Universidad del Valle de Guatemala
Data Science
Laboratorio 7

Integrantes:
- Christopher García 20541
- Andrea Lam 20102

```python
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings('ignore')
```

```python
!pip install -U ipykernel
!pip install -U pip
!pip install -U setuptools wheel
!pip install -U "mxnet<2.0.0"
!pip install autogluon --no-cache-dir
```

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Requirement already satisfied: ipykernel in /usr/local/lib/python3.10/dist-packages
(6.25.2)
Requirement already satisfied: comm>=0.1.1 in /usr/local/lib/python3.10/dist-package
s (from ipykernel) (0.1.4)
Requirement already satisfied: debugpy>=1.6.5 in /usr/local/lib/python3.10/dist-pack
ages (from ipykernel) (1.6.6)
Requirement already satisfied: ipython>=7.23.1 in /usr/local/lib/python3.10/dist-pac
kages (from ipykernel) (7.34.0)
Requirement already satisfied: jupyter-client>=6.1.12 in /usr/local/lib/python3.10/d
ist-packages (from ipykernel) (6.1.12)
Requirement already satisfied: jupyter-core!=5.0.*,>=4.12 in /usr/local/lib/python3.
10/dist-packages (from ipykernel) (5.4.0)
Requirement already satisfied: matplotlib-inline>=0.1 in /usr/local/lib/python3.10/d
ist-packages (from ipykernel) (0.1.6)
Requirement already satisfied: nest-asyncio in /usr/local/lib/python3.10/dist-packag
es (from ipykernel) (1.5.8)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages
(from ipykernel) (23.2)
Requirement already satisfied: psutil in /usr/local/lib/python3.10/dist-packages (fr
om ipykernel) (5.9.5)
Requirement already satisfied: pyzmq>=20 in /usr/local/lib/python3.10/dist-packages
(from ipykernel) (23.2.1)
Requirement already satisfied: tornado>=6.1 in /usr/local/lib/python3.10/dist-packag
es (from ipykernel) (6.3.2)
Requirement already satisfied: traitlets>=5.4.0 in /usr/local/lib/python3.10/dist-pa
ckages (from ipykernel) (5.7.1)
Requirement already satisfied: setuptools>=18.5 in /usr/local/lib/python3.10/dist-pa
ckages (from ipython>=7.23.1->ipykernel) (60.2.0)
Requirement already satisfied: jedi>=0.16 in /usr/local/lib/python3.10/dist-packages
(from ipython>=7.23.1->ipykernel) (0.19.1)
Requirement already satisfied: decorator in /usr/local/lib/python3.10/dist-packages
(from ipython>=7.23.1->ipykernel) (4.4.2)
Requirement already satisfied: pickleshare in /usr/local/lib/python3.10/dist-package
s (from ipython>=7.23.1->ipykernel) (0.7.5)
Requirement already satisfied: prompt-toolkit!=3.0.0,!=3.0.1,<3.1.0,>=2.0.0 in /usr/
local/lib/python3.10/dist-packages (from ipython>=7.23.1->ipykernel) (3.0.39)
Requirement already satisfied: pygments in /usr/local/lib/python3.10/dist-packages
(from ipython>=7.23.1->ipykernel) (2.16.1)
Requirement already satisfied: backcall in /usr/local/lib/python3.10/dist-packages
(from ipython>=7.23.1->ipykernel) (0.2.0)
Requirement already satisfied: pexpect>4.3 in /usr/local/lib/python3.10/dist-package
s (from ipython>=7.23.1->ipykernel) (4.8.0)
Requirement already satisfied: python-dateutil>=2.1 in /usr/local/lib/python3.10/dis
t-packages (from jupyter-client>=6.1.12->ipykernel) (2.8.2)
Requirement already satisfied: platformdirs>=2.5 in /usr/local/lib/python3.10/dist-p
ackages (from jupyter-core!=5.0.*,>=4.12->ipykernel) (3.11.0)
Requirement already satisfied: parso<0.9.0,>=0.8.3 in /usr/local/lib/python3.10/dist
-packages (from jedi>=0.16->ipython>=7.23.1->ipykernel) (0.8.3)
Requirement already satisfied: ptyprocess>=0.5 in /usr/local/lib/python3.10/dist-pac
kages (from pexpect>4.3->ipython>=7.23.1->ipykernel) (0.7.0)
Requirement already satisfied: wcwidth in /usr/local/lib/python3.10/dist-packages (f
rom prompt-toolkit!=3.0.0,!=3.0.1,<3.1.0,>=2.0.0->ipython>=7.23.1->ipykernel) (0.2.
8)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages
(from python-dateutil>=2.1->jupyter-client>=6.1.12->ipykernel) (1.16.0)
WARNING: Running pip as the 'root' user can result in broken permissions and conflic
```

ting behaviour with the system package manager. It is recommended to use a virtual e
nvironment instead: https://pip.pypa.io/warnings/venv
Requirement already satisfied: pip in /usr/local/lib/python3.10/dist-packages (23.2.
1)
WARNING: Running pip as the 'root' user can result in broken permissions and conflic
ting behaviour with the system package manager. It is recommended to use a virtual e
nvironment instead: https://pip.pypa.io/warnings/venv
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages
(60.2.0)
Collecting setuptools
  Obtaining dependency information for setuptools from https://files.pythonhosted.or
g/packages/bb/26/7945080113158354380a12ce26873dd6c1ebd88d47f5bc24e2c5bb38c16a/setupt
ools-68.2.2-py3-none-any.whl.metadata
  Using cached setuptools-68.2.2-py3-none-any.whl.metadata (6.3 kB)
Requirement already satisfied: wheel in /usr/local/lib/python3.10/dist-packages (0.4
1.2)
Using cached setuptools-68.2.2-py3-none-any.whl (807 kB)
Installing collected packages: setuptools
  Attempting uninstall: setuptools
    Found existing installation: setuptools 60.2.0
    Uninstalling setuptools-60.2.0:
      Successfully uninstalled setuptools-60.2.0
ERROR: pip's dependency resolver does not currently take into account all the packag
es that are installed. This behaviour is the source of the following dependency conf
licts.
openxlab 0.0.26 requires setuptools~=60.2.0, but you have setuptools 68.2.2 which is
incompatible.
tensorflow 2.13.0 requires protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.
21.5,<5.0.0dev,>=3.20.3, but you have protobuf 3.20.2 which is incompatible.
torchaudio 2.0.2+cu118 requires torch==2.0.1, but you have torch 1.13.1 which is inc
ompatible.
torchdata 0.6.1 requires torch==2.0.1, but you have torch 1.13.1 which is incompatib
le.
torchtext 0.15.2 requires torch==2.0.1, but you have torch 1.13.1 which is incompati
ble.
Successfully installed setuptools-68.2.2
WARNING: Running pip as the 'root' user can result in broken permissions and conflic
ting behaviour with the system package manager. It is recommended to use a virtual e
nvironment instead: https://pip.pypa.io/warnings/venv

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Requirement already satisfied: mxnet<2.0.0 in /usr/local/lib/python3.10/dist-package
s (1.9.1)
Requirement already satisfied: numpy<2.0.0,>1.16.0 in /usr/local/lib/python3.10/dist
-packages (from mxnet<2.0.0) (1.23.5)
Requirement already satisfied: requests<3,>=2.20.0 in /usr/local/lib/python3.10/dist
-packages (from mxnet<2.0.0) (2.28.2)
Requirement already satisfied: graphviz<0.9.0,>=0.8.1 in /usr/local/lib/python3.10/d
ist-packages (from mxnet<2.0.0) (0.8.4)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.1
0/dist-packages (from requests<3,>=2.20.0->mxnet<2.0.0) (3.3.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packag
es (from requests<3,>=2.20.0->mxnet<2.0.0) (3.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /usr/local/lib/python3.10/di
st-packages (from requests<3,>=2.20.0->mxnet<2.0.0) (1.26.17)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-
packages (from requests<3,>=2.20.0->mxnet<2.0.0) (2023.7.22)
WARNING: Running pip as the 'root' user can result in broken permissions and conflic
ting behaviour with the system package manager. It is recommended to use a virtual e
nvironment instead: https://pip.pypa.io/warnings/venv
Requirement already satisfied: autogluon in /usr/local/lib/python3.10/dist-packages
(0.8.2)
Requirement already satisfied: autogluon.core[all]==0.8.2 in /usr/local/lib/python3.
10/dist-packages (from autogluon) (0.8.2)
Requirement already satisfied: autogluon.features==0.8.2 in /usr/local/lib/python3.1
0/dist-packages (from autogluon) (0.8.2)
Requirement already satisfied: autogluon.tabular[all]==0.8.2 in /usr/local/lib/pytho
n3.10/dist-packages (from autogluon) (0.8.2)
Requirement already satisfied: autogluon.multimodal==0.8.2 in /usr/local/lib/python
3.10/dist-packages (from autogluon) (0.8.2)
Requirement already satisfied: autogluon.timeseries[all]==0.8.2 in /usr/local/lib/py
thon3.10/dist-packages (from autogluon) (0.8.2)
Requirement already satisfied: numpy<1.27,>=1.21 in /usr/local/lib/python3.10/dist-p
ackages (from autogluon.core[all]==0.8.2->autogluon) (1.23.5)
Requirement already satisfied: scipy<1.12,>=1.5.4 in /usr/local/lib/python3.10/dist-
packages (from autogluon.core[all]==0.8.2->autogluon) (1.11.3)
Requirement already satisfied: scikit-learn<1.3,>=1.0 in /usr/local/lib/python3.10/d
ist-packages (from autogluon.core[all]==0.8.2->autogluon) (1.2.2)
Requirement already satisfied: networkx<4,>=3.0 in /usr/local/lib/python3.10/dist-pa
ckages (from autogluon.core[all]==0.8.2->autogluon) (3.1)
Requirement already satisfied: pandas<1.6,>=1.4.1 in /usr/local/lib/python3.10/dist-
packages (from autogluon.core[all]==0.8.2->autogluon) (1.5.3)
Requirement already satisfied: tqdm<5,>=4.38 in /usr/local/lib/python3.10/dist-packa
ges (from autogluon.core[all]==0.8.2->autogluon) (4.65.2)
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-packages
(from autogluon.core[all]==0.8.2->autogluon) (2.28.2)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-packages
(from autogluon.core[all]==0.8.2->autogluon) (3.7.1)
Requirement already satisfied: boto3<2,>=1.10 in /usr/local/lib/python3.10/dist-pack
ages (from autogluon.core[all]==0.8.2->autogluon) (1.28.63)
Requirement already satisfied: autogluon.common==0.8.2 in /usr/local/lib/python3.10/
dist-packages (from autogluon.core[all]==0.8.2->autogluon) (0.8.2)
Requirement already satisfied: hyperopt<0.2.8,>=0.2.7 in /usr/local/lib/python3.10/d
ist-packages (from autogluon.core[all]==0.8.2->autogluon) (0.2.7)
Requirement already satisfied: ray[default]<2.4,>=2.3 in /usr/local/lib/python3.10/d
ist-packages (from autogluon.core[all]==0.8.2->autogluon) (2.3.1)
Requirement already satisfied: pydantic<2.0,>=1.10.4 in /usr/local/lib/python3.10/di
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st-packages (from autogluon.core[all]==0.8.2->autogluon) (1.10.13)
Requirement already satisfied: grpcio<=1.50.0,>=1.42.0 in /usr/local/lib/python3.10/
dist-packages (from autogluon.core[all]==0.8.2->autogluon) (1.50.0)
Requirement already satisfied: Pillow<9.6,>=9.3 in /usr/local/lib/python3.10/dist-pa
ckages (from autogluon.multimodal==0.8.2->autogluon) (9.4.0)
Requirement already satisfied: jsonschema<4.18,>=4.14 in /usr/local/lib/python3.10/d
ist-packages (from autogluon.multimodal==0.8.2->autogluon) (4.17.3)
Requirement already satisfied: seqeval<1.3.0,>=1.2.2 in /usr/local/lib/python3.10/di
st-packages (from autogluon.multimodal==0.8.2->autogluon) (1.2.2)
Requirement already satisfied: evaluate<0.4.0,>=0.2.2 in /usr/local/lib/python3.10/d
ist-packages (from autogluon.multimodal==0.8.2->autogluon) (0.3.0)
Requirement already satisfied: accelerate<0.17,>=0.9 in /usr/local/lib/python3.10/di
st-packages (from autogluon.multimodal==0.8.2->autogluon) (0.16.0)
Requirement already satisfied: timm<0.10.0,>=0.9.2 in /usr/local/lib/python3.10/dist
-packages (from autogluon.multimodal==0.8.2->autogluon) (0.9.7)
Requirement already satisfied: torch<1.14,>=1.9 in /usr/local/lib/python3.10/dist-pa
ckages (from autogluon.multimodal==0.8.2->autogluon) (1.13.1)
Requirement already satisfied: torchvision<0.15.0 in /usr/local/lib/python3.10/dist-
packages (from autogluon.multimodal==0.8.2->autogluon) (0.14.1)
Requirement already satisfied: scikit-image<0.20.0,>=0.19.1 in /usr/local/lib/python
3.10/dist-packages (from autogluon.multimodal==0.8.2->autogluon) (0.19.3)
Requirement already satisfied: pytorch-lightning<1.10.0,>=1.9.0 in /usr/local/lib/py
thon3.10/dist-packages (from autogluon.multimodal==0.8.2->autogluon) (1.9.5)
Requirement already satisfied: text-unidecode<1.4,>=1.3 in /usr/local/lib/python3.1
0/dist-packages (from autogluon.multimodal==0.8.2->autogluon) (1.3)
Requirement already satisfied: torchmetrics<0.12.0,>=0.11.0 in /usr/local/lib/python
3.10/dist-packages (from autogluon.multimodal==0.8.2->autogluon) (0.11.4)
Requirement already satisfied: transformers[sentencepiece]<4.27.0,>=4.23.0 in /usr/l
ocal/lib/python3.10/dist-packages (from autogluon.multimodal==0.8.2->autogluon) (4.2
6.1)
Requirement already satisfied: nptyping<2.5.0,>=1.4.4 in /usr/local/lib/python3.10/d
ist-packages (from autogluon.multimodal==0.8.2->autogluon) (2.4.1)
Requirement already satisfied: omegaconf<2.3.0,>=2.1.1 in /usr/local/lib/python3.10/
dist-packages (from autogluon.multimodal==0.8.2->autogluon) (2.2.3)
Requirement already satisfied: pytorch-metric-learning<2.0,>=1.3.0 in /usr/local/li
b/python3.10/dist-packages (from autogluon.multimodal==0.8.2->autogluon) (1.7.3)
Requirement already satisfied: nlpaug<1.2.0,>=1.1.10 in /usr/local/lib/python3.10/di
st-packages (from autogluon.multimodal==0.8.2->autogluon) (1.1.11)
Requirement already satisfied: nltk<4.0.0,>=3.4.5 in /usr/local/lib/python3.10/dist-
packages (from autogluon.multimodal==0.8.2->autogluon) (3.8.1)
Requirement already satisfied: openmim<0.4.0,>=0.3.7 in /usr/local/lib/python3.10/di
