Code for Abalone Dataset무시

In [1]:
```
pip install ucimlrepo
```

```
Requirement already satisfied: ucimlrepo in c:\anacon\lib\site-packages (0.0.7)
Requirement already satisfied: pandas>=1.0.0 in c:\anacon\lib\site-packages (from
ucimlrepo) (2.1.4)
Requirement already satisfied: certifi>=2020.12.5 in c:\anacon\lib\site-packages
(from ucimlrepo) (2024.2.2)
Requirement already satisfied: numpy<2,>=1.23.2 in c:\anacon\lib\site-packages (f
rom pandas>=1.0.0->ucimlrepo) (1.26.4)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\anacon\lib\site-packa
ges (from pandas>=1.0.0->ucimlrepo) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in c:\anacon\lib\site-packages (from
pandas>=1.0.0->ucimlrepo) (2023.3.post1)
Requirement already satisfied: tzdata>=2022.1 in c:\anacon\lib\site-packages (fro
m pandas>=1.0.0->ucimlrepo) (2023.3)
Requirement already satisfied: six>=1.5 in c:\anacon\lib\site-packages (from pyth
on-dateutil>=2.8.2->pandas>=1.0.0->ucimlrepo) (1.16.0)
Note: you may need to restart the kernel to use updated packages.
```

In [11]:
```
from ucimlrepo import fetch_ucirepo

# fetch dataset
abalone = fetch_ucirepo(id=1)

# data (as pandas dataframes)
X = abalone.data.features
y = abalone.data.targets

# metadata
print(abalone.metadata)

# variable information
print(abalone.variables)
```

{'uci_id': 1, 'name': 'Abalone', 'repository_url': 'https://archive.ics.uci.edu/dataset/1/abalone', 'data_url': 'https://archive.ics.uci.edu/static/public/1/data.csv', 'abstract': 'Predict the age of abalone from physical measurements', 'area': 'Biology', 'tasks': ['Classification', 'Regression'], 'characteristics': ['Tabular'], 'num_instances': 4177, 'num_features': 8, 'feature_types': ['Categorical', 'Integer', 'Real'], 'demographics': [], 'target_col': ['Rings'], 'index_col': None, 'has_missing_values': 'no', 'missing_values_symbol': None, 'year_of_dataset_creation': 1994, 'last_updated': 'Mon Aug 28 2023', 'dataset_doi': '10.24432/C55C7W', 'creators': ['Warwick Nash', 'Tracy Sellers', 'Simon Talbot', 'Andrew Cawthorn', 'Wes Ford'], 'intro_paper': None, 'additional_info': {'summary': 'Predicting the age of abalone from physical measurements. The age of abalone is determined by cutting the shell through the cone, staining it, and counting the number of rings through a microscope -- a boring and time-consuming task. Other measurements, which are easier to obtain, are used to predict the age. Further information, such as weather patterns and location (hence food availability) may be required to solve the problem.\r\n\r\nFrom the original data examples with missing values were removed (the majority having the predicted value missing), and the ranges of the continuous values have been scaled for use with an ANN (by dividing by 200).', 'purpose': None, 'funded_by': None, 'instances_represent': None, 'recommended_data_splits': None, 'sensitive_data': None, 'preprocessing_description': None, 'variable_info': 'Given is the attribute name, attribute type, the measurement unit and a brief description. The number of rings is the value to predict: either as a continuous value or as a classification problem.\r\n\r\nName / Data Type / Measurement Unit / Description\r\n-----------------------------\r\nSex / nominal / -- / M, F, and I (infant)\r\nLength / continuous / mm / Longest shell measurement\r\nDiameter\t/ continuous / mm / perpendicular to length\r\nHeight / continuous / mm / with meat in shell\r\nWhole weight / continuous / grams / whole abalone\r\nShucked weight / continuous\t / grams / weight of meat\r\nViscera weight / continuous / grams / gut weight (after bleeding)\r\nShell weight / continuous / grams / after being dried\r\nRings / integer / -- / +1.5 gives the age in years\r\n\r\nThe readme file contains attribute statistics.', 'citation': None}}

```
             name     role         type demographic  \
0             Sex  Feature  Categorical        None
1          Length  Feature   Continuous        None
2        Diameter  Feature   Continuous        None
3          Height  Feature   Continuous        None
4    Whole_weight  Feature   Continuous        None
5  Shucked_weight  Feature   Continuous        None
6  Viscera_weight  Feature   Continuous        None
7    Shell_weight  Feature   Continuous        None
8           Rings   Target      Integer        None

                 description  units missing_values
0         M, F, and I (infant)   None             no
1    Longest shell measurement     mm             no
2      perpendicular to length     mm             no
3          with meat in shell     mm             no
4               whole abalone  grams             no
5              weight of meat  grams             no
6  gut weight (after bleeding)  grams             no
7            after being dried  grams             no
8  +1.5 gives the age in years   None             no
```

