Prep Data for Multiple Linear Regression

In [3]:
```
import pandas as pd
```

In [4]:
```
# import baseball stats data
stats = pd.read_csv('../Final Project/ds_final_stats.csv')
# rename players column
stats = stats.rename(columns = {'last_name, first_name': 'player'})
# set players column as index
stats = stats.set_index('player')
# drop unnecessary column player_id
stats = stats.drop('player_id', axis=1)
stats.shape
stats
```

Out[4]:

	year	single	double	triple	home_run	strikeout	walk	batting_avg	on_base_pl
player									
Pujols, Albert	2019	75	22	0	23	68	43	0.244	
Cabrera, Miguel	2019	106	21	0	12	108	48	0.282	
Choo, Shin-Soo	2019	92	31	2	24	165	78	0.265	
Jones, Adam	2019	84	25	1	16	101	31	0.260	
Cruz Jr., Nelson	2019	74	26	0	41	131	56	0.311	
...	...	...	...	...	...	...	...	...	
Chourio, Jackson	2024	91	29	4	21	121	39	0.275	
Schanuel, Nolan	2024	98	19	0	13	103	68	0.250	
Langford, Wyatt	2024	81	25	4	16	115	51	0.253	
Young, Jacob	2024	92	24	1	3	102	30	0.256	
Merrill, Jackson	2024	101	31	6	24	101	29	0.292	

660 rows × 14 columns

In [5]:
```
# select columns for use in MLR
features = ['single', 'double', 'triple', 'home_run', 'strikeout', 'walk', '
            'b_rbi', 'b_total_bases', 'r_total_stolen_base', 'barrel_batte
target = ['on_base_plus_slg']
```

Begin Multiple Linear Regression

In [6]:
```
# split into training and testing
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(stats[features], stats[t
```

In [7]:
```
# model building
from sklearn.linear_model import LinearRegression
linear_regression_model = LinearRegression()
linear_regression_model.fit(X=X_train, y=y_train)
```

Out[7]:
```
▾ LinearRegression
LinearRegression()
```

Evaluate our Model

In [8]:
```
# use model to make predictions
y_predictions = linear_regression_model.predict(X_test)
```

In [9]:
```
# predicted vs actual
# y_predictions vs y_test dataframe
findings = pd.DataFrame()
findings['Actual'] = y_test
findings['Predictions'] = y_predictions
findings.head()
```

Out[9]:

	Actual	Predictions
player		
Abreu, José	0.824	0.807371
Raleigh, Cal	0.762	0.765326
Kemp, Tony	0.641	0.644158
Suzuki, Seiya	0.848	0.846508
Bellinger, Cody	0.881	0.887010

Mean Squared Error

In [10]:
```
import statistics
# find mean squared error of findings data
def mse(predicted, actual):
    mse = ((i-k)**2 for i,k in zip(predicted, actual))
    return statistics.mean(mse)
```

In [11]:
```
stats_mse = mse(findings['Predictions'], findings['Actual'])
```

In [12]:
```
f'Mean squared error of stats data is {stats_mse}.'
```

Out[12]:
```
'Mean squared error of stats data is 8.457601209942882e-05.'
```

Coefficient of Determination (R²)

In [13]:
```
# find r-squared of findings data
from sklearn.metrics import r2_score
stats_r2score = r2_score(findings['Actual'], findings['Predictions'])
```

In [14]:
```
f'R-squared value of stats data is {stats_r2score}.'
```

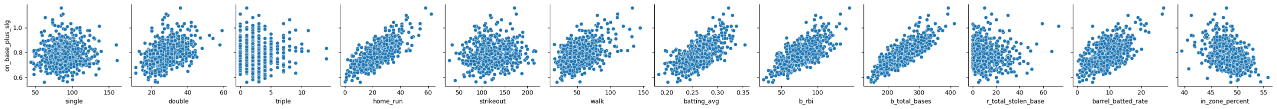
Out[14]:
```
'R-squared value of stats data is 0.9900065210743451.'
```