st-packages (from autogluon.multimodal==0.8.2->autogluon) (0.3.9)
Requirement already satisfied: defusedxml<0.7.2,>=0.7.1 in /usr/local/lib/python3.1
0/dist-packages (from autogluon.multimodal==0.8.2->autogluon) (0.7.1)
Requirement already satisfied: jinja2<3.2,>=3.0.3 in /usr/local/lib/python3.10/dist-
packages (from autogluon.multimodal==0.8.2->autogluon) (3.1.2)
Requirement already satisfied: tensorboard<3,>=2.9 in /usr/local/lib/python3.10/dist
-packages (from autogluon.multimodal==0.8.2->autogluon) (2.13.0)
Requirement already satisfied: pytesseract<0.3.11,>=0.3.9 in /usr/local/lib/python3.
10/dist-packages (from autogluon.multimodal==0.8.2->autogluon) (0.3.10)
Requirement already satisfied: lightgbm<3.4,>=3.3 in /usr/local/lib/python3.10/dist-
packages (from autogluon.tabular[all]==0.8.2->autogluon) (3.3.5)
Requirement already satisfied: xgboost<1.8,>=1.6 in /usr/local/lib/python3.10/dist-p
ackages (from autogluon.tabular[all]==0.8.2->autogluon) (1.7.6)
Requirement already satisfied: fastai<2.8,>=2.3.1 in /usr/local/lib/python3.10/dist-
packages (from autogluon.tabular[all]==0.8.2->autogluon) (2.7.12)
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Requirement already satisfied: catboost<1.3,>=1.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.tabular[all]==0.8.2->autogluon) (1.2.2)
Requirement already satisfied: joblib<2,>=1.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.timeseries[all]==0.8.2->autogluon) (1.3.2)
Requirement already satisfied: statsmodels<0.15,>=0.13.0 in /usr/local/lib/python3.10/dist-packages (from autogluon.timeseries[all]==0.8.2->autogluon) (0.14.0)
Requirement already satisfied: gluonts<0.14,>=0.13.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.timeseries[all]==0.8.2->autogluon) (0.13.5)
Requirement already satisfied: statsforecast<1.5,>=1.4.0 in /usr/local/lib/python3.10/dist-packages (from autogluon.timeseries[all]==0.8.2->autogluon) (1.4.0)
Requirement already satisfied: mlforecast<0.7.4,>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from autogluon.timeseries[all]==0.8.2->autogluon) (0.7.3)
Requirement already satisfied: ujson<6,>=5 in /usr/local/lib/python3.10/dist-packages (from autogluon.timeseries[all]==0.8.2->autogluon) (5.8.0)
Requirement already satisfied: psutil<6,>=5.7.3 in /usr/local/lib/python3.10/dist-packages (from autogluon.common==0.8.2->autogluon.core[all]==0.8.2->autogluon) (5.9.5)
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (from autogluon.common==0.8.2->autogluon.core[all]==0.8.2->autogluon) (68.2.2)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from accelerate<0.17,>=0.9->autogluon.multimodal==0.8.2->autogluon) (23.2)
Requirement already satisfied: pyyaml in /usr/local/lib/python3.10/dist-packages (from accelerate<0.17,>=0.9->autogluon.multimodal==0.8.2->autogluon) (6.0.1)
Requirement already satisfied: botocore<1.32.0,>=1.31.63 in /usr/local/lib/python3.10/dist-packages (from boto3<2,>=1.10->autogluon.core[all]==0.8.2->autogluon) (1.31.63)
Requirement already satisfied: jmespath<2.0.0,>=0.7.1 in /usr/local/lib/python3.10/dist-packages (from boto3<2,>=1.10->autogluon.core[all]==0.8.2->autogluon) (0.10.0)
Requirement already satisfied: s3transfer<0.8.0,>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from boto3<2,>=1.10->autogluon.core[all]==0.8.2->autogluon) (0.7.0)
Requirement already satisfied: graphviz in /usr/local/lib/python3.10/dist-packages (from catboost<1.3,>=1.1->autogluon.tabular[all]==0.8.2->autogluon) (0.8.4)
Requirement already satisfied: plotly in /usr/local/lib/python3.10/dist-packages (from catboost<1.3,>=1.1->autogluon.tabular[all]==0.8.2->autogluon) (5.15.0)
Requirement already satisfied: six in /usr/local/lib/python3.10/dist-packages (from catboost<1.3,>=1.1->autogluon.tabular[all]==0.8.2->autogluon) (1.16.0)
Requirement already satisfied: datasets>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->autogluon) (2.14.5)
Requirement already satisfied: dill in /usr/local/lib/python3.10/dist-packages (from evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->autogluon) (0.3.7)
Requirement already satisfied: xxhash in /usr/local/lib/python3.10/dist-packages (from evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->autogluon) (3.4.1)
Requirement already satisfied: multiprocess in /usr/local/lib/python3.10/dist-packages (from evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->autogluon) (0.70.15)
Requirement already satisfied: fsspec[http]>=2021.05.0 in /usr/local/lib/python3.10/dist-packages (from evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->autogluon) (2023.6.0)
Requirement already satisfied: huggingface-hub>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->autogluon) (0.18.0)
Requirement already satisfied: responses<0.19 in /usr/local/lib/python3.10/dist-packages (from evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->autogluon) (0.18.0)
Requirement already satisfied: pip in /usr/local/lib/python3.10/dist-packages (from fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluon) (23.2.1)
Requirement already satisfied: fastdownload<2,>=0.0.5 in /usr/local/lib/python3.10/dist-packages (from fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluon) (0.0.7)

Requirement already satisfied: fastcore<1.6,>=1.5.29 in /usr/local/lib/python3.10/di
st-packages (from fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluon) (1.
5.29)
Requirement already satisfied: fastprogress>=0.2.4 in /usr/local/lib/python3.10/dist
-packages (from fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluon) (1.0.
3)
Requirement already satisfied: spacy<4 in /usr/local/lib/python3.10/dist-packages (f
rom fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluon) (3.6.1)
Requirement already satisfied: toolz~=0.10 in /usr/local/lib/python3.10/dist-package
s (from gluonts<0.14,>=0.13.1->autogluon.timeseries[all]==0.8.2->autogluon) (0.12.0)
Requirement already satisfied: typing-extensions~=4.0 in /usr/local/lib/python3.10/d
ist-packages (from gluonts<0.14,>=0.13.1->autogluon.timeseries[all]==0.8.2->autogluo
n) (4.5.0)
Requirement already satisfied: future in /usr/local/lib/python3.10/dist-packages (fr
om hyperopt<0.2.8,>=0.2.7->autogluon.core[all]==0.8.2->autogluon) (0.18.3)
Requirement already satisfied: cloudpickle in /usr/local/lib/python3.10/dist-package
s (from hyperopt<0.2.8,>=0.2.7->autogluon.core[all]==0.8.2->autogluon) (2.2.1)
Requirement already satisfied: py4j in /usr/local/lib/python3.10/dist-packages (from
hyperopt<0.2.8,>=0.2.7->autogluon.core[all]==0.8.2->autogluon) (0.10.9.7)
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.10/dist-pac
kages (from jinja2<3.2,>=3.0.3->autogluon.multimodal==0.8.2->autogluon) (2.1.3)
Requirement already satisfied: attrs>=17.4.0 in /usr/local/lib/python3.10/dist-packa
ges (from jsonschema<4.18,>=4.14->autogluon.multimodal==0.8.2->autogluon) (23.1.0)
Requirement already satisfied: pyrsistent!=0.17.0,!=0.17.1,!=0.17.2,>=0.14.0 in /us
r/local/lib/python3.10/dist-packages (from jsonschema<4.18,>=4.14->autogluon.multimo
dal==0.8.2->autogluon) (0.19.3)
Requirement already satisfied: wheel in /usr/local/lib/python3.10/dist-packages (fro
m lightgbm<3.4,>=3.3->autogluon.tabular[all]==0.8.2->autogluon) (0.41.2)
Requirement already satisfied: numba in /usr/local/lib/python3.10/dist-packages (fro
m mlforecast<0.7.4,>=0.7.0->autogluon.timeseries[all]==0.8.2->autogluon) (0.56.4)
Requirement already satisfied: window-ops in /usr/local/lib/python3.10/dist-packages
(from mlforecast<0.7.4,>=0.7.0->autogluon.timeseries[all]==0.8.2->autogluon) (0.0.1
4)
Requirement already satisfied: gdown>=4.0.0 in /usr/local/lib/python3.10/dist-packag
es (from nlpaug<1.2.0,>=1.1.10->autogluon.multimodal==0.8.2->autogluon) (4.6.6)
Requirement already satisfied: click in /usr/local/lib/python3.10/dist-packages (fro
m nltk<4.0.0,>=3.4.5->autogluon.multimodal==0.8.2->autogluon) (8.1.7)
Requirement already satisfied: regex>=2021.8.3 in /usr/local/lib/python3.10/dist-pac
kages (from nltk<4.0.0,>=3.4.5->autogluon.multimodal==0.8.2->autogluon) (2023.6.3)
Requirement already satisfied: antlr4-python3-runtime==4.9.* in /usr/local/lib/pytho
n3.10/dist-packages (from omegaconf<2.3.0,>=2.1.1->autogluon.multimodal==0.8.2->auto
gluon) (4.9.3)
Requirement already satisfied: colorama in /usr/local/lib/python3.10/dist-packages
(from openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon) (0.4.6)
Requirement already satisfied: model-index in /usr/local/lib/python3.10/dist-package
s (from openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon) (0.1.11)
Requirement already satisfied: opendatalab in /usr/local/lib/python3.10/dist-package
s (from openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon) (0.0.10)
Requirement already satisfied: rich in /usr/local/lib/python3.10/dist-packages (from
openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon) (13.4.2)
Requirement already satisfied: tabulate in /usr/local/lib/python3.10/dist-packages
(from openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon) (0.9.0)
Requirement already satisfied: python-dateutil>=2.8.1 in /usr/local/lib/python3.10/d
ist-packages (from pandas<1.6,>=1.4.1->autogluon.core[all]==0.8.2->autogluon) (2.8.
2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packag

es (from pandas<1.6,>=1.4.1->autogluon.core[all]==0.8.2->autogluon) (2023.3.post1)
Requirement already satisfied: lightning-utilities>=0.6.0.post0 in /usr/local/lib/py
thon3.10/dist-packages (from pytorch-lightning<1.10.0,>=1.9.0->autogluon.multimodal=
=0.8.2->autogluon) (0.9.0)
Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages
(from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (3.12.4)
Requirement already satisfied: msgpack<2.0.0,>=1.0.0 in /usr/local/lib/python3.10/di
st-packages (from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (1.
0.7)
Requirement already satisfied: protobuf!=3.19.5,>=3.15.3 in /usr/local/lib/python3.1
0/dist-packages (from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon)
(3.20.2)
Requirement already satisfied: aiosignal in /usr/local/lib/python3.10/dist-packages
(from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (1.3.1)
Requirement already satisfied: frozenlist in /usr/local/lib/python3.10/dist-packages
(from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (1.4.0)
Requirement already satisfied: virtualenv>=20.0.24 in /usr/local/lib/python3.10/dist
-packages (from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (20.2
4.5)
Requirement already satisfied: aiohttp>=3.7 in /usr/local/lib/python3.10/dist-packag
es (from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (3.8.6)
Requirement already satisfied: aiohttp-cors in /usr/local/lib/python3.10/dist-packag
es (from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (0.7.0)
Requirement already satisfied: colorful in /usr/local/lib/python3.10/dist-packages
(from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (0.5.5)
Requirement already satisfied: py-spy>=0.2.0 in /usr/local/lib/python3.10/dist-packa
ges (from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (0.3.14)
Requirement already satisfied: gpustat>=1.0.0 in /usr/local/lib/python3.10/dist-pack
ages (from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (1.1.1)
Requirement already satisfied: opencensus in /usr/local/lib/python3.10/dist-packages
(from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (0.11.3)
Requirement already satisfied: prometheus-client>=0.7.1 in /usr/local/lib/python3.1
0/dist-packages (from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon)
(0.17.1)
Requirement already satisfied: smart-open in /usr/local/lib/python3.10/dist-packages
(from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (6.4.0)
Requirement already satisfied: tensorboardX>=1.9 in /usr/local/lib/python3.10/dist-p
ackages (from ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (2.6.2.
2)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.1
0/dist-packages (from requests->autogluon.core[all]==0.8.2->autogluon) (3.3.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packag
es (from requests->autogluon.core[all]==0.8.2->autogluon) (3.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /usr/local/lib/python3.10/di
st-packages (from requests->autogluon.core[all]==0.8.2->autogluon) (1.26.17)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-
packages (from requests->autogluon.core[all]==0.8.2->autogluon) (2023.7.22)
Requirement already satisfied: imageio>=2.4.1 in /usr/local/lib/python3.10/dist-pack
ages (from scikit-image<0.20.0,>=0.19.1->autogluon.multimodal==0.8.2->autogluon) (2.
31.5)
Requirement already satisfied: tifffile>=2019.7.26 in /usr/local/lib/python3.10/dist
-packages (from scikit-image<0.20.0,>=0.19.1->autogluon.multimodal==0.8.2->autogluo
n) (2023.9.26)
Requirement already satisfied: PyWavelets>=1.1.1 in /usr/local/lib/python3.10/dist-p
ackages (from scikit-image<0.20.0,>=0.19.1->autogluon.multimodal==0.8.2->autogluon)
(1.4.1)

