

▼ **Predict Bike Sharing Demand with AutoGluon Template**

**Project: Predict Bike Sharing Demand with AutoGluon**

This notebook is a template with each step that you need to complete for the project.

Please fill in your code where there are explicit `?` markers in the notebook. You are welcome to add more cells and code as you see fit.

Once you have completed all the code implementations, please export your notebook as a HTML file so the reviews can view your code. Make sure you have all outputs correctly outputted.

File-> Export Notebook As... -> Export Notebook as HTML

There is a writeup to complete as well after all code implementation is done. Please answer all questions and attach the necessary tables and charts. You can complete the writeup in either markdown or PDF.

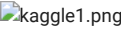
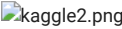

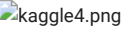
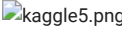
Completing the code template and writeup template will cover all of the rubric points for this project.

The rubric contains "Stand Out Suggestions" for enhancing the project beyond the minimum requirements. The stand out suggestions are optional. If you decide to pursue the "stand out suggestions", you can include the code in this notebook and also discuss the results in the writeup file.

▼ **Step 1: Create an account with Kaggle**

▼ **Create Kaggle Account and download API key**

Below is example of steps to get the API username and key. Each student will have their own username and key.

- 1. Open account settings.  
- 2. Scroll down to API and click Create New API Token.  
- 3. Open up `kaggle.json` and use the username and key. 

▼ **Step 2: Download the Kaggle dataset using the kaggle python library**

▼ **Open up Sagemaker Studio and use starter template**

- 1. Notebook should be using a `m1.t3.medium` instance (2 vCPU + 4 GiB)
- 2. Notebook should be using kernel: Python 3 (MXNet 1.8 Python 3.7 CPU Optimized)

▼ **Install packages**

```
%%capture

!pip install -U pip
!pip install -U setuptools wheel
!pip install -U "mxnet<2.0.0" bokeh==2.0.1
!pip install autogluon --no-cache-dir
# Without --no-cache-dir, smaller aws instances may have trouble installing
```

▼ **Setup Kaggle API Key**

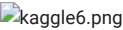
```
# create the .kaggle directory and an empty kaggle.json file
!mkdir -p /root/.kaggle
!touch /root/.kaggle/kaggle.json
!chmod 600 /root/.kaggle/kaggle.json

# Fill in your user name and key from creating the kaggle account and API token file
import json
kaggle_username = "snakebutcher"
kaggle_key = "8f5a8aafb9d19778486e1945297d99a7"

# Save API token the kaggle.json file
with open("/root/.kaggle/kaggle.json", "w") as f:
    f.write(json.dumps({"username": kaggle_username, "key": kaggle_key}))
```

**Download and explore dataset**

▼ **Go to the [bike sharing demand competition](#) and agree to the terms**



```
# Download the dataset, it will be in a .zip file so you'll need to unzip it as well.
!kaggle competitions download -c bike-sharing-demand
# If you already downloaded it you can use the -o command to overwrite the file
!unzip -o bike-sharing-demand.zip

bike-sharing-demand.zip: Skipping, found more recently modified local copy (use --force to force download)
Archive: bike-sharing-demand.zip
  inflating: sampleSubmission.csv
  inflating: test.csv
  inflating: train.csv
```

```
import pandas as pd
from autogluon.tabular import TabularPredictor
```

```
# Create the train dataset in pandas by reading the csv
# Set the parsing of the datetime column so you can use some of the `dt` features in pandas later
train = pd.read_csv('train.csv', parse_dates=["datetime"])
train.head()
```

	datetime	season	holiday	workingday	weather	temp	atemp	humidity	windspeed	casual	registered	count
0	2011-01-01 00:00:00	1	0	0	1	9.84	14.395	81	0.0	3	13	
1	2011-01-01 01:00:00	1	0	0	1	9.02	13.635	80	0.0	8	32	
	2011-01-											

```
# Simple output of the train dataset to view some of the min/max/varition of the dataset features.
train.describe()
```

	season	holiday	workingday	weather	temp	atemp	humidity	windspeed	casual	registered	count
count	10886.000000	10886.000000	10886.000000	10886.000000	10886.000000	10886.000000	10886.000000	10886.000000	10886.000000	10886.000000	10886.000000
mean	2.506614	0.028569	0.680875	1.418427	20.23086	23.655084	61.886460	12.000000	12.000000	12.000000	12.000000
std	1.116174	0.166599	0.466159	0.633839	7.79159	8.474601	19.245033	8.000000	8.000000	8.000000	8.000000
min	1.000000	0.000000	0.000000	1.000000	0.82000	0.760000	0.000000	0.000000	0.000000	0.000000	0.000000
25%	2.000000	0.000000	0.000000	1.000000	13.94000	16.665000	47.000000	7.000000	7.000000	7.000000	7.000000
50%	3.000000	0.000000	1.000000	1.000000	20.50000	24.240000	62.000000	12.000000	12.000000	12.000000	12.000000
75%	4.000000	0.000000	1.000000	2.000000	26.24000	31.060000	77.000000	16.000000	16.000000	16.000000	16.000000
max	4.000000	1.000000	1.000000	4.000000	41.00000	45.455000	100.000000	56.000000	56.000000	56.000000	56.000000

```
# Create the test pandas dataframe in pandas by reading the csv, remember to parse the datetime!
test = pd.read_csv('test.csv', parse_dates=["datetime"])
test.head()
```

	datetime	season	holiday	workingday	weather	temp	atemp	humidity	windspeed	casual	registered	count
0	2011-01-20 00:00:00	1	0	1	1	10.66	11.365	56	26.0027			
1	2011-01-20 01:00:00	1	0	1	1	10.66	13.635	56	0.0000			
2	2011-01-20 02:00:00	1	0	1	1	10.66	13.635	56	0.0000			
3	2011-01-20 03:00:00	1	0	1	1	10.66	12.880	56	11.0014			
4	2011-01-20 04:00:00	1	0	1	1	10.66	12.880	56	11.0014			

```
# Same thing as train and test dataset
submission = pd.read_csv('sampleSubmission.csv', parse_dates=["datetime"])
submission.head()
```

	datetime	count
0	2011-01-20 00:00:00	0
1	2011-01-20 01:00:00	0
2	2011-01-20 02:00:00	0
3	2011-01-20 03:00:00	0
4	2011-01-20 04:00:00	0

### Step 3: Train a model using AutoGluon's Tabular Prediction

Requirements:

- We are predicting `count`, so it is the label we are setting.
- Ignore `casual` and `registered` columns as they are also not present in the test dataset.
- Use the `root_mean_squared_error` as the metric to use for evaluation.
- Set a time limit of 10 minutes (600 seconds).
- Use the preset `best_quality` to focus on creating the best model.

```
predictor = TabularPredictor(label="count",
                             eval_metric="root_mean_squared_error",
                             learner_kwargs={"ignored_columns": ["casual", "registered"]}).fit(train_data=train,
```



```

'NeuralNetFastAI_BAG_L1': 'StackerEnsembleModel_NNFastAiTabular',
'WeightedEnsemble_L2': 'WeightedEnsembleModel',
'LightGBMXT_BAG_L2': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L2': 'StackerEnsembleModel_LGB',
'RandomForestMSE_BAG_L2': 'StackerEnsembleModel_RF',
'CatBoost_BAG_L2': 'StackerEnsembleModel_CatBoost',
'ExtraTreesMSE_BAG_L2': 'StackerEnsembleModel_XT',
'WeightedEnsemble_L3': 'WeightedEnsembleModel'},
'model_performance': {'KNeighborsUnif_BAG_L1': -101.54619908446061,
'KNeighborsDist_BAG_L1': -84.12506123181602,
'LightGBMXT_BAG_L1': -131.46090891834504,
'LightGBM_BAG_L1': -131.054161598899,
'RandomForestMSE_BAG_L1': -116.54835939455667,
'CatBoost_BAG_L1': -130.4932232916892,
'ExtraTreesMSE_BAG_L1': -124.60067564699747,
'NeuralNetFastAI_BAG_L1': -139.06642310467205,
'WeightedEnsemble_L2': -84.12506123181602,
'LightGBMXT_BAG_L2': -60.27603610124728,