In [12]:
```
X
```

Out[12]:

	Sex	Length	Diameter	Height	Whole_weight	Shucked_weight	Viscera_weight
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395
...	...	...	...	...	...	...	...
4172	F	0.565	0.450	0.165	0.8870	0.3700	0.2390
4173	M	0.590	0.440	0.135	0.9660	0.4390	0.2145
4174	M	0.600	0.475	0.205	1.1760	0.5255	0.2875
4175	F	0.625	0.485	0.150	1.0945	0.5310	0.2610
4176	M	0.710	0.555	0.195	1.9485	0.9455	0.3765

4177 rows × 8 columns

In [13]:

```
y
```

Out[13]:

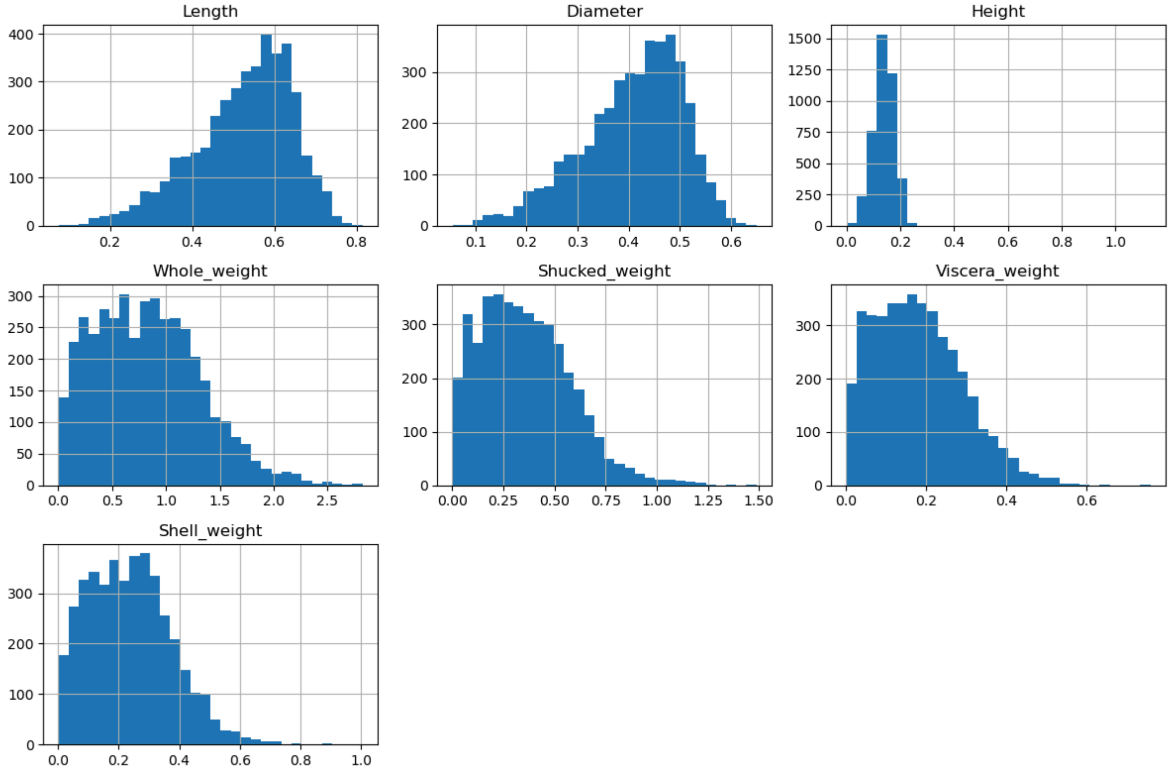
	Rings
0	15
1	7
2	9
3	10
4	7
...	...
4172	11
4173	10
4174	9
4175	10
4176	12

4177 rows × 1 columns

In [7]:

```
import matplotlib.pyplot as plt

X.hist(figsize=(12, 8), bins=30)
plt.tight_layout()
plt.show()
```