```
Requirement already satisfied: threadpoolctl>=2.0.0 in /usr/local/lib/python3.10/dis
t-packages (from scikit-learn<1.3,>=1.0->autogluon.core[all]==0.8.2->autogluon) (3.
2.0)
Requirement already satisfied: patsy>=0.5.2 in /usr/local/lib/python3.10/dist-packag
es (from statsmodels<0.15,>=0.13.0->autogluon.timeseries[all]==0.8.2->autogluon) (0.
5.3)
Requirement already satisfied: absl-py>=0.4 in /usr/local/lib/python3.10/dist-packag
es (from tensorboard<3,>=2.9->autogluon.multimodal==0.8.2->autogluon) (1.4.0)
Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3.10/di
st-packages (from tensorboard<3,>=2.9->autogluon.multimodal==0.8.2->autogluon) (2.1
7.3)
Requirement already satisfied: google-auth-oauthlib<1.1,>=0.5 in /usr/local/lib/pyth
on3.10/dist-packages (from tensorboard<3,>=2.9->autogluon.multimodal==0.8.2->autoglu
on) (1.0.0)
Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.10/dist-pac
kages (from tensorboard<3,>=2.9->autogluon.multimodal==0.8.2->autogluon) (3.5)
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in /usr/local/l
ib/python3.10/dist-packages (from tensorboard<3,>=2.9->autogluon.multimodal==0.8.2->
autogluon) (0.7.1)
Requirement already satisfied: werkzeug>=1.0.1 in /usr/local/lib/python3.10/dist-pac
kages (from tensorboard<3,>=2.9->autogluon.multimodal==0.8.2->autogluon) (3.0.0)
Requirement already satisfied: safetensors in /usr/local/lib/python3.10/dist-package
s (from timm<0.10.0,>=0.9.2->autogluon.multimodal==0.8.2->autogluon) (0.4.0)
Requirement already satisfied: nvidia-cuda-runtime-cu11==11.7.99 in /usr/local/lib/p
ython3.10/dist-packages (from torch<1.14,>=1.9->autogluon.multimodal==0.8.2->autoglu
on) (11.7.99)
Requirement already satisfied: nvidia-cudnn-cu11==8.5.0.96 in /usr/local/lib/python
3.10/dist-packages (from torch<1.14,>=1.9->autogluon.multimodal==0.8.2->autogluon)
(8.5.0.96)
Requirement already satisfied: nvidia-cublas-cu11==11.10.3.66 in /usr/local/lib/pyth
on3.10/dist-packages (from torch<1.14,>=1.9->autogluon.multimodal==0.8.2->autogluon)
(11.10.3.66)
Requirement already satisfied: nvidia-cuda-nvrtc-cu11==11.7.99 in /usr/local/lib/pyt
hon3.10/dist-packages (from torch<1.14,>=1.9->autogluon.multimodal==0.8.2->autogluo
n) (11.7.99)
Requirement already satisfied: tokenizers!=0.11.3,<0.14,>=0.11.1 in /usr/local/lib/p
ython3.10/dist-packages (from transformers[sentencepiece]<4.27.0,>=4.23.0->autogluo
n.multimodal==0.8.2->autogluon) (0.13.3)
Requirement already satisfied: sentencepiece!=0.1.92,>=0.1.91 in /usr/local/lib/pyth
on3.10/dist-packages (from transformers[sentencepiece]<4.27.0,>=4.23.0->autogluon.mu
ltimodal==0.8.2->autogluon) (0.1.99)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-pa
ckages (from matplotlib->autogluon.core[all]==0.8.2->autogluon) (1.1.1)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packag
es (from matplotlib->autogluon.core[all]==0.8.2->autogluon) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-p
ackages (from matplotlib->autogluon.core[all]==0.8.2->autogluon) (4.43.1)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-p
ackages (from matplotlib->autogluon.core[all]==0.8.2->autogluon) (1.4.5)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-pa
ckages (from matplotlib->autogluon.core[all]==0.8.2->autogluon) (3.1.1)
Requirement already satisfied: multidict<7.0,>=4.5 in /usr/local/lib/python3.10/dist
-packages (from aiohttp>=3.7->ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->au
togluon) (6.0.4)
Requirement already satisfied: async-timeout<5.0,>=4.0.0a3 in /usr/local/lib/python
3.10/dist-packages (from aiohttp>=3.7->ray[default]<2.4,>=2.3->autogluon.core[all]==
```

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0.8.2->autogluon) (4.0.3)
Requirement already satisfied: yarl<2.0,>=1.0 in /usr/local/lib/python3.10/dist-pack
ages (from aiohttp>=3.7->ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autoglu
on) (1.9.2)
Requirement already satisfied: pyarrow>=8.0.0 in /usr/local/lib/python3.10/dist-pack
ages (from datasets>=2.0.0->evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->aut
ogluon) (9.0.0)
Requirement already satisfied: beautifulsoup4 in /usr/local/lib/python3.10/dist-pack
ages (from gdown>=4.0.0->nlpaug<1.2.0,>=1.1.10->autogluon.multimodal==0.8.2->autoglu
on) (4.11.2)
Requirement already satisfied: cachetools<6.0,>=2.0.0 in /usr/local/lib/python3.10/d
ist-packages (from google-auth<3,>=1.6.3->tensorboard<3,>=2.9->autogluon.multimodal=
=0.8.2->autogluon) (5.3.1)
Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.10/di
st-packages (from google-auth<3,>=1.6.3->tensorboard<3,>=2.9->autogluon.multimodal==
0.8.2->autogluon) (0.3.0)
Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.10/dist-packa
ges (from google-auth<3,>=1.6.3->tensorboard<3,>=2.9->autogluon.multimodal==0.8.2->a
utogluon) (4.9)
Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.1
0/dist-packages (from google-auth-oauthlib<1.1,>=0.5->tensorboard<3,>=2.9->autogluo
n.multimodal==0.8.2->autogluon) (1.3.1)
Requirement already satisfied: nvidia-ml-py>=11.450.129 in /usr/local/lib/python3.1
0/dist-packages (from gpustat>=1.0.0->ray[default]<2.4,>=2.3->autogluon.core[all]==
0.8.2->autogluon) (12.535.108)
Requirement already satisfied: blessed>=1.17.1 in /usr/local/lib/python3.10/dist-pac
kages (from gpustat>=1.0.0->ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->auto
gluon) (1.20.0)
Requirement already satisfied: llvmlite<0.40,>=0.39.0dev0 in /usr/local/lib/python3.
10/dist-packages (from numba->mlforecast<0.7.4,>=0.7.0->autogluon.timeseries[all]==
0.8.2->autogluon) (0.39.1)
Requirement already satisfied: spacy-legacy<3.1.0,>=3.0.11 in /usr/local/lib/python
3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2-
>autogluon) (3.0.12)
Requirement already satisfied: spacy-loggers<2.0.0,>=1.0.0 in /usr/local/lib/python
3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2-
>autogluon) (1.0.5)
Requirement already satisfied: murmurhash<1.1.0,>=0.28.0 in /usr/local/lib/python3.1
0/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->au
togluon) (1.0.10)
Requirement already satisfied: cymem<2.1.0,>=2.0.2 in /usr/local/lib/python3.10/dist
-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluo
n) (2.0.8)
Requirement already satisfied: preshed<3.1.0,>=3.0.2 in /usr/local/lib/python3.10/di
st-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogl
uon) (3.0.9)
Requirement already satisfied: thinc<8.2.0,>=8.1.8 in /usr/local/lib/python3.10/dist
-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluo
n) (8.1.12)
Requirement already satisfied: wasabi<1.2.0,>=0.9.1 in /usr/local/lib/python3.10/dis
t-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autoglu
on) (1.1.2)
Requirement already satisfied: srsly<3.0.0,>=2.4.3 in /usr/local/lib/python3.10/dist
-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluo
n) (2.4.8)
Requirement already satisfied: catalogue<2.1.0,>=2.0.6 in /usr/local/lib/python3.10/
```

