Week 4: Deployment on Flask

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- Submission to: Data Glacier

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Data Glacier
Your Deep Learning Partner

Introduction

In this document, we will build a machine learning model based on data about kidney stones precences. We are going to deploy that model to the flask server. Our machine learning model is classify of kidney stones precences related to urine test values.

About Data

This dataset can be used to predict the presence of kidney stones based on urine analysis.

The 79 urine specimens, were analyzed in an effort to
determine if certain physical characteristics of the urine might be related to the
formation of calcium oxalate crystals.
The six physical characteristics of the urine are: (1) specific gravity, the density of the urine relative to water; (2) pH, the negative logarithm of the hydrogen ion; (3) osmolarity (mOsm), a unit used in biology and medicine but not in
physical chemistry. Osmolarity is proportional to the concentration of
molecules in solution; (4) conductivity (mMho milliMho). One Mho is one
reciprocal Ohm. Conductivity is proportional to the concentration of charged
ions in solution; (5) urea concentration in millimoles per litre; and (6) calcium
concentration (CALC) in millimolesllitre.

Machine Learning Model Codes

İmporting libraries and tools

```
import pandas as pd
from sklearn.metrics import accuracy_score,classification_report
from sklearn.model_selection import train_test_split
from sklearn.metrics import confusion_matrix
import pickle
import numpy as np
import seaborn as sns
```

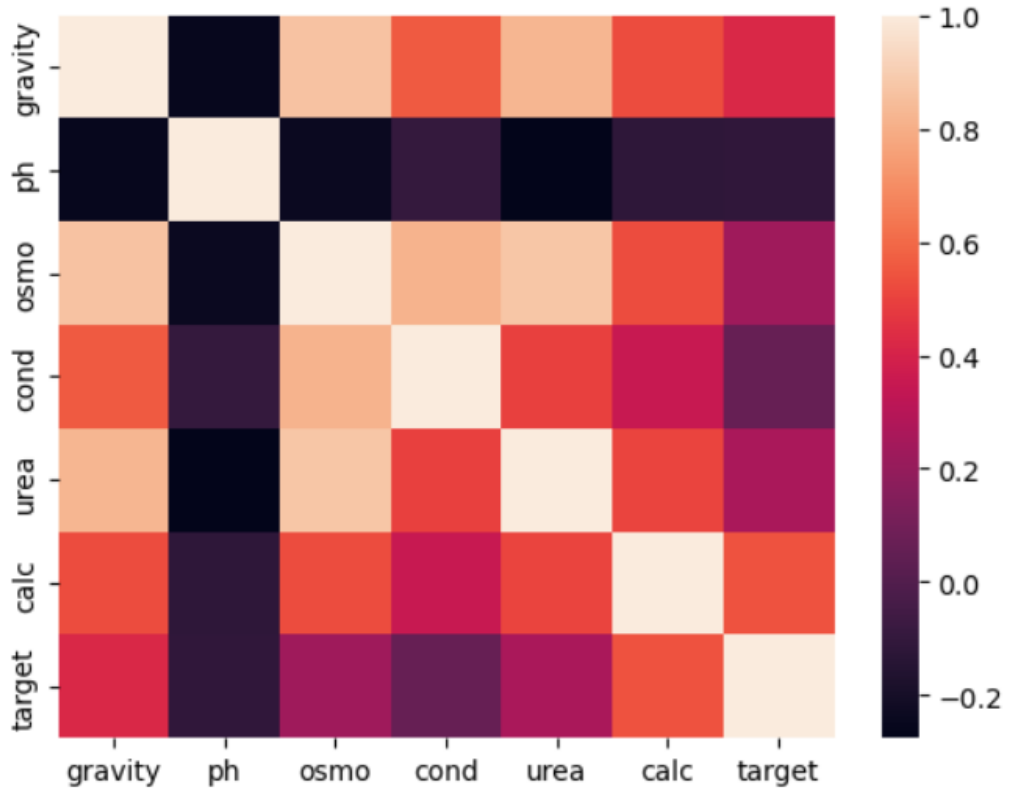
Reading Csv file of Data

```
df=pd.read_csv("kindey stone urine analysis.csv")
df.head()
```

	gravity	ph	osmo	cond	urea	calc	target
0	1.021	4.91	725	14.0	443	2.45	0
1	1.017	5.74	577	20.0	296	4.49	0
2	1.008	7.20	321	14.9	101	2.36	0
3	1.011	5.51	408	12.6	224	2.15	0
4	1.005	6.52	187	7.5	91	1.16	0

```
sns.heatmap(df.corr())
```

```
<AxesSubplot:>
```