```

### ▼ Create predictions from test dataset

```

predictions = predictor.predict(test)
predictions.head()

```

```

0      23.526438
1      43.059238
2      46.611351
3      48.741203
4      51.410240
Name: count, dtype: float32

```

### ▼ NOTE: Kaggle will reject the submission if we don't set everything to be > 0.

```

# Describe the `predictions` series to see if there are any negative values
predictions.describe()

```

```

count      6493.000000
mean       100.777969
std         90.193413
min         2.972115
25%        20.830881
50%         63.056473
75%        169.288544
max        366.138489
Name: count, dtype: float64

```

```

# How many negative values do we have?
predictions[predictions < 0]

```

```

Series([], Name: count, dtype: float32)

```

```

# Set them to zero
predictions[predictions < 0] = 0

```

### ▼ Set predictions to submission dataframe, save, and submit

```

submission["count"] = predictions
submission.to_csv("submission.csv", index=False)

```

```

!kaggle competitions submit -c bike-sharing-demand -f submission.csv -m "first raw submission"

```

```

100% 188k/188k [00:01<00:00, 113kB/s]
Successfully submitted to Bike Sharing Demand

```

### ▼ View submission via the command line or in the web browser under the competition's page - My Submissions

```

!kaggle competitions submissions -c bike-sharing-demand | tail -n +1 | head -n 3

```

fileName	date	description	status	publicScore	privateScore
submission.csv	2023-06-12 01:28:57	first raw submission	complete	1.80586	1.80586

Initial score of \*1.80506\*

### ▼ Step 4: Exploratory Data Analysis and Creating an additional feature

- Any additional feature will do, but a great suggestion would be to separate out the datetime into hour, day, or month parts.

```

# Create a histogram of all features to show the distribution of each one relative to the data. This is part of the exploratory data analysis
train.hist(figsize=(20,20))

```

```

# Create a new feature (day of week)
train['dayofweek'] = train['datetime'].dt.dayofweek
test['dayofweek'] = test['datetime'].dt.dayofweek

```

Make category types for these so models know they are not just numbers

- AutoGluon originally sees these as ints, but in reality they are int representations of a category.
- Setting the dtype to category will classify these as categories in AutoGluon.

```
# Turn 'season' and 'weather' into category type
train = train.astype({"season": "category", "weather": "category"})
test = train.astype({"season": "category", "weather": "category"})
```

```
# View the new feature
train.head()
```

	datetime	season	holiday	workingday	weather	temp	atemp	humidity	windspeed	casual	registered	coi
0	2011-01-01 00:00:00	1	0	0	1	9.84	14.395	81	0.0	3	13	
1	2011-01-01 01:00:00	1	0	0	1	9.02	13.635	80	0.0	8	32	
	2011-01-											

```
# View histogram of all features again now with the day of week feature
train.hist(figsize=(20, 20))
```

```
array([[<Axes: title={'center': 'datetime'}>,
<Axes: title={'center': 'holiday'}>,
<Axes: title={'center': 'workingday'}>]], dtype=object)
```



## ▼ Step 5: Rerun the model with the same settings as before, just with more features

```
predictor_new_features = TabularPredictor(label="count",
eval_metric="root_mean_squared_error",
learner_kwargs={"ignored_columns": ["casual", "registered"]}).fit(train_data=train,
time_limit=600,
presets="best_quality")
```

```
No path specified. Models will be saved in: "AutogluonModels/ag-20230612_013137/"
Presets specified: ['best_quality']
Stack configuration (auto_stack=True): num_stack_levels=1, num_bag_folds=8, num_bag_sets=20
Beginning AutoGluon training ... Time limit = 600s
AutoGluon will save models to "AutogluonModels/ag-20230612_013137/"
AutoGluon Version: 0.7.0
Python Version: 3.10.12
Operating System: Linux
Platform Machine: x86_64
Platform Version: #1 SMP Sat Apr 29 09:15:28 UTC 2023
Train Data Rows: 10886
Train Data Columns: 12
Label Column: count
Preprocessing data ...
AutoGluon infers your prediction problem is: 'regression' (because dtype of label-column == int and many unique label-values observed).
Label info (max, min, mean, stddev): (977, 1, 191.57413, 181.14445)
If 'regression' is not the correct problem_type, please manually specify the problem_type parameter during predictor init (You may specify problem_type as
Using Feature Generators to preprocess the data ...
Dropping user-specified ignored columns: ['casual', 'registered']
Fitting AutoMLPipelineFeatureGenerator...
Available Memory: 10742.13 MB
Train Data (Original) Memory Usage: 0.72 MB (0.0% of available memory)
Inferring data type of each feature based on column values. Set feature_metadata_in to manually specify special dtypes of the features.
Stage 1 Generators:
Fitting AsTypeFeatureGenerator...
Note: Converting 2 features to boolean dtype as they only contain 2 unique values.
Stage 2 Generators:
Fitting FillNaFeatureGenerator...
Stage 3 Generators:
Fitting IdentityFeatureGenerator...
Fitting CategoryFeatureGenerator...
Fitting CategoryMemoryMinimizeFeatureGenerator...
Fitting DatetimeFeatureGenerator...
Stage 4 Generators:
Fitting DropUniqueFeatureGenerator...
Types of features in original data (raw dtype, special dtypes):
('category', []) : 2 | ['season', 'weather']
('datetime', []) : 1 | ['datetime']
('float', []) : 3 | ['temp', 'atemp', 'windspeed']
('int', []) : 4 | ['holiday', 'workingday', 'humidity', 'dayofweek']
Types of features in processed data (raw dtype, special dtypes):
('category', []) : 2 | ['season', 'weather']
('float', []) : 3 | ['temp', 'atemp', 'windspeed']
('int', []) : 2 | ['humidity', 'dayofweek']
('int', ['bool']) : 2 | ['holiday', 'workingday']
('int', ['datetime_as_int']) : 5 | ['datetime', 'datetime.year', 'datetime.month', 'datetime.day', 'datetime.dayofweek']
0.1s = Fit runtime
10 features in original data used to generate 14 features in processed data.
Train Data (Processed) Memory Usage: 0.92 MB (0.0% of available memory)
Data preprocessing and feature engineering runtime = 0.15s ...
AutoGluon will gauge predictive performance using evaluation metric: 'root_mean_squared_error'
This metric's sign has been flipped to adhere to being higher is better. The metric score can be multiplied by -1 to get the metric value.
To change this, specify the eval_metric parameter of Predictor()
AutoGluon will fit 2 stack levels (L1 to L2) ...
Fitting 11 L1 models ...
Fitting model: KNeighborsUnif_BAG_L1 ... Training model for up to 399.8s of the 599.84s of remaining time.
-101.5462 = Validation score (-root_mean_squared_error)
```

```
predictor_new_features.fit_summary()
```

```
*** Summary of fit() ***
Estimated performance of each model:
```