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dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->auto
gluon) (2.0.10)
Requirement already satisfied: typer<0.10.0,>=0.3.0 in /usr/local/lib/python3.10/dis
t-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autoglu
on) (0.9.0)
Requirement already satisfied: pathy>=0.10.0 in /usr/local/lib/python3.10/dist-packa
ges (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluon) (0.
10.2)
Requirement already satisfied: langcodes<4.0.0,>=3.2.0 in /usr/local/lib/python3.10/
dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->auto
gluon) (3.3.0)
Requirement already satisfied: distlib<1,>=0.3.7 in /usr/local/lib/python3.10/dist-p
ackages (from virtualenv>=20.0.24->ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.
2->autogluon) (0.3.7)
Requirement already satisfied: platformdirs<4,>=3.9.1 in /usr/local/lib/python3.10/d
ist-packages (from virtualenv>=20.0.24->ray[default]<2.4,>=2.3->autogluon.core[all]=
=0.8.2->autogluon) (3.11.0)
Requirement already satisfied: ordered-set in /usr/local/lib/python3.10/dist-package
s (from model-index->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon)
(4.1.0)
Requirement already satisfied: opencensus-context>=0.1.3 in /usr/local/lib/python3.1
0/dist-packages (from opencensus->ray[default]<2.4,>=2.3->autogluon.core[all]==0.8.2
->autogluon) (0.1.3)
Requirement already satisfied: google-api-core<3.0.0,>=1.0.0 in /usr/local/lib/pytho
n3.10/dist-packages (from opencensus->ray[default]<2.4,>=2.3->autogluon.core[all]==
0.8.2->autogluon) (2.11.1)
Requirement already satisfied: pycryptodome in /usr/local/lib/python3.10/dist-packag
es (from opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon)
(3.19.0)
Requirement already satisfied: openxlab in /usr/local/lib/python3.10/dist-packages
(from opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon)
(0.0.26)
Requirement already satisfied: tenacity>=6.2.0 in /usr/local/lib/python3.10/dist-pac
kages (from plotly->catboost<1.3,>=1.1->autogluon.tabular[all]==0.8.2->autogluon)
(8.2.3)
Requirement already satisfied: markdown-it-py>=2.2.0 in /usr/local/lib/python3.10/di
st-packages (from rich->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluo
n) (3.0.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in /usr/local/lib/python3.10/
dist-packages (from rich->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogl
uon) (2.16.1)
Requirement already satisfied: wcwidth>=0.1.4 in /usr/local/lib/python3.10/dist-pack
ages (from blessed>=1.17.1->gpustat>=1.0.0->ray[default]<2.4,>=2.3->autogluon.core[a
ll]==0.8.2->autogluon) (0.2.8)
Requirement already satisfied: googleapis-common-protos<2.0.dev0,>=1.56.2 in /usr/lo
cal/lib/python3.10/dist-packages (from google-api-core<3.0.0,>=1.0.0->opencensus->ra
y[default]<2.4,>=2.3->autogluon.core[all]==0.8.2->autogluon) (1.60.0)
Requirement already satisfied: mdurl~=0.1 in /usr/local/lib/python3.10/dist-packages
(from markdown-it-py>=2.2.0->rich->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.
2->autogluon) (0.1.2)
Requirement already satisfied: pyasn1<0.6.0,>=0.4.6 in /usr/local/lib/python3.10/dis
t-packages (from pyasn1-modules>=0.2.1->google-auth<3,>=1.6.3->tensorboard<3,>=2.9->
autogluon.multimodal==0.8.2->autogluon) (0.5.0)
Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.10/dist-pac
kages (from requests-oauthlib>=0.7.0->google-auth-oauthlib<1.1,>=0.5->tensorboard<3,
>=2.9->autogluon.multimodal==0.8.2->autogluon) (3.2.2)
```