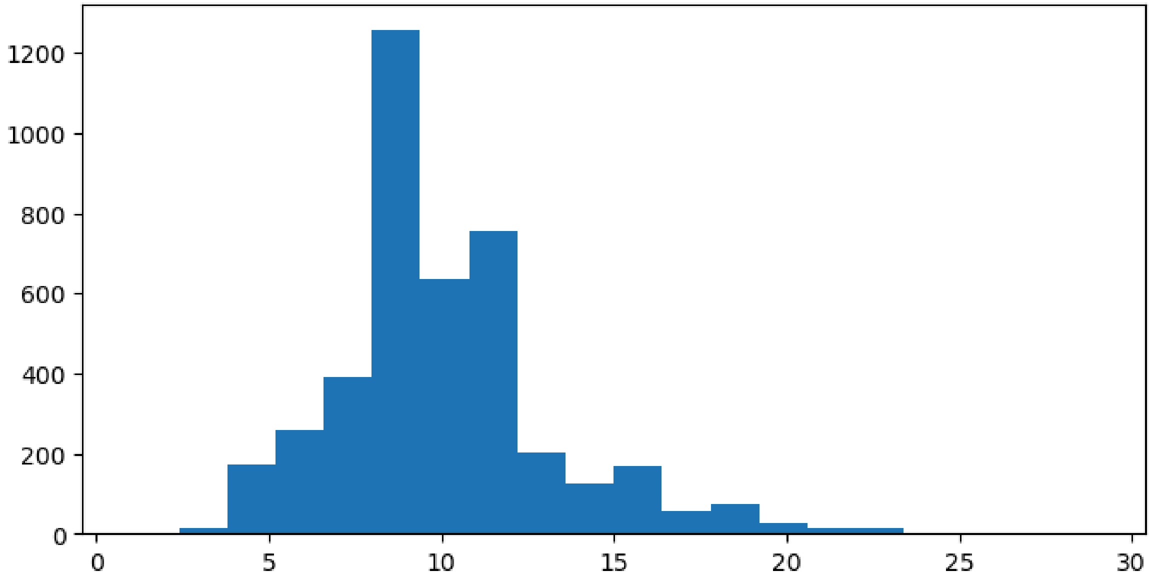


In [8]:

```
import matplotlib.pyplot as plt
import seaborn as sns

plt.figure(figsize=(8, 4))
plt.hist(y, bins=20)
plt.show()

print(y.describe())
```



```
            Rings
count  4177.000000
mean      9.933684
std       3.224169
min       1.000000
25%       8.000000
50%       9.000000
75%      11.000000
max      29.000000
```

