70–200 mg/dL
- SerumCreatinine: 0.5–5.0 mg/dL
- GFR: 15–120 mL/min/1.73m²

📂 Project Structure

```
ckd_predictor_app/
├── app.py
```

```
├── requirements.txt
├── data/
│   └── Chronic_Kidney_Dsease_data.csv
├── models/
│   ├── train_model.py
│   ├── ckd_model.pkl
│   └── scaler.pkl
└── src/
    ├── __init__.py
    ├── predictor.py
    └── utils.py
```

📦 Dependencies

- streamlit
- pandas
- numpy
- scikit-learn
- matplotlib, seaborn
- pickle

```
pip install -r requirements.txt
```

📄 app.py — Main Entry Point

Runs the Streamlit app, sets layout, and routes to data exploration or CKD prediction.

- `st.set_page_config()` : Set page layout
- Tabs: Data Exploration, CKD Prediction
- Initializes CKDPredictor class

src/utils.py

Function `load_model_and_scaler()` loads model and scaler with caching for performance.

src/predictor.py

The **CKDPredictor** class handles dataset loading, data analysis, and prediction logic.

form_inputs()

Interactive patient form for 12 major features: Age, BMI, BP, Fasting Blood Sugar, HbA1c, Serum Creatinine, BUN Levels, GFR, Protein in Urine, Hemoglobin Levels, Cholesterol.

📄 models/train_model.py

Handles model training and saving. Uses RandomForestClassifier for robust prediction.

Evaluation Metrics

```
 Accuracy: 0.96
 Classification Report:
           precision    recall  f1-score    support
        0       0.95      0.98      0.96
        1       0.98      0.94      0.96
```

▶️ How to Run the App

```
streamlit run app.py
```

Ensure `ckd_model.pkl` , `scaler.pkl` , and dataset exist in their respective folders.

✅ Summary

- Uses ML and Streamlit for intuitive CKD prediction
- Modular structure

- Real dataset-based training
- Visual insights and prediction results

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