```
Requirement already satisfied: blis<0.8.0,>=0.7.8 in /usr/local/lib/python3.10/dist-
packages (from thinc<8.2.0,>=8.1.8->spacy<4->fastai<2.8,>=2.3.1->autogluon.tabular[a
ll]==0.8.2->autogluon) (0.7.11)
Requirement already satisfied: confection<1.0.0,>=0.0.1 in /usr/local/lib/python3.1
0/dist-packages (from thinc<8.2.0,>=8.1.8->spacy<4->fastai<2.8,>=2.3.1->autogluon.ta
bular[all]==0.8.2->autogluon) (0.1.3)
Requirement already satisfied: soupsieve>1.2 in /usr/local/lib/python3.10/dist-packa
ges (from beautifulsoup4->gdown>=4.0.0->nlpaug<1.2.0,>=1.1.10->autogluon.multimodal=
=0.8.2->autogluon) (2.5)
Requirement already satisfied: oss2~=2.17.0 in /usr/local/lib/python3.10/dist-packag
es (from openxlab->opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->
autogluon) (2.17.0)
Collecting setuptools (from autogluon.common==0.8.2->autogluon.core[all]==0.8.2->aut
ogluon)
  Downloading setuptools-60.2.0-py3-none-any.whl (953 kB)
  ──────────────────────────────────────── 953.1/953.1 kB 7.9 MB/s eta 0:00:00
Requirement already satisfied: PySocks!=1.5.7,>=1.5.6 in /usr/local/lib/python3.10/d
ist-packages (from requests->autogluon.core[all]==0.8.2->autogluon) (1.7.1)
Requirement already satisfied: crcmod>=1.7 in /usr/local/lib/python3.10/dist-package
s (from oss2~=2.17.0->openxlab->opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multim
odal==0.8.2->autogluon) (1.7)
Requirement already satisfied: aliyun-python-sdk-kms>=2.4.1 in /usr/local/lib/python
3.10/dist-packages (from oss2~=2.17.0->openxlab->opendatalab->openmim<0.4.0,>=0.3.7-
>autogluon.multimodal==0.8.2->autogluon) (2.16.2)
Requirement already satisfied: aliyun-python-sdk-core>=2.13.12 in /usr/local/lib/pyt
hon3.10/dist-packages (from oss2~=2.17.0->openxlab->opendatalab->openmim<0.4.0,>=0.
3.7->autogluon.multimodal==0.8.2->autogluon) (2.14.0)
Requirement already satisfied: cryptography>=2.6.0 in /usr/local/lib/python3.10/dist
-packages (from aliyun-python-sdk-core>=2.13.12->oss2~=2.17.0->openxlab->opendatalab
->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon) (41.0.4)
Requirement already satisfied: cffi>=1.12 in /usr/local/lib/python3.10/dist-packages
(from cryptography>=2.6.0->aliyun-python-sdk-core>=2.13.12->oss2~=2.17.0->openxlab->
opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon) (1.16.0)
Requirement already satisfied: pycparser in /usr/local/lib/python3.10/dist-packages
(from cffi>=1.12->cryptography>=2.6.0->aliyun-python-sdk-core>=2.13.12->oss2~=2.17.0
->openxlab->opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autoglu
on) (2.21)
Installing collected packages: setuptools
  Attempting uninstall: setuptools
    Found existing installation: setuptools 68.2.2
    Uninstalling setuptools-68.2.2:
      Successfully uninstalled setuptools-68.2.2
ERROR: pip's dependency resolver does not currently take into account all the packag
es that are installed. This behaviour is the source of the following dependency conf
licts.
cvxpy 1.3.2 requires setuptools>65.5.1, but you have setuptools 60.2.0 which is inco
mpatible.
tensorflow 2.13.0 requires protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.
21.5,<5.0.0dev,>=3.20.3, but you have protobuf 3.20.2 which is incompatible.
torchaudio 2.0.2+cu118 requires torch==2.0.1, but you have torch 1.13.1 which is inc
ompatible.
torchdata 0.6.1 requires torch==2.0.1, but you have torch 1.13.1 which is incompatib
le.
torchtext 0.15.2 requires torch==2.0.1, but you have torch 1.13.1 which is incompati
ble.
Successfully installed setuptools-60.2.0
```

WARNING: Running pip as the 'root' user can result in broken permissions and conflic
ting behaviour with the system package manager. It is recommended to use a virtual e
nvironment instead: https://pip.pypa.io/warnings/venv

```
In [ ]: from autogluon.tabular import TabularDataset, TabularPredictor
```

```
In [ ]: diabetes = pd.read_csv('diabetes.csv')
```

Análisis exploratorio (EDA)

```
In [ ]: diabetes
```

Out[ ]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFu
0	6	148	72	35	0	33.6	
1	1	85	66	29	0	26.6	
2	8	183	64	0	0	23.3	
3	1	89	66	23	94	28.1	
4	0	137	40	35	168	43.1	
...	...	...	...	...	...	...	
763	10	101	76	48	180	32.9	
764	2	122	70	27	0	36.8	
765	5	121	72	23	112	26.2	
766	1	126	60	0	0	30.1	
767	1	93	70	31	0	30.4	

768 rows × 9 columns

```
In [ ]: diabetes.head(5)
```

Out[ ]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunc
0	6	148	72	35	0	33.6	0
1	1	85	66	29	0	26.6	0
2	8	183	64	0	0	23.3	0
3	1	89	66	23	94	28.1	0
4	0	137	40	35	168	43.1	2