	model	score_val	pred_time_val	fit_time	pred_time_val_marginal	fit_time_marginal	stack_level	can_infer	fit_order
0	WeightedEnsemble_L3	-52.915011	12.336025	516.606548	0.000463	0.175993	3	True	14
1	RandomForestMSE_BAG_L2	-53.195590	11.787641	427.226037	0.498044	27.755407	2	True	12
2	LightGBM_BAG_L2	-54.943739	11.682105	424.774227	0.392509	25.303597	2	True	11
3	CatBoost_BAG_L2	-56.032291	11.445009	463.371552	0.155413	63.900922	2	True	13
4	LightGBMXt_BAG_L2	-61.053077	14.724574	447.078334	3.434977	47.607704	2	True	10
5	KNeighborsDist_BAG_L1	-84.125061	0.036325	0.027736	0.036325	0.027736	1	True	2
6	WeightedEnsemble_L2	-84.125061	0.037319	0.349008	0.000995	0.321272	2	True	9
7	KNeighborsUnif_BAG_L1	-101.546199	0.029713	0.035012	0.029713	0.035012	1	True	1
8	RandomForestMSE_BAG_L1	-116.625918	0.603104	10.868001	0.603104	10.868001	1	True	5
9	ExtraTreesMSE_BAG_L1	-124.518985	0.507713	4.030432	0.507713	4.030432	1	True	7
10	LightGBM_BAG_L1	-130.674797	1.445498	34.095030	1.445498	34.095030	1	True	4
11	LightGBMXt_BAG_L1	-131.048150	7.552938	63.786417	7.552938	63.786417	1	True	3
12	CatBoost_BAG_L1	-131.637762	0.478144	238.166733	0.478144	238.166733	1	True	6
13	NeuralNetFastAI_BAG_L1	-142.120327	0.636163	48.461270	0.636163	48.461270	1	True	8

```
Number of models trained: 14
Types of models trained:
```

```

{'StackerEnsembleModel_LGB', 'StackerEnsembleModel_XT', 'StackerEnsembleModel_RF', 'StackerEnsembleModel_NNFastAiTabular', 'WeightedEnsembleModel', 'StackerEnsembleModel_LGB', 'StackerEnsembleModel_XT', 'StackerEnsembleModel_RF', 'StackerEnsembleModel_NNFastAiTabular', 'WeightedEnsembleModel'}
Bagging used: True (with 8 folds)
Multi-layer stack-ensembling used: True (with 3 levels)
Feature Metadata (Processed):
(raw dtype, special dtypes):
('category', []) : 2 | ['season', 'weather']
('float', []) : 3 | ['temp', 'atemp', 'windspeed']
('int', []) : 2 | ['humidity', 'dayofweek']
('int', ['bool']) : 2 | ['holiday', 'workingday']
('int', ['datetime_as_int']) : 5 | ['datetime', 'datetime.year', 'datetime.month', 'datetime.day', 'datetime.dayofweek']
*** End of fit() summary ***
/usr/local/lib/python3.10/dist-packages/autogluon/core/utils/plots.py:138: UserWarning: AutoGluon summary plots cannot be created because bokeh is not installed.
warnings.warn("AutoGluon summary plots cannot be created because bokeh is not installed. To see plots, please do: \"pip install bokeh==2.0.1\"")
{'model_types': {'KNeighborsUnif_BAG_L1': 'StackerEnsembleModel_KNN',
'KNeighborsDist_BAG_L1': 'StackerEnsembleModel_KNN',
'LightGBMX_T_BAG_L1': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L1': 'StackerEnsembleModel_LGB',
'RandomForestMSE_BAG_L1': 'StackerEnsembleModel_RF',
'CatBoost_BAG_L1': 'StackerEnsembleModel_CatBoost',
'ExtraTreesMSE_BAG_L1': 'StackerEnsembleModel_XT',
'NeuralNetFastAI_BAG_L1': 'StackerEnsembleModel_NNFastAiTabular',
'WeightedEnsemble_L2': 'WeightedEnsembleModel',
'LightGBMX_T_BAG_L2': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L2': 'StackerEnsembleModel_LGB',
'RandomForestMSE_BAG_L2': 'StackerEnsembleModel_RF',
'CatBoost_BAG_L2': 'StackerEnsembleModel_CatBoost',
'WeightedEnsemble_L3': 'WeightedEnsembleModel'},
'model_performance': {'KNeighborsUnif_BAG_L1': -101.54619908446061,
'KNeighborsDist_BAG_L1': -84.12506123181602,
'LightGBMX_T_BAG_L1': -131.0481503121184,
'LightGBM_BAG_L1': -130.6747968241385,
'RandomForestMSE_BAG_L1': -116.62591809957327,
'CatBoost_BAG_L1': -131.63776192578732,
'ExtraTreesMSE_BAG_L1': -124.51898464420267,
'NeuralNetFastAI_BAG_L1': -142.1203272532277,
'WeightedEnsemble_L2': -84.12506123181602,
'LightGBMX_T_BAG_L2': -61.05307721288435,
'LightGBM_BAG_L2': -61.05307721288435,
'RandomForestMSE_BAG_L2': -116.62591809957327,
'CatBoost_BAG_L2': -131.63776192578732,
'ExtraTreesMSE_BAG_L2': -124.51898464420267,
'NeuralNetFastAI_BAG_L2': -142.1203272532277,
'WeightedEnsemble_L3': -84.12506123181602}}
# Remember to set all negative values to zero
prediction_new_features = predictor_new_features.predict(test)
prediction_new_features[prediction_new_features < 0] = 0