In [3]:
```
from autogluon.tabular import TabularPredictor
from sklearn.model_selection import train_test_split
from sklearn.metrics import r2_score

X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=42)

# AutoGluon용 데이터 준비
train_data = X_train.copy()
train_data['target'] = y_train

test_data = X_test.copy()
test_data['target'] = y_test
# AutoML 모델 학습
predictor = TabularPredictor(label='target').fit(train_data)

predictions = predictor.predict(test_data.drop(columns=['target']))
print(predictor.evaluate(test_data))
```

```
No path specified. Models will be saved in: "AutogluonModels\ag-20250613_050741"
Verbosity: 2 (Standard Logging)
=================== System Info ===================
AutoGluon Version:  1.3.1
Python Version:     3.11.7
Operating System:   Windows
Platform Machine:   AMD64
Platform Version:   10.0.26100
CPU Count:          12
Memory Avail:       8.37 GB / 15.69 GB (53.3%)
Disk Space Avail:   317.99 GB / 476.05 GB (66.8%)
===================================================
No presets specified! To achieve strong results with AutoGluon, it is recommended
to use the available presets. Defaulting to `'medium'`...
        Recommended Presets (For more details refer to https://auto.gluon.ai/stab
le/tutorials/tabular/tabular-essentials.html#presets):
        presets='experimental' : New in v1.2: Pre-trained foundation model + para
llel fits. The absolute best accuracy without consideration for inference speed.
Does not support GPU.
        presets='best'         : Maximize accuracy. Recommended for most users. U
se in competitions and benchmarks.
        presets='high'         : Strong accuracy with fast inference speed.
        presets='good'         : Good accuracy with very fast inference speed.
        presets='medium'       : Fast training time, ideal for initial prototypin
g.
Beginning AutoGluon training ...
AutoGluon will save models to "C:\Users\준서\Desktop\Jun\3-2\데과프\A5\AutogluonM
odels\ag-20250613_050741"
Train Data Rows:    3132
Train Data Columns: 8
Label Column:       target
AutoGluon infers your prediction problem is: 'multiclass' (because dtype of label
-column == int, but few unique label-values observed).
        First 10 (of 28) unique label values:  [9, 12, 10, 15, 6, 8, 5, 11, 7, 1
4]
        If 'multiclass' is not the correct problem_type, please manually specify
the problem_type parameter during Predictor init (You may specify problem_type as
one of: ['binary', 'multiclass', 'regression', 'quantile'])
Problem Type:       multiclass
Preprocessing data ...
Warning: Some classes in the training set have fewer than 10 examples. AutoGluon
will only keep 19 out of 28 classes for training and will not try to predict the
rare classes. To keep more classes, increase the number of datapoints from these
rare classes in the training data or reduce label_count_threshold.
Fraction of data from classes with at least 10 examples that will be kept for tra
ining models: 0.9945721583652618
Train Data Class Count: 19
Using Feature Generators to preprocess the data ...
Fitting AutoMLPipelineFeatureGenerator...
        Available Memory:                    8563.79 MB
        Train Data (Original)  Memory Usage: 0.34 MB (0.0% of available memory)
        Inferring data type of each feature based on column values. Set feature_m
etadata_in to manually specify special dtypes of the features.
        Stage 1 Generators:
                Fitting AsTypeFeatureGenerator...
        Stage 2 Generators:
                Fitting FillNaFeatureGenerator...
        Stage 3 Generators:
                Fitting IdentityFeatureGenerator...
                Fitting CategoryFeatureGenerator...
```

```
                        Fitting CategoryMemoryMinimizeFeatureGenerator...
        Stage 4 Generators:
                Fitting DropUniqueFeatureGenerator...
        Stage 5 Generators:
                Fitting DropDuplicatesFeatureGenerator...
        Types of features in original data (raw dtype, special dtypes):
                ('float', [])  : 7 | ['Length', 'Diameter', 'Height', 'Whole_weig
ht', 'Shucked_weight', ...]
                ('object', []) : 1 | ['Sex']
        Types of features in processed data (raw dtype, special dtypes):
                ('category', []) : 1 | ['Sex']
                ('float', [])    : 7 | ['Length', 'Diameter', 'Height', 'Whole_we
ight', 'Shucked_weight', ...]
        0.4s = Fit runtime
        8 features in original data used to generate 8 features in processed dat
a.
        Train Data (Processed) Memory Usage: 0.17 MB (0.0% of available memory)
Data preprocessing and feature engineering runtime = 0.45s ...
AutoGluon will gauge predictive performance using evaluation metric: 'accuracy'
        To change this, specify the eval_metric parameter of Predictor()
Automatically generating train/validation split with holdout_frac=0.1596424010217
1137, Train Rows: 2617, Val Rows: 498
User-specified model hyperparameters to be fit:
{
        'NN_TORCH': [{}],
        'GBM': [{'extra_trees': True, 'ag_args': {'name_suffix': 'XT'}}, {}, {'le
arning_rate': 0.03, 'num_leaves': 128, 'feature_fraction': 0.9, 'min_data_in_lea
f': 3, 'ag_args': {'name_suffix': 'Large', 'priority': 0, 'hyperparameter_tune_kw
args': None}}],
        'CAT': [{}],
        'XGB': [{}],
        'FASTAI': [{}],
        'RF': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini', 'problem_
types': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args': {'name_su
ffix': 'Entr', 'problem_types': ['binary', 'multiclass']}}, {'criterion': 'square
d_error', 'ag_args': {'name_suffix': 'MSE', 'problem_types': ['regression', 'quan
tile']}}],
        'XT': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini', 'problem_
types': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args': {'name_su
ffix': 'Entr', 'problem_types': ['binary', 'multiclass']}}, {'criterion': 'square
d_error', 'ag_args': {'name_suffix': 'MSE', 'problem_types': ['regression', 'quan
tile']}}],
        'KNN': [{'weights': 'uniform', 'ag_args': {'name_suffix': 'Unif'}}, {'wei
ghts': 'distance', 'ag_args': {'name_suffix': 'Dist'}}],
}
Fitting 13 L1 models, fit_strategy="sequential" ...
Fitting model: KNeighborsUnif ...
        0.2028   = Validation score   (accuracy)
        10.77s   = Training   runtime
        0.03s    = Validation runtime
Fitting model: KNeighborsDist ...
        0.2269   = Validation score   (accuracy)
        0.02s    = Training   runtime
        0.03s    = Validation runtime
Fitting model: NeuralNetFastAI ...
        0.2791   = Validation score   (accuracy)
        22.56s   = Training   runtime
        0.07s    = Validation runtime
Fitting model: LightGBMXT ...
        0.2831   = Validation score   (accuracy)
```

```
        34.03s   = Training   runtime
        0.1s     = Validation runtime
Fitting model: LightGBM ...
        0.2369   = Validation score   (accuracy)
        35.66s   = Training   runtime
        0.02s    = Validation runtime
Fitting model: RandomForestGini ...
        0.2329   = Validation score   (accuracy)
        3.69s    = Training   runtime
        0.22s    = Validation runtime
Fitting model: RandomForestEntr ...
        0.239    = Validation score   (accuracy)
        2.81s    = Training   runtime
        0.24s    = Validation runtime
Fitting model: CatBoost ...
        0.2892   = Validation score   (accuracy)
        65.45s   = Training   runtime
        0.02s    = Validation runtime
Fitting model: ExtraTreesGini ...
        0.245    = Validation score   (accuracy)
        3.0s     = Training   runtime
        0.22s    = Validation runtime
Fitting model: ExtraTreesEntr ...
        0.2369   = Validation score   (accuracy)
        2.98s    = Training   runtime
        0.21s    = Validation runtime
Fitting model: XGBoost ...
        0.2631   = Validation score   (accuracy)
        19.77s   = Training   runtime
        0.03s    = Validation runtime
Fitting model: NeuralNetTorch ...
        0.2912   = Validation score   (accuracy)
        27.62s   = Training   runtime
        0.03s    = Validation runtime
Fitting model: LightGBMLarge ...
        0.239    = Validation score   (accuracy)
        170.19s  = Training   runtime
        0.11s    = Validation runtime
Fitting model: WeightedEnsemble_L2 ...
        Ensemble Weights: {'NeuralNetTorch': 0.4, 'CatBoost': 0.3, 'NeuralNetFast
AI': 0.15, 'LightGBMXT': 0.05, 'ExtraTreesGini': 0.05, 'XGBoost': 0.05}
        0.3052   = Validation score   (accuracy)
        0.32s    = Training   runtime
        0.0s     = Validation runtime
AutoGluon training complete, total runtime = 406.03s ... Best model: WeightedEnse
mble_L2 | Estimated inference throughput: 1066.9 rows/s (498 batch size)
TabularPredictor saved. To load, use: predictor = TabularPredictor.load("C:\Users
\준서\Desktop\Jun\3-2\데과프\A5\AutogluonModels\ag-20250613_050741")
{'accuracy': 0.29473684210526313, 'balanced_accuracy': 0.1577012626196434, 'mcc':
0.19763505959395405}
```