```
In [ ]: diabetes.tail(5)
```

Out[ ]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFu
763	10	101	76	48	180	32.9	
764	2	122	70	27	0	36.8	
765	5	121	72	23	112	26.2	
766	1	126	60	0	0	30.1	
767	1	93	70	31	0	30.4	

In [ ]:
```python
diabetes.describe()
```

Out[ ]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	Dia
count	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	
mean	3.845052	120.894531	69.105469	20.536458	79.799479	31.992578	
std	3.369578	31.972618	19.355807	15.952218	115.244002	7.884160	
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	1.000000	99.000000	62.000000	0.000000	0.000000	27.300000	
50%	3.000000	117.000000	72.000000	23.000000	30.500000	32.000000	
75%	6.000000	140.250000	80.000000	32.000000	127.250000	36.600000	
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.100000	

In [ ]:
```python
diabetes.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 9 columns):
 #   Column                    Non-Null Count   Dtype
---  ------                    --------------   -----
 0   Pregnancies               768 non-null     int64
 1   Glucose                   768 non-null     int64
 2   BloodPressure             768 non-null     int64
 3   SkinThickness             768 non-null     int64
 4   Insulin                   768 non-null     int64
 5   BMI                       768 non-null     float64
 6   DiabetesPedigreeFunction  768 non-null     float64
 7   Age                       768 non-null     int64
 8   Outcome                   768 non-null     int64
dtypes: float64(2), int64(7)
memory usage: 54.1 KB
```

In [ ]:
```python
df_region = diabetes.groupby('Outcome').describe()
df_region
```

Out[ ]:

									Pregnancies	Glucose	...
	count	mean	std	min	25%	50%	75%	max	count	mean	...
Outcome											
0	500.0	3.298000	3.017185	0.0	1.00	2.0	5.0	13.0	500.0	109.980000	...
1	268.0	4.865672	3.741239	0.0	1.75	4.0	8.0	17.0	268.0	141.257463	...

2 rows × 64 columns

In [ ]:
```python
sns.heatmap(diabetes.isnull(), yticklabels = False, cbar = False, cmap="Blues")
```

Out[ ]:   <Axes: >

In [ ]:
```python
diabetes[['Age', 'Glucose', 'BloodPressure', 'Insulin', 'DiabetesPedigreeFunction',
```
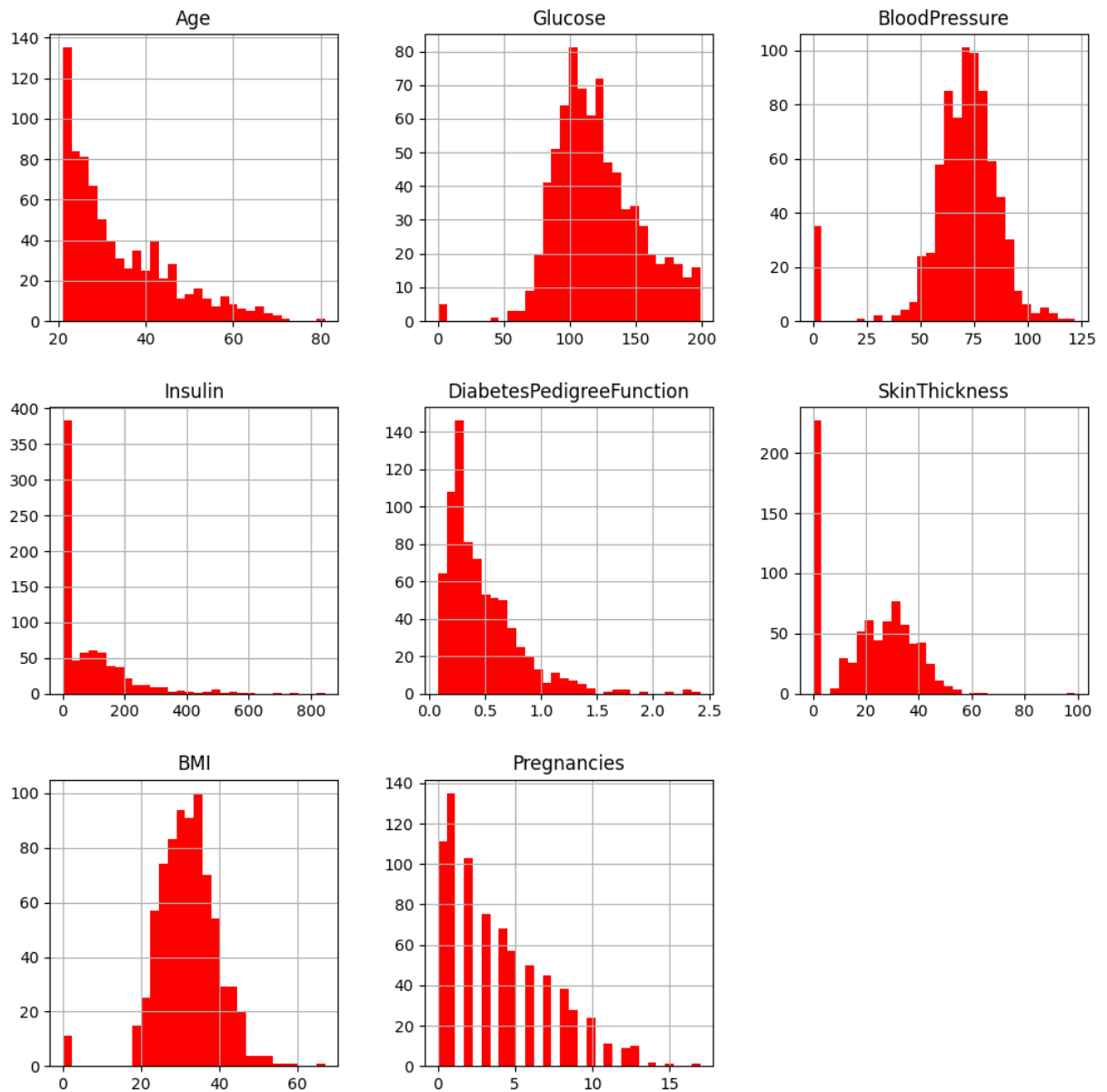
```
In [ ]:  sns.pairplot(diabetes)

Out[ ]:  <seaborn.axisgrid.PairGrid at 0x78f29c1577c0>
```
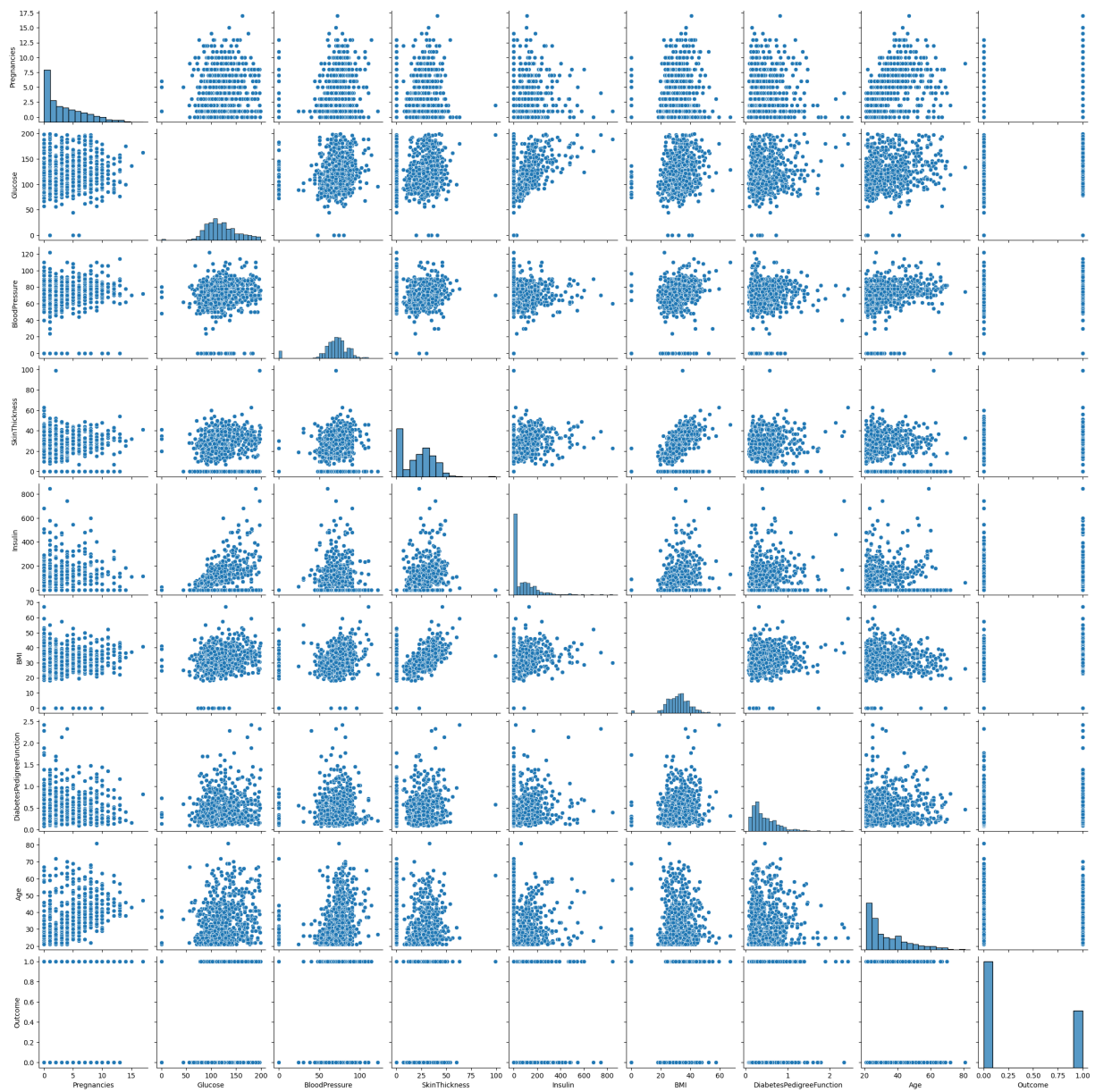
```
In [ ]:   plt.figure(figsize = (15, 6))
          sns.regplot(x = 'Glucose', y = 'BloodPressure', data = diabetes)
          plt.show()
```
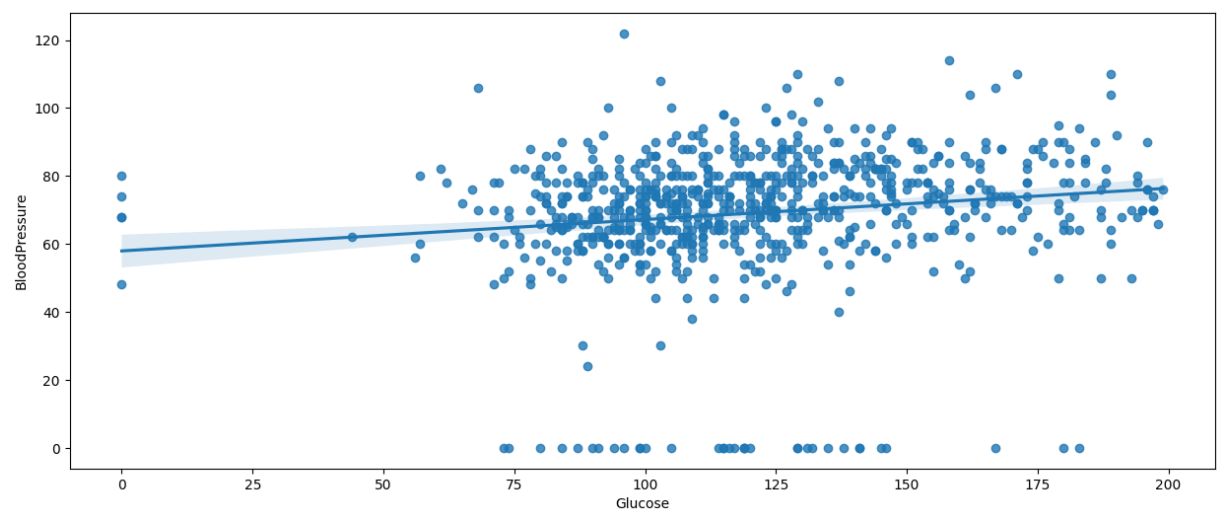
```
In [ ]:  plt.figure(figsize = (15, 6))
         sns.regplot(x = 'BMI', y = 'BloodPressure', data = diabetes)
         plt.show()
```
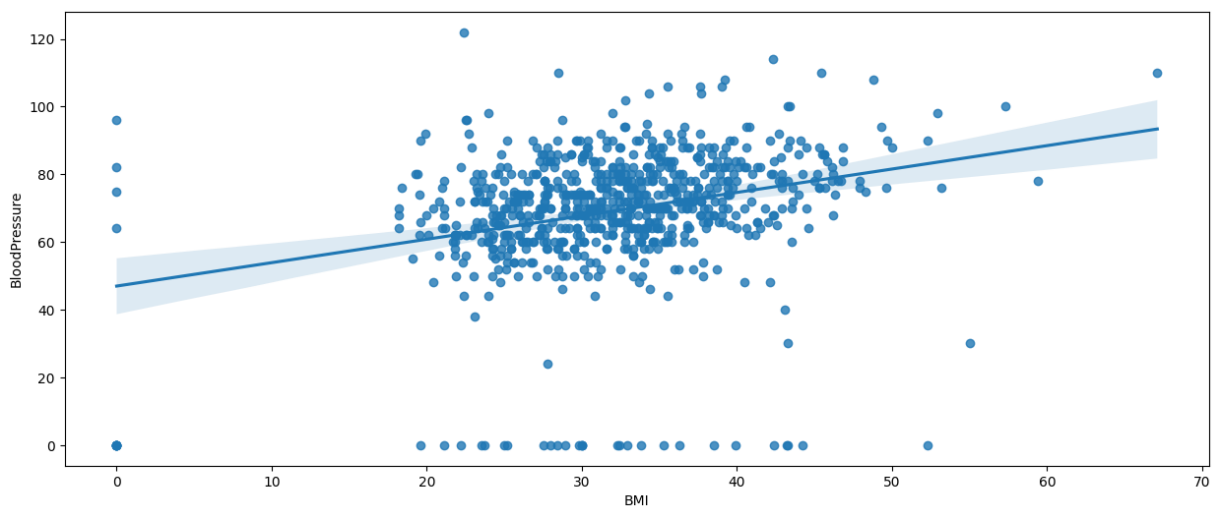

Entrenamiento

