Model Evaluation

```
In [18]: predictions = model.predict(X_test)

cm = confusion_matrix(y_test, predictions).flatten()
print(cm)
(tn, fp, fn, tp) = cm
accuracy = (tp + tn) / float(cm.sum())
print(accuracy)
```

```
[23  7  6 24]
0.7833333333333333
```

Save The Model

```
In [19]: pickle.dump(model,open('parkinson.pkl','wb'))
```

```
In [20]: !tar zcvf parkinson-detection-model_new.tgz parkinson.pkl
```

```
parkinson.pkl
```

```
In [21]: ls -1
```

```
dataset/
parkinson-detection-model_new.tgz
parkinson.pkl
```

```
In [22]: !pip install watson-machine-learning-client --upgrade
```

```
Collecting watson-machine-learning-client
  Downloading watson_machine_learning_client-1.0.391-py3-none-any.whl (538 kB)
     |████████████████████████████████| 538 kB 15.8 MB/s eta 0:00:01
Requirement already satisfied: boto3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (1.18.21)
Requirement already satisfied: tqdm in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (4.62.3)
Requirement already satisfied: lomond in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (0.3.3)
Requirement already satisfied: pandas in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (1.3.4)
Requirement already satisfied: requests in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (2.26.0)
Requirement already satisfied: tabulate in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (0.8.9)
Requirement already satisfied: ibm-cos-sdk in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (2.11.0)
Requirement already satisfied: certifi in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (2022.9.24)
Requirement already satisfied: urllib3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from watson-machine-learning-client) (1.26.7)
Requirement already satisfied: jmespath<1.0.0,>=0.7.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from boto3->watson-machine-learning-client) (0.10.0)
Requirement already satisfied: botocore<1.22.0,>=1.21.21 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from boto3->watson-machine-learning-client) (1.21.41)
Requirement already satisfied: s3transfer<0.6.0,>=0.5.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from boto3->watson-machine-learning-client) (0.5.0)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from botocore<1.22.0,>=1.21.21->boto3->watson-machine-learning-client) (2.8.2)
Requirement already satisfied: six>=1.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from python-dateutil<3.0.0,>=2.1->botocore<1.22.0,>=1.21.21->boto3->watson-machine-learning-client) (1.15.0)
Requirement already satisfied: ibm-cos-sdk-s3transfer==2.11.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk->watson-machine-learning-client) (2.11.0)
Requirement already satisfied: ibm-cos-sdk-core==2.11.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from ibm-cos-sdk->watson-machine-learning-client) (2.11.0)
Requirement already satisfied: charset-normalizer~=2.0.0 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests->watson-machine-learning-client) (2.0.4)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from requests->watson-machine-learning-client) (3.3)
Requirement already satisfied: pytz>=2017.3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from pandas->watson-machine-learning-client) (2021.3)
Requirement already satisfied: numpy>=1.17.3 in /opt/conda/envs/Python-3.9/lib/python3.9/site-packages (from pandas->watson-machine-learning-client) (1.20.3)
Installing collected packages: watson-machine-learning-client
Successfully installed watson-machine-learning-client-1.0.391
```

```
In [23]:  #Replace the credentials that got from Watson Machine Learning Service
          from ibm_watson_machine_learning import APIClient
          wml_credentials = {
                          "url":"https://us-south.ml.cloud.ibm.com",
                          "apikey":"NZUQxq9mF1SSVoBb_3R4y1jovaFzRtjg89hiEe23e6Vt"
          }
          client = APIClient(wml_credentials)
```

```
In [24]:  client = APIClient(wml_credentials)
```

```
In [25]:  def guid_from_space_name(client, space_name):
              space = client.spaces.get_details()
              return(next(item for item in space['resources'] if item ['entity']["name"] == space_name)['metadata']['id'])
```

```
In [26]:  space_uid = guid_from_space_name(client, 'Parkinson disease detection')
          print("Space UID = " + space_uid)

              Space UID = 43cbedc0-e171-4a97-9671-8a07cdc34faf
```

```
In [27]:  client.set.default_space(space_uid)
```

Out[27]: 'SUCCESS'

```
In [28]:  client.software_specifications.list(150)
```

```
          caffe-ibm_1.0-py3.6               8d863266-7927-4d1e-97d7-56a7f4c0a19b    base
          runtime-22.2-py3.10-cuda          8ef391e4-ef58-5d46-b078-a82c211c1058    base
          spss-modeler_17.1                 902d0051-84bd-4af6-ab6b-8f6aa6fdeabb    base
          do_12.10                          9100fd72-8159-4eb9-8a0b-a87e12eefa36    base
          do_py3.7                          9447fa8b-2051-4d24-9eef-5acb0e3c59f8    base
          spark-mllib_3.0-r_3.6             94bb6052-c837-589d-83f1-f4142f219e32    base
          cuda-py3.7-opence                 94e9652b-7f2d-59d5-ba5a-23a414ea488f    base
          nlp-py3.8                         96e60351-99d4-5a1c-9cc0-473ac1b5a864    base
          cuda-py3.7                        9a44990c-1aa1-4c7d-baf8-c4099011741c    base
          hybrid_0.2                        9b3f9040-9cee-4ead-8d7a-780600f542f7    base
          spark-mllib_3.0-py38              9f7a8fc1-4d3c-5e65-ab90-41fa8de2d418    base
          autoai-kb_3.3-py3.7               a545cca3-02df-5c61-9e88-998b09dc79af    base
          spark-mllib_3.0-py39              a6082a27-5acc-5163-b02c-6b96916eb5e0    base
          runtime-22.1-py3.9-do             a7e7dbf1-1d03-5544-994d-e5ec845ce99a    base
          default_py3.8                     ab9e1b80-f2ce-592c-a7d2-4f2344f77194    base
          tensorflow_rt22.1-py3.9           acd9c798-6974-5d2f-a657-ce06e986df4d    base
          kernel-spark3.2-py3.9             ad7033ee-794e-58cf-812e-a95f4b64b207    base
          autoai-obm_2.0 with Spark 3.0     af10f35f-69fa-5d66-9bf5-acb58434263a    base
          runtime-22.2-py3.10               b56101f1-309d-549b-a849-eaa63f77b2fb    base
```

```
In [29]:  software_spec_uid = client.software_specifications.get_uid_by_name("do_20.1")
          software_spec_uid
```

Out[29]: 'f686cdd9-7904-5f9d-a732-01b0d6b10dc5'

```
In [30]: model_details = client.repository.store_model(model='parkinson-detection-model_new.tgz',meta_props={
             client.repository.ModelMetaNames.NAME:"Random Forest",
             client.repository.ModelMetaNames.TYPE:"do-docplex_20.1",
             client.repository.ModelMetaNames.SOFTWARE_SPEC_UID:software_spec_uid
         }
                                                        )
         model_id = client.repository.get_model_id(model_details)
```

```
In [31]: model_id
```

Out[31]: '56274edd-0ab8-4ac1-bbe8-a07eb46e2dae'

```
In [32]: client.repository.download(model_id, 'my_model.tar.gz')
```

Successfully saved model content to file: 'my_model.tar.gz'

Out[32]: '/home/wsuser/work/my_model.tar.gz'

```
In [33]: import pickle
```

```
In [34]: file = open("parkinson.pkl", 'rb')
         model = pickle.load(file)
```