In [4]:
```
predictor.leaderboard(test_data, silent=True)
```

Out[4]:

	model	score_test	score_val	eval_metric	pred_time_test	pred_time_
0	CatBoost	0.298565	0.289157	accuracy	0.110805	0.0167
1	WeightedEnsemble_L2	0.294737	0.305221	accuracy	2.289722	0.4667
2	NeuralNetTorch	0.288038	0.291165	accuracy	0.127230	0.0317
3	LightGBMXT	0.279426	0.283133	accuracy	0.291936	0.0961
4	ExtraTreesGini	0.270813	0.244980	accuracy	0.821686	0.2223
5	RandomForestGini	0.266986	0.232932	accuracy	0.758744	0.2226
6	XGBoost	0.263158	0.263052	accuracy	0.697042	0.0317
7	RandomForestEntr	0.262201	0.238956	accuracy	0.959423	0.2403
8	NeuralNetFastAI	0.256459	0.279116	accuracy	0.161646	0.0679
9	ExtraTreesEntr	0.253589	0.236948	accuracy	0.734684	0.2064
10	LightGBM	0.243062	0.236948	accuracy	0.065602	0.0160
11	LightGBMLarge	0.243062	0.238956	accuracy	0.617127	0.1105
12	KNeighborsUnif	0.233493	0.202811	accuracy	0.062595	0.0311
13	KNeighborsDist	0.226794	0.226908	accuracy	0.062432	0.0327