```
In [ ]:  from sklearn.model_selection import train_test_split
         X_entreno, X_prueba = train_test_split(diabetes, test_size=0.2, random_state=0)
```

```
In [ ]:  X_entreno
```

Out[ ]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeF
603	7	150	78	29	126	35.2	
118	4	97	60	23	0	28.2	
247	0	165	90	33	680	52.3	
157	1	109	56	21	135	25.2	
468	8	120	0	0	0	30.0	
...	...	...	...	...	...	...	
763	10	101	76	48	180	32.9	
192	7	159	66	0	0	30.4	
629	4	94	65	22	0	24.7	
559	11	85	74	0	0	30.1	
684	5	136	82	0	0	0.0	

614 rows × 9 columns

```
In [ ]:  X_prueba
```

Out[ ]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFu
661	1	199	76	43	0	42.9	
122	2	107	74	30	100	33.6	
113	4	76	62	0	0	34.0	
14	5	166	72	19	175	25.8	
529	0	111	65	0	0	24.6	
...	...	...	...	...	...	...	
476	2	105	80	45	191	33.7	
482	4	85	58	22	49	27.8	
230	4	142	86	0	0	44.0	
527	3	116	74	15	105	26.3	
380	1	107	72	30	82	30.8	

154 rows × 9 columns

In [ ]:
```python
predictor = TabularPredictor(label="Outcome",
                             problem_type='binary',   # Cambia a 'binary'
                             eval_metric='accuracy',   # Usa una métrica de clasific
                             ).fit(train_data=X_entreno,
                                   time_limit=200,
                                   presets="best_quality")
```

```
No path specified. Models will be saved in: "AutogluonModels/ag-20231014_034024/"
Presets specified: ['best_quality']
Stack configuration (auto_stack=True): num_stack_levels=0, num_bag_folds=6, num_bag_
sets=20
Beginning AutoGluon training ... Time limit = 200s
AutoGluon will save models to "AutogluonModels/ag-20231014_034024/"
AutoGluon Version:  0.8.2
Python Version:     3.10.12
Operating System:   Linux
Platform Machine:   x86_64
Platform Version:   #1 SMP Wed Aug 30 11:19:59 UTC 2023
Disk Space Avail:   50.29 GB / 83.96 GB (59.9%)
Train Data Rows:    614
Train Data Columns: 8
Label Column: Outcome
Preprocessing data ...
Selected class <--> label mapping:  class 1 = 1, class 0 = 0
Using Feature Generators to preprocess the data ...
Fitting AutoMLPipelineFeatureGenerator...
        Available Memory:                    11141.16 MB
        Train Data (Original)  Memory Usage: 0.04 MB (0.0% of available memory)
        Inferring data type of each feature based on column values. Set feature_meta
data_in to manually specify special dtypes of the features.
        Stage 1 Generators:
                Fitting AsTypeFeatureGenerator...
        Stage 2 Generators:
                Fitting FillNaFeatureGenerator...
        Stage 3 Generators:
                Fitting IdentityFeatureGenerator...
        Stage 4 Generators:
                Fitting DropUniqueFeatureGenerator...
        Stage 5 Generators:
                Fitting DropDuplicatesFeatureGenerator...
        Types of features in original data (raw dtype, special dtypes):
                ('float', []) : 2 | ['BMI', 'DiabetesPedigreeFunction']
                ('int', [])   : 6 | ['Pregnancies', 'Glucose', 'BloodPressure', 'Ski
nThickness', 'Insulin', ...]
        Types of features in processed data (raw dtype, special dtypes):
                ('float', []) : 2 | ['BMI', 'DiabetesPedigreeFunction']
                ('int', [])   : 6 | ['Pregnancies', 'Glucose', 'BloodPressure', 'Ski
nThickness', 'Insulin', ...]
        0.2s = Fit runtime
        8 features in original data used to generate 8 features in processed data.
        Train Data (Processed) Memory Usage: 0.04 MB (0.0% of available memory)
Data preprocessing and feature engineering runtime = 0.36s ...
AutoGluon will gauge predictive performance using evaluation metric: 'accuracy'
        To change this, specify the eval_metric parameter of Predictor()
User-specified model hyperparameters to be fit:
{
        'NN_TORCH': {},
        'GBM': [{'extra_trees': True, 'ag_args': {'name_suffix': 'XT'}}, {}, 'GBMLar
ge'],
        'CAT': {},
        'XGB': {},
        'FASTAI': {},
        'RF': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini', 'problem_typ
```