```

### Step 6: Hyperparameter optimization

```
hyperparameter_tune_kwargs = { # HPO is not performed unless hyperparameter_tune_kwargs is specified
    'num_trials': num_trials,
    'scheduler' : 'local',
    'searcher': search_strategy,
}

predictor_new_hpo = TabularPredictor(label="count",
    eval_metric="root_mean_squared_error",
    learner_kwargs={"ignored_columns": ["casual", "registered"]}).fit(train_data=train,
    time_limit=600,
    presets="best_quality",
    hyperparameters=hyperparameters,
    hyperparameter_tune_kwargs=hyperparameter_tune_kwargs,)
```



```

No path specified. Models will be saved in: "AutogluonModels/ag-20230612_014233/"
Presets specified: ['best_quality']
Warning: hyperparameter tuning is currently experimental and may cause the process to hang.
Stack configuration (auto_stack=True): num_stack_levels=1, num_bag_folds=8, num_bag_sets=20
Beginning AutoGluon training ... Time limit = 600s
AutoGluon will save models to "AutogluonModels/ag-20230612_014233/"
AutoGluon Version: 0.7.0
Python Version: 3.10.12
Operating System: Linux
Platform Machine: x86_64
Platform Version: #1 SMP Sat Apr 29 09:15:28 UTC 2023
Train Data Rows: 10886
Train Data Columns: 12
Label Column: count
Preprocessing data ...
AutoGluon infers your prediction problem is: 'regression' (because dtype of label-column == int and many un
Label info (max, min, mean, stddev): (977, 1, 191.57413, 181.14445)
If 'regression' is not the correct problem_type, please manually specify the problem_type parameter
Using Feature Generators to preprocess the data ...
Dropping user-specified ignored columns: ['casual', 'registered']
Fitting AutoMLPipelineFeatureGenerator...
Available Memory: 10662.99 MB
Train Data (Original) Memory Usage: 0.72 MB (0.0% of available memory)
Inferring data type of each feature based on column values. Set feature_metadata_in to manually spe
Stage 1 Generators:
Fitting AsTypeFeatureGenerator...
Note: Converting 2 features to boolean dtype as they only contain 2 unique values.
Stage 2 Generators:
Fitting FillNaFeatureGenerator...
Stage 3 Generators:
Fitting IdentityFeatureGenerator...
Fitting CategoryFeatureGenerator...
Fitting CategoryMemoryMinimizeFeatureGenerator...
Fitting DatetimeFeatureGenerator...
Stage 4 Generators:
Fitting DropUniqueFeatureGenerator...
Types of features in original data (raw dtype, special dtypes):
('category', []) : 2 | ['season', 'weather']
('datetime', []) : 1 | ['datetime']
('float', []) : 3 | ['temp', 'atemp', 'windspeed']
('int', []) : 4 | ['holiday', 'workingday', 'humidity', 'dayofweek']
Types of features in processed data (raw dtype, special dtypes):
('category', []) : 2 | ['season', 'weather']
('float', []) : 3 | ['temp', 'atemp', 'windspeed']
('int', []) : 2 | ['humidity', 'dayofweek']
('int', ['bool']) : 2 | ['holiday', 'workingday']
('int', ['datetime_as_int']) : 5 | ['datetime', 'datetime.year', 'datetime.month', 'datetin
0.2s = Fit runtime
10 features in original data used to generate 14 features in processed data.
Train Data (Processed) Memory Usage: 0.92 MB (0.0% of available memory)
Data preprocessing and feature engineering runtime = 0.21s ...
AutoGluon will gauge predictive performance using evaluation metric: 'root_mean_squared_error'
This metric's sign has been flipped to adhere to being higher_is_better. The metric score can be mu
To change this, specify the eval_metric parameter of Predictor()
AutoGluon will fit 2 stack levels (L1 to L2) ...
WARNING: "NN" model has been deprecated in v0.4.0 and renamed to "NN_MXNET". Starting in v0.6.0, sp
Fitting 2 L1 models ...
Hyperparameter tuning model: LightGBM_BAG_L1 ... Tuning model for up to 179.89s of the 599.79s of remaining
100% 5/5 [01:54<00:00, 22.87s/it]
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
Fitted model: LightGBM_BAG_L1/T1 ...
-135.234 = Validation score (-root_mean_squared_error)
22.68s = Training runtime
0.0s = Validation runtime
Fitted model: LightGBM_BAG_L1/T2 ...
-134.904 = Validation score (-root_mean_squared_error)
22.82s = Training runtime
0.0s = Validation runtime
Fitted model: LightGBM_BAG_L1/T3 ...
-134.0638 = Validation score (-root_mean_squared_error)
23.27s = Training runtime
0.0s = Validation runtime
Fitted model: LightGBM_BAG_L1/T4 ...
-155.9818 = Validation score (-root_mean_squared_error)
22.15s = Training runtime
0.0s = Validation runtime
Fitted model: LightGBM_BAG_L1/T5 ...
-135.7518 = Validation score (-root_mean_squared_error)
23.18s = Training runtime
0.0s = Validation runtime
Hyperparameter tuning model: NeuralNetMXNet_BAG_L1 ... Tuning model for up to 179.89s of the 485.5s of rema
100% 5/5 [00:33<00:00, 5.91s/it]
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
ray::_ray_fit() (pid=155552, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
train_dataset, val_dataset = self.generate_datasets(X=X, y=y, params=params, X_val=X_val, y_val=y_val)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
train_dataset = self.process_train_data(
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
df = self.processor.fit_transform(df) # 2D numpy array
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/_set_output.py", line 140, in wrapped
data_to_wrap = f(self, X, *args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 727, in fit_t
result = self._fit_transform(X, y, _fit_transform_one)
File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 658, in _fit_
return Parallel(n_jobs=self.n_jobs)(
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 63, in _call__
return super().__call__(iterable_with_config)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 1088, in _call__

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while self.dispatch_one_batch(iterator):
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 901, in dispatch_one_batch
self._dispatch(tasks)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 819, in _dispatch
job = self._backend.apply_async(batch, callback=cb)
File "/usr/local/lib/python3.10/dist-packages/joblib/_parallel_backends.py", line 208, in apply_async
result = ImmediateResult(func)
File "/usr/local/lib/python3.10/dist-packages/joblib/_parallel_backends.py", line 597, in _init__
self.results = batch()
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in __call__
return [func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in <listcomp>
return [func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 123, in __call__
return self.function(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 893, in _fit_transform_one
res = transformer.fit_transform(X, y, **fit_params)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 437, in fit_transform
Xt = self._fit(X, y, **fit_params_steps)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 359, in _fit
X, fitted_transformer = fit_transform_one_cached(
File "/usr/local/lib/python3.10/dist-packages/joblib/memory.py", line 349, in __call__
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File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/_set_output.py", line 140, in wrapped
data_to_wrap = f(self, X, *args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/base.py", line 878, in fit_transform
return self.fit(X, **fit_params).transform(X)
File "/usr/local/lib/python3.10/dist-packages/sklearn/impute/_base.py", line 408, in fit
raise ValueError(
ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
Traceback (most recent call last):
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 43, in
model = fit_and_save_model(
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 101, in
model.fit(**fit_args, time_limit=time_left)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/stacker_ensemble_model.py",
return super()._fit(X=X, y=y, time_limit=time_limit, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
self._fit_folds(X=X, y=y, model_base=model_base, X_pseudo=X_pseudo, y_pseudo=y_pseudo,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
fold_fitting_strategy.after_all_folds_scheduled()
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
raise processed_exception
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
time_end_fit, predict_time, predict_1_time = self.ray.get(finished)
File "/usr/local/lib/python3.10/dist-packages/ray/_private/client_mode_hook.py", line 105, in wrapper
return func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/ray/_private/worker.py", line 2309, in get
raise value.as_instanceof_cause()
ray.exceptions.RayTaskError(ValueError): ray::_ray_fit() (pid=155552, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
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File "/usr/local/lib/python3.10/dist-packages/joblib/_parallel_backends.py", line 597, in _init__
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File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in __call__
return [func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in <listcomp>
return [func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 123, in __call__
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File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 893, in _fit_transform_one
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File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 437, in fit_transform
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raise ValueError(
ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
2023-06-12 01:44:37,616 ERROR worker.py:400 -- Unhandled error (suppress with 'RAY_IGNORE_UNHANDLED_ERRORS=
ray::_ray_fit() (pid=155650, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
```

