Model Development Phase Template

Date	15 March 2024
Team ID	738306
Project Title	Employee performance prediction with ML
Maximum Marks	4 Marks

Model Validation and Evaluation Report

Regression model is the best fit for the employee performance prediction model.

Initial Model Training Code:

```python
#splitting data into train test split
#import train_test_split dependency
from sklearn.model_selection import train_test_split


x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=42)


x.shape,x_train.shape,x_test.shape
```

Model Validation and Evaluation Report:

Model	Regression Report	Accuracy	Confusion Matrix

| Linear regression model | ```python
#model building
#importing linear regression dependency
from sklearn.linear_model import LinearRegression
linear=LinearRegression()
linear.fit(x_train,y_train)
#linear model mean squared error
score_train=linear.predict(x_train)
mse_train=mean_squared_error(y_train,score_train)
print("mean squared error in training data in linear regression is:",mse_train)

score_test=linear.predict(x_test)
mse_test=mean_squared_error(y_test,score_test)
print("mean squared error in testing data in linear regression is:",mse_test)

#linear model r2_score
score_train=linear.predict(x_train)
mse_train=r2_score(y_train,score_train)                    (variable) mse_train: Float
print("r2_score in training data in linear regression is:",mse_train)

score_test=linear.predict(x_test)
mse_test=r2_score(y_test,score_test)
print("r2_score in test data in linear regression is:",mse_test)

#linear model mean_absolute_error
score_train=linear.predict(x_train)
mse_train=mean_absolute_error(y_train,score_train)
print("mean_absolute_error in training data in linear regression is:",mse_train)

score_test=linear.predict(x_test)
mse_test=mean_absolute_error(y_test,score_test)
print("mean_absolute_error in testing data in linear regression is:",mse_test)
``` | 0.303 | <table><tr><th></th><th>Actual Value</th><th>predicted_value</th></tr><tr><td>921</td><td>0.268214</td><td>0.432858</td></tr><tr><td>321</td><td>0.800359</td><td>0.799398</td></tr><tr><td>101</td><td>0.681061</td><td>0.671121</td></tr><tr><td>920</td><td>0.325000</td><td>0.591028</td></tr><tr><td>58</td><td>0.667604</td><td>0.593638</td></tr><tr><td>790</td><td>0.800980</td><td>0.735931</td></tr><tr><td>948</td><td>0.768847</td><td>0.549655</td></tr><tr><td>969</td><td>0.768847</td><td>0.526311</td></tr><tr><td>410</td><td>0.650417</td><td>0.631047</td></tr><tr><td>1079</td><td>0.750396</td><td>0.750391</td></tr></table> |
| Random forest model | ```python
#Random Forest Regressor
from sklearn.ensemble import RandomForestRegressor
RandomForest = RandomForestRegressor()
RandomForest.fit(x_train, y_train)

#Random Forest Regressor mean squared error
score_train=RandomForest.predict(x_train)
mse_train=mean_squared_error(y_train,score_train)
print("mean squared error in training data in Random Forest Regressor is:",mse_train)

score_test=RandomForest.predict(x_test)
mse_test=mean_squared_error(y_test,score_test)
print("mean squared error in testing data in Random Forest Regressor is:",mse_test)

#Random Forest Regressor r2_score
score_train=RandomForest.predict(x_train)
mse_train=r2_score(y_train,score_train)
print("r2_score in training data in Random Forest Regressor is:",mse_train)

score_test=RandomForest.predict(x_test)
mse_test=r2_score(y_test,score_test)
print("r2_score in test data in Random Forest Regressor is:",mse_test)

#Random Forest Regressor mean_absolute_error
score_train=linear.predict(x_train)
mse_train=mean_absolute_error(y_train,score_train)
print("mean_absolute_error in training data in Random Forest Regressor is:",mse_train)

score_test=linear.predict(x_test)
mse_test=mean_absolute_error(y_test,score_test)
print("mean_absolute_error in testing data in Random Forest Regressor is:",mse_test)
``` | 0.92 | <table><tr><th></th><th>Actual Value</th><th>predicted_value</th></tr><tr><td>921</td><td>0.268214</td><td>0.432858</td></tr><tr><td>321</td><td>0.800359</td><td>0.799398</td></tr><tr><td>101</td><td>0.681061</td><td>0.671121</td></tr><tr><td>920</td><td>0.325000</td><td>0.591028</td></tr><tr><td>58</td><td>0.667604</td><td>0.593638</td></tr><tr><td>790</td><td>0.800980</td><td>0.735931</td></tr><tr><td>948</td><td>0.768847</td><td>0.549655</td></tr><tr><td>969</td><td>0.768847</td><td>0.526311</td></tr><tr><td>410</td><td>0.650417</td><td>0.631047</td></tr><tr><td>1079</td><td>0.750396</td><td>0.750391</td></tr></table> |

| Xgboost model | | 0.88 | |

```
#Xgboost regression
import xgboost as xgb
model_xgb=xgb.XGBRegressor(n_estimators=200,max_depth=5,learning_rate=0.1)
model_xgb.fit(x_train,y_train)


#Xgboost mean squared error
score_train=model_xgb.predict(x_train)
mse_train=mean_squared_error(y_train,score_train)
print("mean squared error in training data in Xgboost regression is:",mse_train)

score_test=model_xgb.predict(x_test)
mse_test=mean_squared_error(y_test,score_test)
print("mean squared error in testing data in Xgboost regressionr is:",mse_test)

#Xgboost Regressor r2_score
score_train=model_xgb.predict(x_train)
mse_train=r2_score(y_train,score_train)
print("r2_score in training data in Xgboost regression is:",mse_train)

score_test=model_xgb.predict(x_test)
mse_test=r2_score(y_test,score_test)
print("r2_score in test data in Random Xgboost regressionr is:",mse_test)

#Xgboost regression mean_absolute_error
score_train=linear.predict(x_train)
mse_train=mean_absolute_error(y_train,score_train)
print("mean_absolute_error in training data in Xgboost regression is:",mse_train)

score_test=linear.predict(x_test)
mse_test=mean_absolute_error(y_test,score_test)
print("mean_absolute_error in testing data in Xgboost regression is:",mse_test)
```

	Actual Value	predicted_value
921	0.268214	0.432858
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