Visualize our Model

In [32]:
```
import seaborn as sns
# pairplot of all indepedent variables against OPS
sns.pairplot(stats, y_vars = target, x_vars = features)
```

```
/Users/wesleychapman/anaconda3/lib/python3.11/site-packages/seaborn/axisgri
d.py:123: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```

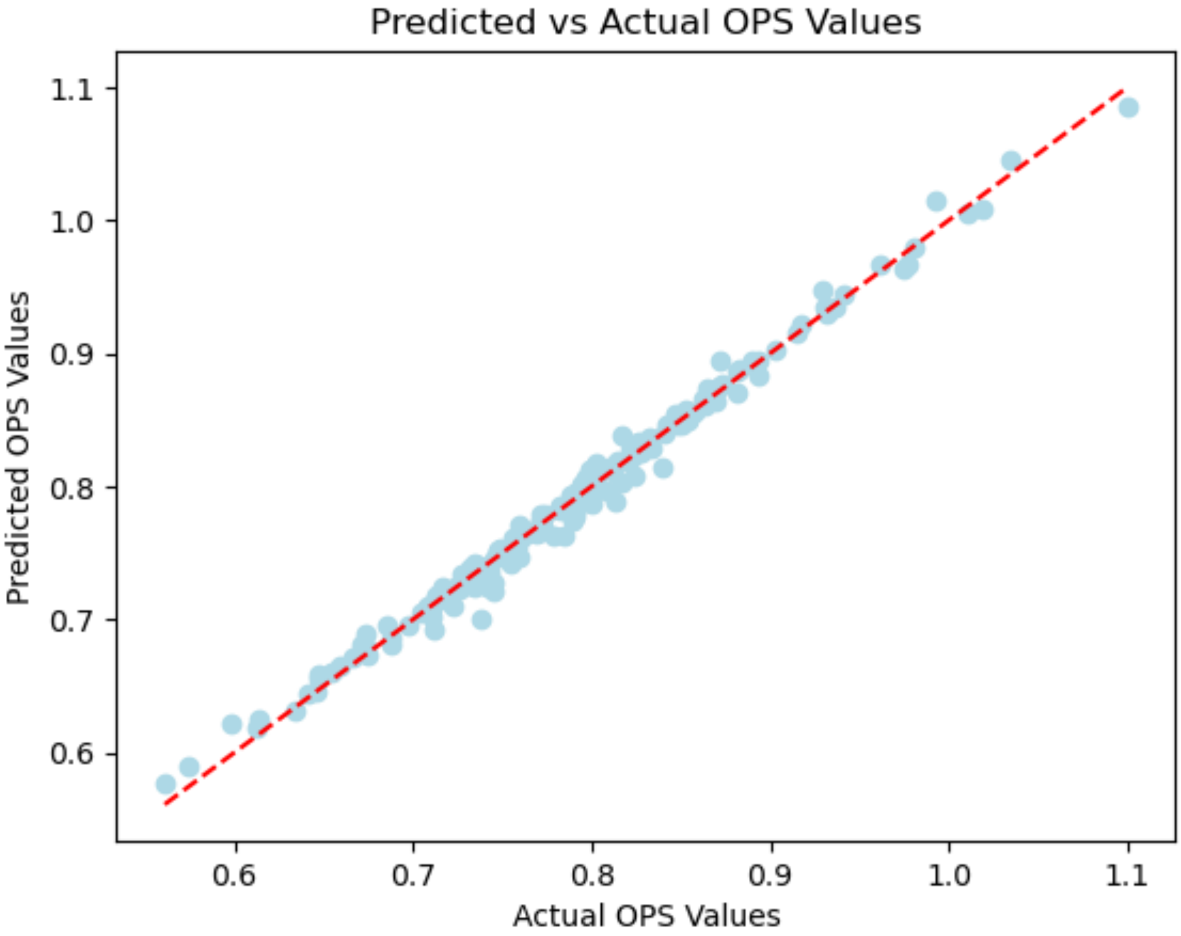
Out[32]:
```
<seaborn.axisgrid.PairGrid at 0x15820c090>
```



In [26]:
```
import matplotlib.pyplot as plt
```

In [27]:
```
# scatter plot of actual vs predicted OPS values
plt.scatter(findings['Actual'], findings['Predictions'], c='lightblue')
plt.plot([min(findings['Actual']), max(findings['Actual'])], [min(findings['
plt.xlabel('Actual OPS Values')
plt.ylabel('Predicted OPS Values')
plt.title('Predicted vs Actual OPS Values')
```

Out[27]:
```
Text(0.5, 1.0, 'Predicted vs Actual OPS Values')
```


Predicted vs Actual OPS Values
Predicted OPS Values
Actual OPS Values
0.6
0.7
0.8
0.9
1.0
1.1
0.6
0.7
0.8
0.9
1.0
1.1