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fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
train_dataset, val_dataset = self.generate_datasets(X=X, y=y, params=params, X_val=X_val, y_val=y_val)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
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File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 658, in _fit_
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File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 63, in __call__
return super().__call__(iterable_with_config)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 1088, in __call__
while self.dispatch_one_batch(iterator):
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 901, in dispatch_one_batch
self._dispatch(tasks)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 819, in _dispatch
job = self._backend.apply_async(batch, callback=cb)
File "/usr/local/lib/python3.10/dist-packages/joblib/_parallel_backends.py", line 208, in apply_async
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File "/usr/local/lib/python3.10/dist-packages/joblib/_parallel_backends.py", line 597, in _init__
self.results = batch()
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in __call__
return [func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in <listcomp>
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File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 123, in __call__
return self.function(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 893, in _fit_transform_one
res = transformer.fit_transform(X, y, **fit_params)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 437, in fit_transform
Xt = self._fit(X, y, **fit_params_steps)
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File "/usr/local/lib/python3.10/dist-packages/sklearn/base.py", line 878, in fit_transform
return self.fit(X, **fit_params).transform(X)
File "/usr/local/lib/python3.10/dist-packages/sklearn/impute/_base.py", line 408, in fit
raise ValueError(
ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
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File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 43, in
model = fit_and_save_model(
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 101, i
model.fit(**fit_args, time_limit=time_left)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/stacker_ensemble_model.py",
return super()._fit(X=X, y=y, time_limit=time_limit, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
self._fit_folds(X=X, y=y, model_base=model_base, X_pseudo=X_pseudo, y_pseudo=y_pseudo,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
fold_fitting_strategy.after_all_folds_scheduled()
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
raise processed_exception
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
time_end_fit, predict_time, predict_1_time = self.ray.get(finished)
File "/usr/local/lib/python3.10/dist-packages/ray/_private/client_mode_hook.py", line 105, in wrapper
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raise value.as_instanceof_cause()
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File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
df = self.processor.fit_transform(df) # 2D numpy array
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File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in <listcomp>
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File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 123, in __call__
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File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 893, in _fit_transform_one
res = transformer.fit_transform(X, y, **fit_params)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 437, in fit_transform

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Xt = self._fit(X, y, **fit_params_steps)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 359, in _fit
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File "/usr/local/lib/python3.10/dist-packages/joblib/memory.py", line 349, in __call__
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File "/usr/local/lib/python3.10/dist-packages/sklearn/impute/_base.py", line 408, in fit
raise ValueError(
ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
2023-06-12 01:44:45.077 ERROR worker.py:400 -- Unhandled error (suppress with 'RAY_IGNORE_UNHANDLED_ERRORS=
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
ray::_ray_fit() (pid=155752, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", line 1
fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
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model = fit_and_save_model(
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File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/stacker_ensemble_model.py",
return super()._fit(X=X, y=y, time_limit=time_limit, **kwargs)
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self._fit_folds(X=X, y=y, model_base=model_base, X_pseudo=X_pseudo, y_pseudo=y_pseudo,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", line 1
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File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", line 1
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File "/usr/local/lib/python3.10/dist-packages/ray/_private/worker.py", line 2309, in get
raise value.as_instanceof_cause()
ray.exceptions.RayTaskError(ValueError): ray::_ray_fit() (pid=155752, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", line 1
fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
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File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 1088, in call

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ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
2023-06-12 01:44:53.467 ERROR worker.py:400 -- Unhandled error (suppress with 'RAY_IGNORE_UNHANDLED_ERRORS=
ray::_ray_fit() (pid=155849, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
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File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
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model.fit(**fit_args, time limit=time left)

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File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble_model.py", line 703
    out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/stacker_ensemble_model.py",
    return super()._fit(X=X, y=y, time_limit=time_limit, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
    self._fit_folds(X=X, y=y, model_base=model_base, X_pseudo=X_pseudo, y_pseudo=y_pseudo,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
    fold_fitting_strategy.after_all_folds_scheduled()
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
    raise processed_exception
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
    time_end_fit, predict_time, predict_1_time = self.ray.get(finished)
File "/usr/local/lib/python3.10/dist-packages/ray/_private/client_mode_hook.py", line 105, in wrapper
    return func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/ray/_private/worker.py", line 2309, in get
    raise value.as_instanceof_cause()
ray.exceptions.RayTaskError(ValueError): ray::_ray_fit() (pid=155933, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
    fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
    out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
    train_dataset, val_dataset = self.generate_datasets(X=X, y=y, params=params, X_val=X_val, y_val=y_val)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
    train_dataset = self.process_train_data()
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
    df = self.processor.fit_transform(df) # 2D numpy array
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/_set_output.py", line 140, in wrapped
    data_to_wrap = f(self, X, *args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 727, in fit_t
    result = self._fit_transform(X, y, _fit_transform_one)
File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 658, in _fit
    return Parallel(n_jobs=self.n_jobs)(
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 63, in __call__
    return super().__call__(iterable_with_config)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 1088, in __call__
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File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 901, in dispatch_one_batch
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File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 123, in __call__
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    res = transformer.fit_transform(X, y, **fit_params)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 437, in fit_transform
    Xt = self._fit(X, y, **fit_params_steps)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 359, in _fit
    X, fitted_transformer = fit_transform_one_cached(
File "/usr/local/lib/python3.10/dist-packages/joblib/memory.py", line 349, in __call__
    return self.func(*args, **kwargs)
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File "/usr/local/lib/python3.10/dist-packages/sklearn/base.py", line 878, in fit_transform
    return self.fit(X, **fit_params).transform(X)
File "/usr/local/lib/python3.10/dist-packages/sklearn/impute/_base.py", line 408, in fit
    raise ValueError(
ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
No model was trained during hyperparameter tuning NeuralNetMXNet_BAG_L1... Skipping this model.
Repeating k-fold bagging: 2/20
Fitting model: LightGBM_BAG_L1/T1 ... Training model for up to 252.09s of the 452.12s of remaining time.
    Fitting 8 child models (S2F1 - S2F8) | Fitting with ParallelLocalFoldFittingStrategy
2023-06-12 01:45:08.078 ERROR worker.py:400 -- Unhandled error (suppress with 'RAY_IGNORE_UNHANDLED_ERRORS=
-134.7649      = Validation score    (-root_mean_squared_error)
    40.0s      = Training runtime
    0.12s      = Validation runtime
Fitting model: LightGBM_BAG_L1/T2 ... Training model for up to 228.41s of the 428.44s of remaining time.
    Fitting 8 child models (S2F1 - S2F8) | Fitting with ParallelLocalFoldFittingStrategy
-134.3446      = Validation score    (-root_mean_squared_error)
    47.31s     = Training runtime
    0.32s     = Validation runtime
Fitting model: LightGBM_BAG_L1/T3 ... Training model for up to 198.33s of the 398.36s of remaining time.
    Fitting 8 child models (S2F1 - S2F8) | Fitting with ParallelLocalFoldFittingStrategy
-133.4625      = Validation score    (-root_mean_squared_error)
    41.34s     = Training runtime
    0.17s     = Validation runtime
Fitting model: LightGBM_BAG_L1/T4 ... Training model for up to 174.92s of the 374.95s of remaining time.
    Fitting 8 child models (S2F1 - S2F8) | Fitting with ParallelLocalFoldFittingStrategy
-155.8543      = Validation score    (-root_mean_squared_error)
    40.55s     = Training runtime
    0.12s     = Validation runtime
Fitting model: LightGBM_BAG_L1/T5 ... Training model for up to 151.63s of the 351.66s of remaining time.
    Fitting 8 child models (S2F1 - S2F8) | Fitting with ParallelLocalFoldFittingStrategy
-135.2861      = Validation score    (-root_mean_squared_error)
    42.24s     = Training runtime
    0.13s     = Validation runtime
Completed 2/20 k-fold bagging repeats ...
Fitting model: WeightedEnsemble_L2 ... Training model for up to 360.0s of the 328.09s of remaining time.
-133.4353      = Validation score    (-root_mean_squared_error)
    0.37s     = Training runtime
    0.0s      = Validation runtime
WARNING: "NN" model has been deprecated in v0.4.0 and renamed to "NN_MXNET". Starting in v0.6.0, sp
Fitting 2 L2 models ...
Hyperparameter tuning model: LightGBM_BAG_L2 ... Tuning model for up to 147.47s of the 327.69s of remaining
100%
5/5 [02:02<00:00, 23.94s/it]

    Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
    Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
    Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy

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Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
Fitted model: LightGBM_BAG_L2/T1 ...
-133.1708      = Validation score    (-root_mean_squared_error)
26.24s      = Training runtime
0.0s       = Validation runtime
Fitted model: LightGBM_BAG_L2/T2 ...
-132.8025      = Validation score    (-root_mean_squared_error)
26.26s      = Training runtime
0.0s       = Validation runtime
Fitted model: LightGBM_BAG_L2/T3 ...
-133.8095      = Validation score    (-root_mean_squared_error)
24.31s      = Training runtime
0.0s       = Validation runtime
Fitted model: LightGBM_BAG_L2/T4 ...
-148.7502      = Validation score    (-root_mean_squared_error)
23.08s      = Training runtime
0.0s       = Validation runtime
Fitted model: LightGBM_BAG_L2/T5 ...
-133.2849      = Validation score    (-root_mean_squared_error)
22.98s      = Training runtime
0.0s       = Validation runtime
Hyperparameter tuning model: NeuralNetMXNet_BAG_L2 ... Tuning model for up to 147.47s of the 204.66s of rem
100%
5/5 [00:33<00:00, 6.75s/it]
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Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
ray::ray_fit() (pid=159670, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
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train_dataset, val_dataset = self.generate_datasets(X=X, y=y, params=params, X_val=X_val, y_val=y_val)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
train_dataset = self.process_train_data(
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File "/usr/local/lib/python3.10/dist-packages/sklearn/base.py", line 878, in fit_transform
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File "/usr/local/lib/python3.10/dist-packages/sklearn/impute/_base.py", line 408, in fit
raise ValueError(
ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
Traceback (most recent call last):
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 43, in
model = fit_and_save_model(
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 101, i
model.fit(**fit_args, time_limit=time_left)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/stacker_ensemble_model.py",
return super()._fit(X=X, y=y, time_limit=time_limit, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
self._fit_folds(X=X, y=y, model_base=model_base, X_pseudo=X_pseudo, y_pseudo=y_pseudo,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
fold_fitting_strategy.after_all_folds_scheduled()
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
raise processed_exception
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
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File "/usr/local/lib/python3.10/dist-packages/ray/_private/worker.py", line 2309, in get
raise value.as_instanceof_cause()
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df = self.processor.fit_transform(df) # 2D numpy array
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/_set_output.py", line 140, in wrapped
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    raise ValueError(
ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
2023-06-12 01:49:18.440 ERROR worker.py:400 -- Unhandled error (suppress with 'RAY_IGNORE_UNHANDLED_ERRORS=
    Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
ray::ray_fit() (pid=159768, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", line 1
    fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
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ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
Traceback (most recent call last):
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 43, in
    model = fit_and_save_model(
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 101, in
    model.fit(**fit_args, time_limit=time_left)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
    out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/stacker_ensemble_model.py",
    return super()._fit(X=X, y=y, time_limit=time_limit, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", line 1
    self._fit_folds(X=X, y=y, model_base=model_base, X_pseudo=X_pseudo, y_pseudo=y_pseudo,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", line 1
    fold_fitting_strategy.after_all_folds_scheduled()

```

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File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
raise processed_exception
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
time_end_fit, predict_time, predict_1_time = self.ray.get(finished)
File "/usr/local/lib/python3.10/dist-packages/ray/_private/client_mode_hook.py", line 105, in wrapper
return func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/ray/_private/worker.py", line 2309, in get
raise value.as_instanceof_cause()
ray.exceptions.RayTaskError(ValueError): ray::ray_fit() (pid=159768, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
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train_dataset, val_dataset = self.generate_datasets(X=X, y=y, params=params, X_val=X_val, y_val=y_val)
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File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 658, in _fit_
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File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 1088, in __call__
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File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 893, in _fit_transform_one
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ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
2023-06-12 01:49:25.067 ERROR worker.py:400 -- Unhandled error (suppress with 'RAY_IGNORE_UNHANDLED_ERRORS=
Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
ray::ray_fit() (pid=159896, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
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2023-06-12 01:49:29.935 ERROR worker.py:400 -- Unhandled error (suppress with 'RAY_IGNORE_UNHANDLED_ERRORS=
ray::_ray_fit() (pid=159982, ip=172.28.0.12)
  File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
    fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
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```

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File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in __call__
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    df = self.processor.fit_transform(df) # 2D numpy array
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    data_to_wrap = f(self, X, *args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 727, in fit_t
    result = self._fit_transform(X, y, _fit_transform_one)
File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 658, in _fit
    return Parallel(n_jobs=self.n_jobs)(
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 63, in __call__
    return super().__call__(iterable_with_config)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 1088, in __call__
    while self.dispatch_one_batch(iterator):
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 901, in dispatch_one_batch
    self._dispatch(tasks)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 819, in _dispatch
    job = self._backend.apply_async(batch, callback=cb)
File "/usr/local/lib/python3.10/dist-packages/joblib/_parallel_backends.py", line 208, in apply_async
    result = ImmediateResult(func)
File "/usr/local/lib/python3.10/dist-packages/joblib/_parallel_backends.py", line 597, in __init__
    self.results = batch()
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in __call__
    return [func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in <listcomp>
    return [func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 123, in __call__
    return self.function(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 893, in _fit_transform_one
    res = transformer.fit_transform(X, y, **fit_params)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 437, in fit_transform
    Xt = self._fit(X, y, **fit_params_steps)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 359, in _fit
    X, fitted_transformer = fit_transform_one_cached(
File "/usr/local/lib/python3.10/dist-packages/joblib/memory.py", line 349, in __call__
    return self.func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 893, in _fit_transform_one
    res = transformer.fit_transform(X, y, **fit_params)
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/_set_output.py", line 140, in wrapped
    data_to_wrap = f(self, X, *args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/base.py", line 878, in fit_transform
    return self.fit(X, **fit_params).transform(X)
File "/usr/local/lib/python3.10/dist-packages/sklearn/impute/_base.py", line 408, in fit
    raise ValueError(
ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
2023-06-12 01:49:34.378 ERROR worker.py:400 -- Unhandled error (suppress with 'RAY_IGNORE_UNHANDLED_ERRORS=
    Fitting 8 child models (S1F1 - S1F8) | Fitting with ParallelLocalFoldFittingStrategy
ray::_ray_fit() (pid=160070, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
    fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
    out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
    train_dataset, val_dataset = self.generate_datasets(X=X, y=y, params=params, X_val=X_val, y_val=y_val)
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
    train_dataset = self.process_train_data(
File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
    df = self.processor.fit_transform(df) # 2D numpy array