In [10]:

```
from autogluon.tabular import TabularPredictor
from sklearn.model_selection import train_test_split
from sklearn.metrics import r2_score

X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=42)

# AutoGluon용 데이터 준비
train_data = X_train.copy()
train_data['target'] = y_train

test_data = X_test.copy()
test_data['target'] = y_test
# AutoML 모델 학습
predictor = TabularPredictor(label='target', eval_metric='mae',problem_type='reg

predictions = predictor.predict(test_data.drop(columns=['target']))
print(predictor.evaluate(test_data))
```

```
No path specified. Models will be saved in: "AutogluonModels\ag-20250613_081951"
Verbosity: 2 (Standard Logging)
=================== System Info ===================
AutoGluon Version:  1.3.1
Python Version:     3.11.7
Operating System:   Windows
Platform Machine:   AMD64
Platform Version:   10.0.26100
CPU Count:          12
Memory Avail:       6.38 GB / 15.69 GB (40.7%)
Disk Space Avail:   317.28 GB / 476.05 GB (66.6%)
===================================================
No presets specified! To achieve strong results with AutoGluon, it is recommended
to use the available presets. Defaulting to `'medium'`...
        Recommended Presets (For more details refer to https://auto.gluon.ai/stab
le/tutorials/tabular/tabular-essentials.html#presets):
        presets='experimental' : New in v1.2: Pre-trained foundation model + para
llel fits. The absolute best accuracy without consideration for inference speed.
Does not support GPU.
        presets='best'         : Maximize accuracy. Recommended for most users. U
se in competitions and benchmarks.
        presets='high'         : Strong accuracy with fast inference speed.
        presets='good'         : Good accuracy with very fast inference speed.
        presets='medium'       : Fast training time, ideal for initial prototypin
g.
Beginning AutoGluon training ...
AutoGluon will save models to "C:\Users\준서\Desktop\Jun\3-2\데과프\A5\AutogluonM
odels\ag-20250613_081951"
Train Data Rows:    3132
Train Data Columns: 8
Label Column:       target
Problem Type:       regression
Preprocessing data ...
Using Feature Generators to preprocess the data ...
Fitting AutoMLPipelineFeatureGenerator...
        Available Memory:                    6535.08 MB
        Train Data (Original)  Memory Usage: 0.34 MB (0.0% of available memory)
        Inferring data type of each feature based on column values. Set feature_m
etadata_in to manually specify special dtypes of the features.
        Stage 1 Generators:
                Fitting AsTypeFeatureGenerator...
        Stage 2 Generators:
                Fitting FillNaFeatureGenerator...
        Stage 3 Generators:
                Fitting IdentityFeatureGenerator...
                Fitting CategoryFeatureGenerator...
                        Fitting CategoryMemoryMinimizeFeatureGenerator...
        Stage 4 Generators:
                Fitting DropUniqueFeatureGenerator...
        Stage 5 Generators:
                Fitting DropDuplicatesFeatureGenerator...
        Types of features in original data (raw dtype, special dtypes):
                ('float', [])  : 7 | ['Length', 'Diameter', 'Height', 'Whole_weig
ht', 'Shucked_weight', ...]
                ('object', []) : 1 | ['Sex']
        Types of features in processed data (raw dtype, special dtypes):
                ('category', []) : 1 | ['Sex']
                ('float', [])    : 7 | ['Length', 'Diameter', 'Height', 'Whole_we
ight', 'Shucked_weight', ...]
        0.1s = Fit runtime
```

```
	8 features in original data used to generate 8 features in processed dat
a.
	Train Data (Processed) Memory Usage: 0.17 MB (0.0% of available memory)
Data preprocessing and feature engineering runtime = 0.18s ...
AutoGluon will gauge predictive performance using evaluation metric: 'mean_absolu
te_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()
Automatically generating train/validation split with holdout_frac=0.1596424010217
1137, Train Rows: 2632, Val Rows: 500
User-specified model hyperparameters to be fit:
{
	'NN_TORCH': [{}],
	'GBM': [{'extra_trees': True, 'ag_args': {'name_suffix': 'XT'}}, {}, {'le
arning_rate': 0.03, 'num_leaves': 128, 'feature_fraction': 0.9, 'min_data_in_lea
f': 3, 'ag_args': {'name_suffix': 'Large', 'priority': 0, 'hyperparameter_tune_kw
args': None}}],
	'CAT': [{}],
	'XGB': [{}],
	'FASTAI': [{}],
	'RF': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini', 'problem_
types': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args': {'name_su
ffix': 'Entr', 'problem_types': ['binary', 'multiclass']}}, {'criterion': 'square
d_error', 'ag_args': {'name_suffix': 'MSE', 'problem_types': ['regression', 'quan
tile']}}],
	'XT': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini', 'problem_
types': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args': {'name_su
ffix': 'Entr', 'problem_types': ['binary', 'multiclass']}}, {'criterion': 'square
d_error', 'ag_args': {'name_suffix': 'MSE', 'problem_types': ['regression', 'quan
tile']}}],
	'KNN': [{'weights': 'uniform', 'ag_args': {'name_suffix': 'Unif'}}, {'wei
ghts': 'distance', 'ag_args': {'name_suffix': 'Dist'}}],
}
Fitting 11 L1 models, fit_strategy="sequential" ...
Fitting model: KNeighborsUnif ...
	-1.6168	 = Validation score   (-mean_absolute_error)
	0.02s	 = Training   runtime
	0.03s	 = Validation runtime
Fitting model: KNeighborsDist ...
	-1.6214	 = Validation score   (-mean_absolute_error)
	0.02s	 = Training   runtime
	0.04s	 = Validation runtime
Fitting model: LightGBMXT ...
	-1.4938	 = Validation score   (-mean_absolute_error)
	2.32s	 = Training   runtime
	0.02s	 = Validation runtime
Fitting model: LightGBM ...
	-1.4945	 = Validation score   (-mean_absolute_error)
	2.15s	 = Training   runtime
	0.01s	 = Validation runtime
Fitting model: RandomForestMSE ...
	-1.5322	 = Validation score   (-mean_absolute_error)
	2.99s	 = Training   runtime
	0.15s	 = Validation runtime
Fitting model: CatBoost ...
	-1.4982	 = Validation score   (-mean_absolute_error)
	54.42s	 = Training   runtime
	0.01s	 = Validation runtime
Fitting model: ExtraTreesMSE ...
```

```
        -1.5175  = Validation score   (-mean_absolute_error)
        3.22s    = Training   runtime
        0.81s    = Validation runtime
Fitting model: NeuralNetFastAI ...
        -1.418   = Validation score   (-mean_absolute_error)
        10.58s   = Training   runtime
        0.04s    = Validation runtime
Fitting model: XGBoost ...
        -1.5331  = Validation score   (-mean_absolute_error)
        1.65s    = Training   runtime
        0.02s    = Validation runtime
Fitting model: NeuralNetTorch ...
        -1.4409  = Validation score   (-mean_absolute_error)
        72.47s   = Training   runtime
        0.03s    = Validation runtime
Fitting model: LightGBMLarge ...
        -1.5765  = Validation score   (-mean_absolute_error)
        10.66s   = Training   runtime
        0.02s    = Validation runtime
Fitting model: WeightedEnsemble_L2 ...
        Ensemble Weights: {'NeuralNetFastAI': 0.684, 'NeuralNetTorch': 0.263, 'Li
ghtGBMXT': 0.053}
        -1.4112  = Validation score   (-mean_absolute_error)
        0.25s    = Training   runtime
        0.0s     = Validation runtime
AutoGluon training complete, total runtime = 163.24s ... Best model: WeightedEnse
mble_L2 | Estimated inference throughput: 5846.0 rows/s (500 batch size)
TabularPredictor saved. To load, use: predictor = TabularPredictor.load("C:\Users
\준서\Desktop\Jun\3-2\데과프\A5\AutogluonModels\ag-20250613_081951")
{'mean_absolute_error': -1.4529536962509155, 'root_mean_squared_error': -2.073709
777934424, 'mean_squared_error': -4.300272464752197, 'r2': 0.5819857120513916, 'p
earsonr': 0.7633699934034512, 'median_absolute_error': -0.9926595687866211}
```

