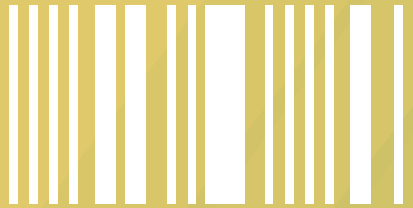
Airline

BOARDING PASS

Vueling Tech Hack

- FLIGHT
  B345
- GATE
  D8
- SEAT
  29E



Guillermo Seoane | IT academy [February 2023]

CONTEXT

At the last Annual General Assembly of IATA, the zero net CO_2 emissions in 2050 (aviation sector) resolution finally got approved. That lets us be one step closer to the Paris Agreement of 2015, accomplishing not exceeding 1.5 ºC the Earth's temperature.

For more info:
Guillermo Seoane | IT Academy

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PLAN YOUR JOURNEY

Cleaning and transforming of the data used by the machine learning algorithm

Best fit model for prediction, finding the right algorithm

Confirm results on Test set

PREPROCESSING

TRAIN/VALID

Evaluating Model Performance Using Validation Dataset

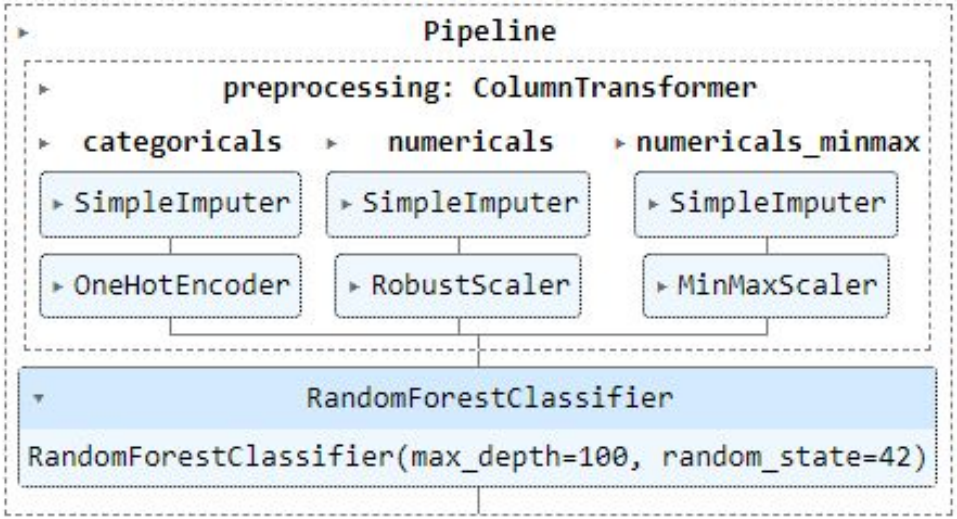
MODEL EVALUATION

HYPER-PARAMETERS

Evaluating the performance of a model with GridSearch

PREDICTION

Pipeline



categoricals

```
['Origin Country']
```

numericals

```
['Total flights', 'Total
seats', 'Total ASKs',
'Km', ‘Eficiencia']
```