```



```

File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/_set_output.py", line 140, in wrapped
    data_to_wrap = f(self, X, *args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 727, in fit_transform
    result = self._fit_transform(X, y, _fit_transform_one)
File "/usr/local/lib/python3.10/dist-packages/sklearn/compose/_column_transformer.py", line 658, in _fit_transform
    return Parallel(n_jobs=self.n_jobs)(
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/parallel.py", line 63, in __call__
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File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 901, in dispatch_one_batch
    self._dispatch(tasks)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 819, in _dispatch
    job = self._backend.apply_async(batch, callback=cb)
File "/usr/local/lib/python3.10/dist-packages/joblib/_parallel_backends.py", line 208, in apply_async
    result = ImmediateResult(func)
File "/usr/local/lib/python3.10/dist-packages/joblib/_parallel_backends.py", line 597, in _init__
    self.results = batch()
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in __call__
    return [func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/joblib/parallel.py", line 288, in <listcomp>
    return [func(*args, **kwargs)
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    Xt = self._fit(X, y, **fit_params_steps)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 359, in _fit
    X, fitted_transformer = fit_transform_one_cached(
File "/usr/local/lib/python3.10/dist-packages/joblib/memory.py", line 349, in __call__
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    return self.fit(X, **fit_params).transform(X)
File "/usr/local/lib/python3.10/dist-packages/sklearn/impute/_base.py", line 408, in fit
    raise ValueError(
ValueError: 'fill_value' is invalid. Expected a numerical value when imputing numerical data
Traceback (most recent call last):
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 43, in
    model = fit_and_save_model(
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/model_trial.py", line 101, in
    model.fit(**fit_args, time_limit=time_left)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/abstract/abstract_model.py", line 703
    out = self._fit(**kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/stacker_ensemble_model.py",
    return super()._fit(X=X, y=y, time_limit=time_limit, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
    self._fit_folds(X=X, y=y, model_base=model_base, X_pseudo=X_pseudo, y_pseudo=y_pseudo,
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/bagged_ensemble_model.py", 1
    fold_fitting_strategy.after_all_folds_scheduled()
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
    raise processed_exception
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
    time_end_fit, predict_time, predict_1_time = self.ray.get(finished)
File "/usr/local/lib/python3.10/dist-packages/ray/_private/client_mode_hook.py", line 105, in wrapper
    return func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/ray/_private/worker.py", line 2309, in get
    raise value.as_instanceof_cause()
ray.exceptions.RayTaskError(ValueError): ray::_ray_fit() (pid=160070, ip=172.28.0.12)
File "/usr/local/lib/python3.10/dist-packages/autogluon/core/models/ensemble/fold_fitting_strategy.py", 1
    fold_model.fit(X=X_fold, y=y_fold, X_val=X_val_fold, y_val=y_val_fold,
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File "/usr/local/lib/python3.10/dist-packages/autogluon/tabular/models/tabular_nn/mxnet/tabular_nn_mxnet.
    train_dataset = self.process_train_data(
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File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 893, in _fit_transform_one
    res = transformer.fit_transform(X, y, **fit_params)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 437, in fit_transform
    Xt = self._fit(X, y, **fit_params_steps)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 359, in _fit
    X, fitted_transformer = fit_transform_one_cached(
File "/usr/local/lib/python3.10/dist-packages/joblib/memory.py", line 349, in __call__
    return self.func(*args, **kwargs)
File "/usr/local/lib/python3.10/dist-packages/sklearn/pipeline.py", line 893, in _fit_transform_one
    res = transformer.fit_transform(X, y, **fit_params)
File "/usr/local/lib/python3.10/dist-packages/sklearn/utils/_set_output.py", line 140, in wrapped
    data_to_wrap = f(self, X, *args, **kwargs)

```

```
File "/usr/local/lib/python3.10/dist-packages/sklearn/base.py", line 878, in fit_transform
    return self.fit(X, **fit_params).transform(X)
File "/usr/local/lib/python3.10/dist-packages/sklearn/impute/_base.py", line 408, in fit
    raise ValueError(
ValueError: 'fill_value'!=missing! is invalid. Expected a numerical value when imputing numerical data
No model was trained during hyperparameter tuning NeuralNetMXNet_BAG_L2... Skipping this model.
Completed 1/20 k-fold bagging repeats ...
Fitting model: WeightedEnsemble_L3 ... Training model for up to 360.0s of the 170.97s of remaining time.
2023-06-12 01:49:43,096 ERROR worker.py:400 -- Unhandled error (suppress with 'RAY_IGNORE_UNHANDLED_ERRORS=
-132.7531      = Validation score      (-root_mean_squared_error)
0.78s      = Training runtime
0.0s      = Validation runtime
AutoGluon training complete, total runtime = 429.87s ... Best model: "WeightedEnsemble_L3"
TabularPredictor saved. To load, use: predictor = TabularPredictor.load("AutogluonModels/ag-20230612_014233
```

predictor\_new\_hpo.fit\_summary()

```
*** Summary of fit() ***
Estimated performance of each model:
      model      score_val  pred_time_val  fit_time  pred_time_val_marginal  fit_time_marginal  stack_level  can_infer  fit_order
0  WeightedEnsemble_L3 -132.753084      0.864384    289.035294      0.001000      0.780450          3      True      12
1  LightGBM_BAG_L2/T2 -132.802509      0.863165    237.704990      0.000119      26.262361          2      True      8
2  LightGBM_BAG_L2/T1 -133.170777      0.863154    237.680641      0.000107      26.238012          2      True      7
3  LightGBM_BAG_L2/T5 -133.284863      0.863175    234.421907      0.000128      22.979278          2      True     11
4  WeightedEnsemble_L2 -133.435258      0.488751      89.021294      0.000897      0.370751          2      True      6
5  LightGBM_BAG_L1/T3 -133.462471      0.170441    41.343043      0.170441      41.343043          1      True      3
6  LightGBM_BAG_L2/T3 -133.809542      0.863158    235.754472      0.000111      24.311842          2      True      9
7  LightGBM_BAG_L1/T2 -134.344603      0.317414     47.307500      0.317414      47.307500          1      True      2
8  LightGBM_BAG_L1/T1 -134.764913      0.123779     39.999125      0.123779      39.999125          1      True      1
9  LightGBM_BAG_L1/T5 -135.286131      0.131668     42.242543      0.131668      42.242543          1      True      5
10 LightGBM_BAG_L2/T4 -148.750178      0.863155    234.526364      0.000108      23.083735          2      True     10
11 LightGBM_BAG_L1/T4 -155.854306      0.119745     40.550419      0.119745      40.550419          1      True      4
Number of models trained: 12
Types of models trained:
{'WeightedEnsembleModel', 'StackerEnsembleModel_LGB'}
Bagging used: True (with 8 folds)
Multi-layer stack-ensembling used: True (with 3 levels)
Feature Metadata (Processed):
(raw dtype, special dtypes):
('category', [])      : 2 | ['season', 'weather']
('float', [])      : 3 | ['temp', 'atemp', 'windspeed']
('int', [])      : 2 | ['humidity', 'dayofweek']
('int', ['bool'])    : 2 | ['holiday', 'workingday']
('int', ['datetime_as_int']) : 5 | ['datetime', 'datetime.year', 'datetime.month', 'datetime.day', 'datetime.dayofweek']
*** End of fit() summary ***
/usr/local/lib/python3.10/dist-packages/autogluon/core/utils/plots.py:138: UserWarning: AutoGluon summary plots cannot be created because bokeh is not installed.
warnings.warn('AutoGluon summary plots cannot be created because bokeh is not installed. To see plots, please do: "pip install bokeh==2.0.1"')
{'model_types': {'LightGBM_BAG_L1/T1': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L1/T2': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L1/T3': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L1/T4': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L1/T5': 'StackerEnsembleModel_LGB',
'WeightedEnsemble_L2': 'WeightedEnsembleModel',
'LightGBM_BAG_L2/T1': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L2/T2': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L2/T3': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L2/T4': 'StackerEnsembleModel_LGB',
'LightGBM_BAG_L2/T5': 'StackerEnsembleModel_LGB',
'WeightedEnsemble_L3': 'WeightedEnsembleModel'},
'model_performance': {'LightGBM_BAG_L1/T1': -134.76491326490574,
'LightGBM_BAG_L1/T2': -134.34460285274366,
'LightGBM_BAG_L1/T3': -133.46247083161762,
'LightGBM_BAG_L1/T4': -155.85430623036984,
'LightGBM_BAG_L1/T5': -135.28613144493488,
'WeightedEnsemble_L2': -133.43525781779988,
'LightGBM_BAG_L2/T1': -133.17077679058127,
'LightGBM_BAG_L2/T2': -132.8025090186813,
'LightGBM_BAG_L2/T3': -133.809541657266,
'LightGBM_BAG_L2/T4': -148.75017760072166,
'LightGBM_BAG_L2/T5': -133.28486260091515,
'WeightedEnsemble_L3': -132.75308429034763},
'model_best': 'WeightedEnsemble_L3',
'model_paths': {'LightGBM_BAG_L1/T1': '/content/AutogluonModels/ag-20230612_014233/models/LightGBM_BAG_L1/T1/',
'LightGBM_BAG_L1/T2': '/content/AutogluonModels/ag-20230612_014233/models/LightGBM_BAG_L1/T2/',
'LightGBM_BAG_L1/T3': '/content/AutogluonModels/ag-20230612_014233/models/LightGBM_BAG_L1/T3/',
'LightGBM_BAG_L1/T4': '/content/AutogluonModels/ag-20230612_014233/models/LightGBM_BAG_L1/T4/',
'LightGBM_BAG_L1/T5': '/content/AutogluonModels/ag-20230612_014233/models/LightGBM_BAG_L1/T5/',
'WeightedEnsemble_L2': '/content/AutogluonModels/ag-20230612_014233/models/WeightedEnsemble_L2',
'WeightedEnsemble_L3': '/content/AutogluonModels/ag-20230612_014233/models/WeightedEnsemble_L3'}}
```

```
# Remember to set all negative values to zero
prediction_new_hpo = predictor_new_hpo.predict(test)
prediction_new_hpo[prediction_new_hpo < 0] = 0
```

```
# Same submitting predictions
submission_new_hpo = pd.read_csv("sampleSubmission.csv", parse_dates=["datetime"])
submission_new_hpo["count"] = prediction_new_hpo
submission_new_hpo.to_csv("submission_new_hpo.csv", index=False)
```