Data Preperation and Modelling

Resampling and dodging underfit

```
cls_0=df[df['target']==0]
cls_1=df[df['target']==1]
df_class_1_over = cls_1.sample(250, replace=True)
df_class_0_over = cls_0.sample(250, replace=True)
df_test_over = pd.concat([df_class_0_over, df_class_1_over], axis=0)
df_test_over.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 500 entries, 3 to 64
Data columns (total 7 columns):
 #   Column   Non-Null Count  Dtype  
---  ------   --------------  -----  
 0   gravity  500 non-null    float64
 1   ph       500 non-null    float64
 2   osmo     500 non-null    int64  
 3   cond     500 non-null    float64
 4   urea     500 non-null    int64  
 5   calc     500 non-null    float64
 6   target   500 non-null    int64  
dtypes: float64(4), int64(3)
memory usage: 31.2 KB
```

```
y=df_test_over["target"]
X=df_test_over.drop("target",axis=1)
```

```
X_train,X_test,y_train,y_test=train_test_split(X.values,y.values,
                                               test_size=0.3,
                                                   random_state=42,
                                                  shuffle = True,
                                                  stratify = y)
```

```
from xgboost import XGBClassifier
Classifier=XGBClassifier()
Classifier.fit(X_train,y_train)
```

```
...
```

```
y_pred=classifier.predict(X_test)
```

```
print(classification_report(y_test,y_pred))
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        75
           1       1.00      1.00      1.00        75

    accuracy                           1.00       150
   macro avg       1.00      1.00      1.00       150
weighted avg       1.00      1.00      1.00       150
```

```
accuracy_score(y_test,y_pred)
```

```
1.0
```

```
confusion_matrix(y_test,y_pred)
```

```
array([[75,  0],
       [ 0, 75]], dtype=int64)
```

Saving model

```
pickle.dump(Classifier,open("model.pkl","wb"))
```

Flask app

```
import pandas as pd
from flask import Flask,render_template,request,jsonify
import pickle
import numpy as np
```

```
app=Flask(__name__)
```

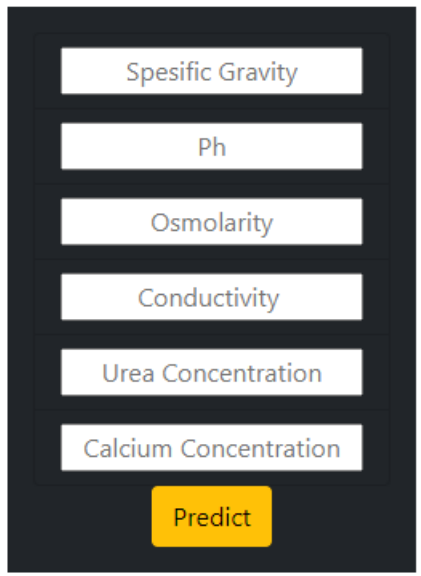
```
model=pickle.load(open("model.pkl","rb"))
```

```
@app.route("/")
def home():
    return render_template("home.html")
@app.route("/about")
def about():
    return render_template("aboutdata.html")

@app.route("/predict", methods=["POST"])
def predict():
    try:
        float_features = [float(x) for x in request.form.values()]
        features = [np.array(float_features)]
        prediction = model.predict(features)
        if prediction ==1:
                return render_template("stonespos.html",
                                       prediction_text1 =
                                       "Your test results indicate the presence of kidney stones.We recommend that you consult your doctor with your urine test values")
        elif prediction==0:
                return render_template("stonesneg.html",prediction_text2 = "Your test results indicate the absence of kidney stones.We wish you healthy days" )
    except ValueError:
        return  render_template("stoneswrong.html",prediction_text3 = "Please fill the form with numeric values otherwise calculation cannot be done" )

if __name__ == "__main__":
    app.run(debug=True,use_reloader=False)
```

```
 * Serving Flask app "__main__" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

Fill this form to predict Kidney Stones

Kidney stones (also called renal calculi, nephrolithiasis or urolithiasis) are hard deposits made of minerals and salts that form inside your kidneys. Diet, excess body weight, some medical conditions, and certain supplements and medications are among the many causes of kidney stones.



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Your test results indicate the absence of kidney stones.We wish you healthy days