In [11]:
```python
predictor.leaderboard(test_data, silent=True)
```

Out[11]:

	model	score_test	score_val	eval_metric	pred_time_test	pr
0	NeuralNetFastAI	-1.452849	-1.417994	mean_absolute_error	0.097618	
1	WeightedEnsemble_L2	-1.452954	-1.411230	mean_absolute_error	0.348891	
2	NeuralNetTorch	-1.483160	-1.440919	mean_absolute_error	0.171790	
3	LightGBMXT	-1.529341	-1.493770	mean_absolute_error	0.063688	
4	LightGBM	-1.530828	-1.494523	mean_absolute_error	0.052126	
5	CatBoost	-1.544927	-1.498244	mean_absolute_error	0.047179	
6	ExtraTreesMSE	-1.559974	-1.517540	mean_absolute_error	0.418848	
7	XGBoost	-1.571919	-1.533070	mean_absolute_error	0.991702	
8	RandomForestMSE	-1.585324	-1.532227	mean_absolute_error	0.372714	
9	LightGBMLarge	-1.593010	-1.576497	mean_absolute_error	0.053102	
10	KNeighborsDist	-1.609496	-1.621376	mean_absolute_error	0.048508	
11	KNeighborsUnif	-1.609761	-1.616800	mean_absolute_error	0.059397	

In [14]:
```
X['Sex'].value_counts()
```

Out[14]:
```
Sex
M    1528
I    1342
F    1307
Name: count, dtype: int64
```

In [15]:
```
X.loc[:, 'Sex'] = X['Sex'].map({'M': 1, 'F': -1, 'I': 0})
```

In [16]:
```
X
```

Out[16]:

	Sex	Length	Diameter	Height	Whole_weight	Shucked_weight	Viscera_weight
0	1	0.455	0.365	0.095	0.5140	0.2245	0.1010
1	1	0.350	0.265	0.090	0.2255	0.0995	0.0485
2	-1	0.530	0.420	0.135	0.6770	0.2565	0.1415
3	1	0.440	0.365	0.125	0.5160	0.2155	0.1140
4	0	0.330	0.255	0.080	0.2050	0.0895	0.0395
...	...	...	...	...	...	...	...
4172	-1	0.565	0.450	0.165	0.8870	0.3700	0.2390
4173	1	0.590	0.440	0.135	0.9660	0.4390	0.2145
4174	1	0.600	0.475	0.205	1.1760	0.5255	0.2875
4175	-1	0.625	0.485	0.150	1.0945	0.5310	0.2610
4176	1	0.710	0.555	0.195	1.9485	0.9455	0.3765

4177 rows × 8 columns

In [17]:
```
from sklearn.model_selection import train_test_split
from sklearn.metrics import r2_score

X_train_val, X_test, y_train_val, y_test = train_test_split(X, y, random_state=4
```

In [18]:
```
from sklearn.preprocessing import StandardScaler, MinMaxScaler
from sklearn.pipeline import Pipeline
from sklearn.model_selection import KFold, GridSearchCV
from sklearn.metrics import mean_absolute_error, make_scorer
from sklearn.neural_network import MLPRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.neighbors import KNeighborsRegressor

pipe = Pipeline([('preprocessing', None),('regressor',RandomForestRegressor())])


# 하이퍼파라미터 그리드 정의
hyperparam_grid = [
    # MLPRegressor
    {
        'regressor': [MLPRegressor()],
```

```
        'preprocessing': [StandardScaler(), MinMaxScaler()],
        'regressor__hidden_layer_sizes': [(50,), (100,), (100, 50)],
        'regressor__learning_rate_init': [0.001, 0.01, 0.1]
    },

    # RandomForestRegressor
    {
        'regressor': [RandomForestRegressor()],
        'preprocessing': [None],  # 트리 기반이므로 스케일링 불필요
        'regressor__n_estimators': [100, 300,500],
        'regressor__max_depth': [None, 10, 30]
    },

    # KNeighborsRegressor
    {
        'regressor': [KNeighborsRegressor()],
        'preprocessing': [StandardScaler(),MinMaxScaler()],
        'regressor__n_neighbors': [3, 5, 7],
        'regressor__metric': ['minkowski'],
        'regressor__p': [1, 2],
    },
]
```

In [19]:

```
#Grid Search
kfold = KFold(n_splits=5, shuffle = True, random_state=42)
grid = GridSearchCV(pipe, hyperparam_grid, scoring = 'neg_mean_absolute_error',

grid.fit(X_train_val,y_train_val)
best_model = grid.best_estimator_
best_params = grid.best_params_

#최적 모델 정보 출력
print("Best Model:", grid.best_estimator_)
print("Best param:", grid.best_params_)
print("Best performance:", grid.best_score_)

#테스트셋 예측 및 MAE 계산
y_test_pred = grid.predict(X_test)
test_mae = mean_absolute_error(y_test, y_test_pred)

print(f"\n Test Set MAE: {test_mae:.4f}")
```

```
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C:\anacon\Lib\site-packages\sklearn\base.py:1363: DataConversionWarning: A column
-vector y was passed when a 1d array was expected. Please change the shape of y t
o (n_samples,), for example using ravel().
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-vector y was passed when a 1d array was expected. Please change the shape of y t
o (n_samples,), for example using ravel().
  return fit_method(estimator, *args, **kwargs)
C:\anacon\Lib\site-packages\sklearn\neural_network\_multilayer_perceptron.py:177
0: DataConversionWarning: A column-vector y was passed when a 1d array was expect
ed. Please change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
Best Model: Pipeline(steps=[('preprocessing', StandardScaler()),
                ('regressor', MLPRegressor(hidden_layer_sizes=(100, 50)))])
Best param: {'preprocessing': StandardScaler(), 'regressor': MLPRegressor(), 'reg
ressor__hidden_layer_sizes': (100, 50), 'regressor__learning_rate_init': 0.001}
Best performance: -1.519460556587417

 Test Set MAE: 1.5365
C:\anacon\Lib\site-packages\sklearn\neural_network\_multilayer_perceptron.py:780:
ConvergenceWarning: Stochastic Optimizer: Maximum iterations (200) reached and th
e optimization hasn't converged yet.
  warnings.warn(
```