!kaggle competitions submit -c bike-sharing-demand -f submission\_new\_hpo.csv -m "new features with hyperparameters"

```
100% 188k/188k [00:01<00:00, 111kB/s]
Successfully submitted to Bike Sharing Demand
```

!kaggle competitions submissions -c bike-sharing-demand | tail -n +1 | head -n 5

fileName	date	description	status	publicScore	privateScore
submission_new_hpo.csv	2023-06-12 01:49:51	new features with hyperparameters	complete	1.50047	1.50047
submission_new_features.csv	2023-06-12 01:42:32	new features	complete	2.14682	2.14682
submission.csv	2023-06-12 01:28:57	first raw submission	complete	1.80586	1.80586

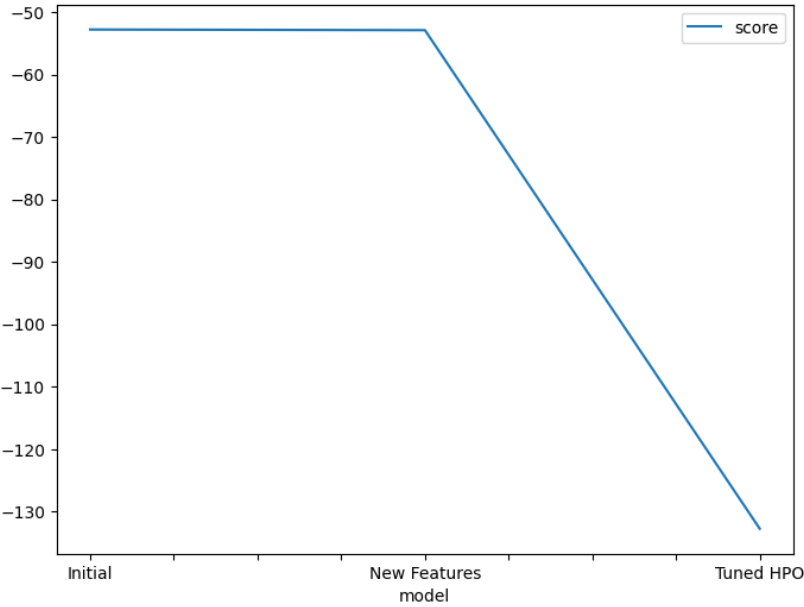
New Score of 1.50047

Step 7: Write a Report

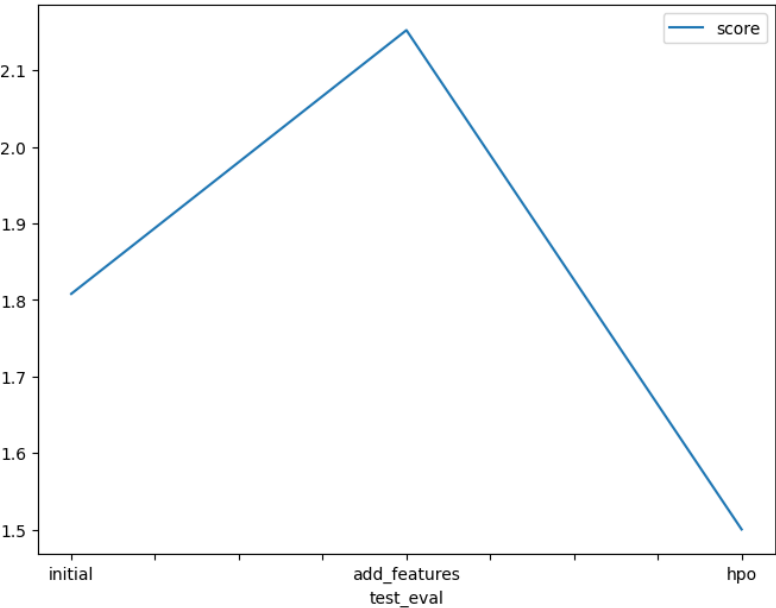
Refer to the markdown file for the full report

Creating plots and table for report

```
# Taking the top model score from each training run and creating a line plot to show improvement
# You can create these in the notebook and save them to PNG or use some other tool (e.g. google sheets, excel)
fig = pd.DataFrame(
    {
        "model": ["Initial", "New Features", "Tuned HPO"],
        "score": [-52.808268, -52.915011, -132.753084]
    }
).plot(x="model", y="score", figsize=(8, 6)).get_figure()
fig.savefig('model_train_score.png')
```



```
# Take the 3 kaggle scores and create a line plot to show improvement
fig = pd.DataFrame(
    {
        "test_eval": ["initial", "add_features", "hpo"],
        "score": [1.80813, 2.15247, 1.50047]
    }
).plot(x="test_eval", y="score", figsize=(8, 6)).get_figure()
fig.savefig('model_test_score.png')
```



Hyperparameter table

```
# The 3 hyperparameters we tuned with the kaggle score as the result
pd.DataFrame({
    "model": ["initial", "add_features", "hpo"],
    "hp-method": ["Auto", "Regression", "Tabular"],
    "score": [1.80506, 2.14682, 1.50047],
}))
```