numericals_minmax

```
['Year', 'Origin
Continent',
'Destination
Continent']
```

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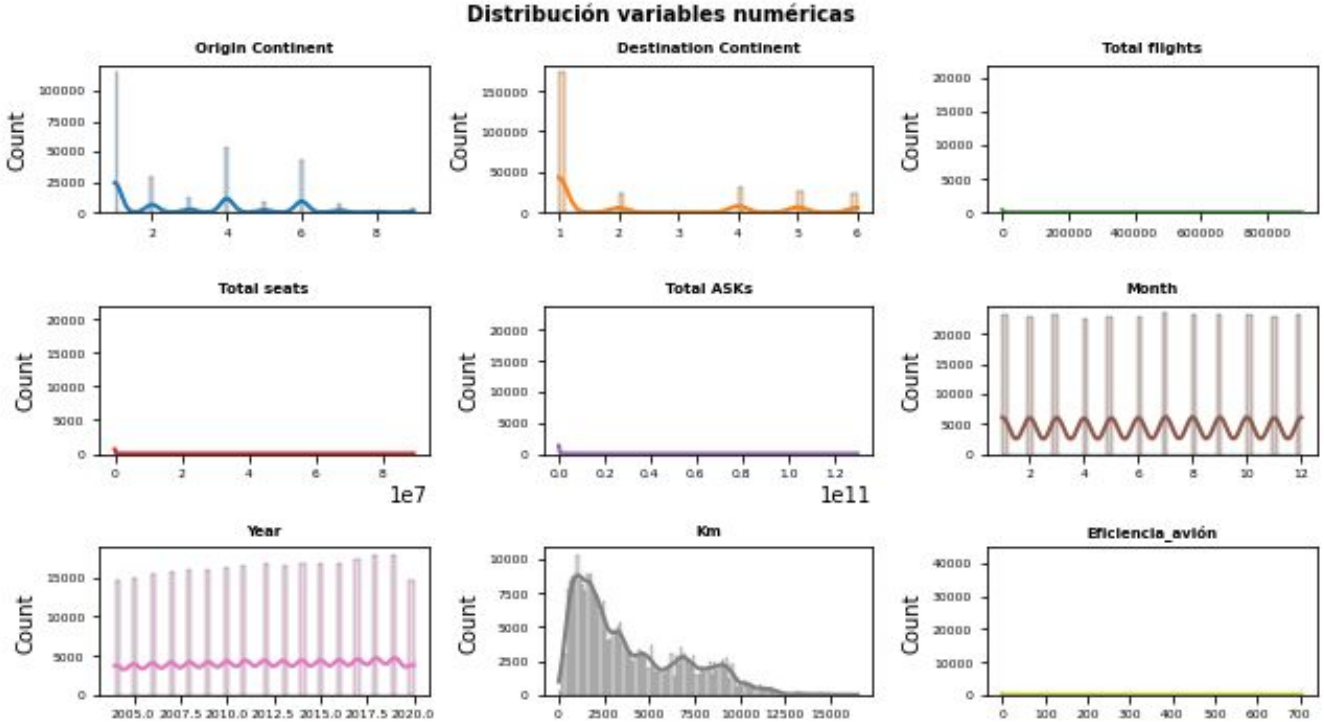
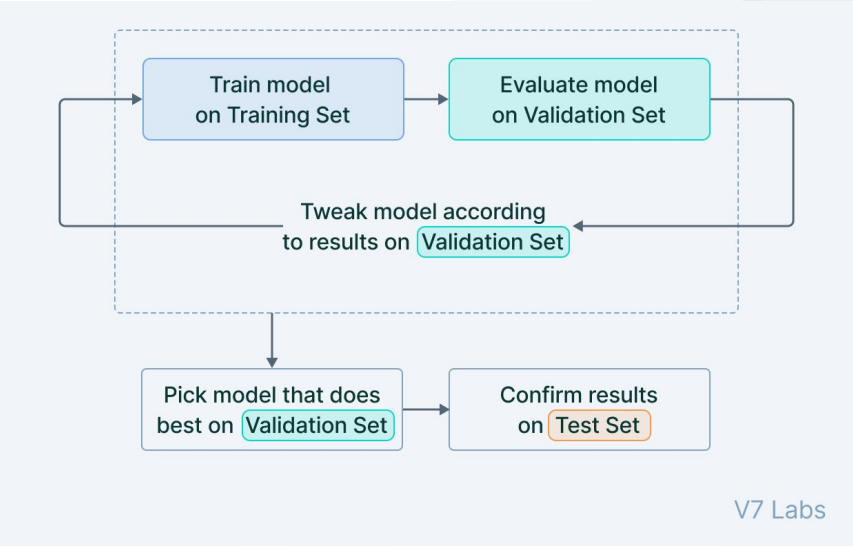

Distribución variables numéricas
Origin Continent
Destination Continent
Total flights
Total seats
Total ASKs
Month
Year
Km
Eficiencia_avión
Count
1e7
1e11

Train/Valid



*statistical approach to deal with Sampling

- Evaluation with Cross-Validation

Model	f1_cv	f1_std_cv
knc	0.78189	0.00270
dtc	0.91649	0.00388
rfc	0.91302	0.00372
lr	0.06016	0.00393

```
knc = KNeighborsClassifier()
dtc = DecisionTreeClassifier()
rfc = RandomForestClassifier()
lr  = LogisticRegression()
```

Hyper Parameters (GridSearchCV)

```
pipeline = Pipeline(
    [
        ('preprocessing', preprocessor),
        ('model', RandomForestClassifier(random_state = 42))
    ]
)

params = {
    'model__criterion':('gini', 'entropy'),
    'model__max_depth': [0.1,10,100]
}

rskf = RepeatedStratifiedKFold(n_splits = 5, n_repeats = 2, random_state = 42)

cv = GridSearchCV(pipeline, params, cv = rskf, scoring = ['f1_macro'], refit = 'f1_macro



cv.fit(X, y)

print(f'Best F1-score: {cv.best_score_:.3f}\n')
print(f'Best parameter set: {cv.best_params_}\n')
print(f'Scores: {classification_report(y, cv.predict(X))}')
```

- Cross validation

```
from sklearn.metrics import f1_score

pipeline = Pipeline(
    [
        ('preprocessing', preprocessor),
        ('model', RandomForestClassifier(criterion = 'gini',
                                         max_depth = 100,
                                         random_state = 42))
    ]
)

score = cross_val_score(pipeline, X, y, cv=5, scoring='f1_macro')
print('F1 score: {0:.2f}'.format(score.mean()))
```

```
F1 score: 0.91
```

Prediction

```python
# Define the target variable and the features
X_train = df_train.drop(['Destination Country'], axis=1) #features
y_train = df_train['Destination Country'] #target

X_test = df_test
```

- Train/Test division

```python
rfc = RandomForestClassifier(criterion = 'gini', max_depth = 100, random_state = 42)
```

- Create a modelo

```python
## Pipeline
pipeline = Pipeline([
            ('preprocessing', preprocessor),
            ('model', rfc)
        ])

pipeline.fit(X_train, y_train)
```

- Pipeline & ColumnTransformer

```python
y_pred = pipeline.predict(X_test)

df_predicciones = pd.DataFrame({'target': y_pred})
```

- Prediction

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THANKS!

NOTE:

Do you have any questions?
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