```
es': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args': {'name_suffix':
'Entr', 'problem_types': ['binary', 'multiclass']}}, {'criterion': 'squared_error',
'ag_args': {'name_suffix': 'MSE', 'problem_types': ['regression', 'quantile']}}],
        'XT': [{'criterion': 'gini', 'ag_args': {'name_suffix': 'Gini', 'problem_typ
es': ['binary', 'multiclass']}}, {'criterion': 'entropy', 'ag_args': {'name_suffix':
'Entr', 'problem_types': ['binary', 'multiclass']}}, {'criterion': 'squared_error',
'ag_args': {'name_suffix': 'MSE', 'problem_types': ['regression', 'quantile']}}],
        'KNN': [{'weights': 'uniform', 'ag_args': {'name_suffix': 'Unif'}}, {'weight
s': 'distance', 'ag_args': {'name_suffix': 'Dist'}}],
}
Fitting 13 L1 models ...
Fitting model: KNeighborsUnif_BAG_L1 ... Training model for up to 199.64s of the 19
9.62s of remaining time.
        0.7003   = Validation score   (accuracy)
        0.04s    = Training    runtime
        0.05s    = Validation runtime
Fitting model: KNeighborsDist_BAG_L1 ... Training model for up to 199.49s of the 19
9.47s of remaining time.
        0.6971   = Validation score   (accuracy)
        0.04s    = Training    runtime
        0.04s    = Validation runtime
Fitting model: LightGBMXT_BAG_L1 ... Training model for up to 199.35s of the 199.33s
of remaining time.
        Fitting 6 child models (S1F1 - S1F6) | Fitting with ParallelLocalFoldFitting
Strategy
        0.7801   = Validation score   (accuracy)
        20.93s   = Training    runtime
        0.02s    = Validation runtime
Fitting model: LightGBM_BAG_L1 ... Training model for up to 164.6s of the 164.59s of
remaining time.
        Fitting 6 child models (S1F1 - S1F6) | Fitting with ParallelLocalFoldFitting
Strategy
        0.7801   = Validation score   (accuracy)
        23.08s   = Training    runtime
        0.02s    = Validation runtime
Fitting model: RandomForestGini_BAG_L1 ... Training model for up to 138.76s of the 1
38.74s of remaining time.
        0.7459   = Validation score   (accuracy)
        0.74s    = Training    runtime
        0.22s    = Validation runtime
Fitting model: RandomForestEntr_BAG_L1 ... Training model for up to 137.74s of the 1
37.73s of remaining time.
        0.7573   = Validation score   (accuracy)
        1.07s    = Training    runtime
        0.19s    = Validation runtime
Fitting model: CatBoost_BAG_L1 ... Training model for up to 136.44s of the 136.42s o
f remaining time.
        Fitting 6 child models (S1F1 - S1F6) | Fitting with ParallelLocalFoldFitting
Strategy
        0.7818   = Validation score   (accuracy)
        16.08s   = Training    runtime
        0.01s    = Validation runtime
Fitting model: ExtraTreesGini_BAG_L1 ... Training model for up to 116.03s of the 11
6.01s of remaining time.
        0.741    = Validation score   (accuracy)
        0.73s    = Training    runtime
```

```
            0.21s    = Validation runtime
Fitting model: ExtraTreesEntr_BAG_L1 ... Training model for up to 115.03s of the 11
5.01s of remaining time.
            0.7394   = Validation score   (accuracy)
            0.82s    = Training    runtime
            0.15s    = Validation runtime
Fitting model: NeuralNetFastAI_BAG_L1 ... Training model for up to 114.02s of the 11
4.01s of remaining time.
            Fitting 6 child models (S1F1 - S1F6) | Fitting with ParallelLocalFoldFitting
Strategy
            0.7883   = Validation score   (accuracy)
            32.89s   = Training    runtime
            0.11s    = Validation runtime
Fitting model: XGBoost_BAG_L1 ... Training model for up to 78.52s of the 78.51s of r
emaining time.
            Fitting 6 child models (S1F1 - S1F6) | Fitting with ParallelLocalFoldFitting
Strategy
            0.7736   = Validation score   (accuracy)
            9.83s    = Training    runtime
            0.04s    = Validation runtime
Fitting model: NeuralNetTorch_BAG_L1 ... Training model for up to 63.44s of the 63.4
2s of remaining time.
            Fitting 6 child models (S1F1 - S1F6) | Fitting with ParallelLocalFoldFitting
Strategy
            0.7638   = Validation score   (accuracy)
            26.44s   = Training    runtime
            0.13s    = Validation runtime
Fitting model: LightGBMLarge_BAG_L1 ... Training model for up to 31.69s of the 31.67
s of remaining time.
            Fitting 6 child models (S1F1 - S1F6) | Fitting with ParallelLocalFoldFitting
Strategy
            0.7638   = Validation score   (accuracy)
            23.98s   = Training    runtime
            0.03s    = Validation runtime
Completed 1/20 k-fold bagging repeats ...
Fitting model: WeightedEnsemble_L2 ... Training model for up to 199.64s of the 2.9s
of remaining time.
            0.7932   = Validation score   (accuracy)
            1.95s    = Training    runtime
            0.0s     = Validation runtime
AutoGluon training complete, total runtime = 199.13s ... Best model: "WeightedEnsemb
le_L2"
TabularPredictor saved. To load, use: predictor = TabularPredictor.load("AutogluonMo
dels/ag-20231014_034024/")
```

In [ ]: `predictor.fit_summary()`

```
*** Summary of fit() ***
Estimated performance of each model:
                    model  score_val  pred_time_val    fit_time  pred_time_val_marg
inal  fit_time_marginal  stack_level  can_infer  fit_order
0        WeightedEnsemble_L2   0.793160       0.158455  44.677372                0.00
3081           1.952873            2       True         14
1    NeuralNetFastAI_BAG_L1   0.788274       0.112152  32.890708                0.11
2152          32.890708            1       True         10
2          CatBoost_BAG_L1   0.781759       0.010322  16.080908                0.01
0322          16.080908            1       True          7
3        LightGBMXT_BAG_L1   0.780130       0.015563  20.928442                0.01
5563          20.928442            1       True          3
4          LightGBM_BAG_L1   0.780130       0.019168  23.080157                0.01
9168          23.080157            1       True          4
5           XGBoost_BAG_L1   0.773616       0.043223   9.833790                0.04
3223           9.833790            1       True         11
6     LightGBMLarge_BAG_L1   0.763844       0.026220  23.984499                0.02
6220          23.984499            1       True         13
7     NeuralNetTorch_BAG_L1   0.763844       0.125980  26.441011                0.12
5980          26.441011            1       True         12
8   RandomForestEntr_BAG_L1   0.757329       0.186416   1.066143                0.18
6416           1.066143            1       True          6
9   RandomForestGini_BAG_L1   0.745928       0.222441   0.741224                0.22
2441           0.741224            1       True          5
10    ExtraTreesGini_BAG_L1   0.741042       0.212654   0.727877                0.21
2654           0.727877            1       True          8
11    ExtraTreesEntr_BAG_L1   0.739414       0.151340   0.815004                0.15
1340           0.815004            1       True          9
12    KNeighborsUnif_BAG_L1   0.700326       0.045170   0.044549                0.04
5170           0.044549            1       True          1
13    KNeighborsDist_BAG_L1   0.697068       0.042531   0.042352                0.04
2531           0.042352            1       True          2
Number of models trained: 14
Types of models trained:
{'StackerEnsembleModel_KNN', 'StackerEnsembleModel_RF', 'StackerEnsembleModel_XGBoos
t', 'StackerEnsembleModel_CatBoost', 'WeightedEnsembleModel', 'StackerEnsembleModel_
TabularNeuralNetTorch', 'StackerEnsembleModel_NNFastAiTabular', 'StackerEnsembleMode
l_LGB', 'StackerEnsembleModel_XT'}
Bagging used: True  (with 6 folds)
Multi-layer stack-ensembling used: False
Feature Metadata (Processed):
(raw dtype, special dtypes):
('float', []) : 2 | ['BMI', 'DiabetesPedigreeFunction']
('int', [])   : 6 | ['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'In
sulin', ...]
Plot summary of models saved to file: AutogluonModels/ag-20231014_034024/SummaryOfMo
dels.html
*** End of fit() summary ***
```

```
Out[ ]:  {'model_types': {'KNeighborsUnif_BAG_L1': 'StackerEnsembleModel_KNN',
          'KNeighborsDist_BAG_L1': 'StackerEnsembleModel_KNN',
          'LightGBMXT_BAG_L1': 'StackerEnsembleModel_LGB',
          'LightGBM_BAG_L1': 'StackerEnsembleModel_LGB',
          'RandomForestGini_BAG_L1': 'StackerEnsembleModel_RF',
          'RandomForestEntr_BAG_L1': 'StackerEnsembleModel_RF',
          'CatBoost_BAG_L1': 'StackerEnsembleModel_CatBoost',
          'ExtraTreesGini_BAG_L1': 'StackerEnsembleModel_XT',
          'ExtraTreesEntr_BAG_L1': 'StackerEnsembleModel_XT',
          'NeuralNetFastAI_BAG_L1': 'StackerEnsembleModel_NNFastAiTabular',
          'XGBoost_BAG_L1': 'StackerEnsembleModel_XGBoost',
          'NeuralNetTorch_BAG_L1': 'StackerEnsembleModel_TabularNeuralNetTorch',
          'LightGBMLarge_BAG_L1': 'StackerEnsembleModel_LGB',
          'WeightedEnsemble_L2': 'WeightedEnsembleModel'},
         'model_performance': {'KNeighborsUnif_BAG_L1': 0.7003257328990228,
          'KNeighborsDist_BAG_L1': 0.6970684039087948,
          'LightGBMXT_BAG_L1': 0.7801302931596091,
          'LightGBM_BAG_L1': 0.7801302931596091,
          'RandomForestGini_BAG_L1': 0.745928338762215,
          'RandomForestEntr_BAG_L1': 0.757328990228013,
          'CatBoost_BAG_L1': 0.7817589576547231,
          'ExtraTreesGini_BAG_L1': 0.741042345276873,
          'ExtraTreesEntr_BAG_L1': 0.739413680781759,
          'NeuralNetFastAI_BAG_L1': 0.7882736156351792,
          'XGBoost_BAG_L1': 0.7736156351791531,
          'NeuralNetTorch_BAG_L1': 0.7638436482084691,
          'LightGBMLarge_BAG_L1': 0.7638436482084691,
          'WeightedEnsemble_L2': 0.7931596091205212},
         'model_best': 'WeightedEnsemble_L2',
         'model_paths': {'KNeighborsUnif_BAG_L1': 'AutogluonModels/ag-20231014_034024/mode
        ls/KNeighborsUnif_BAG_L1/',
          'KNeighborsDist_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/KNeighborsDi
        st_BAG_L1/',
          'LightGBMXT_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/LightGBMXT_BAG_L
        1/',
          'LightGBM_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/LightGBM_BAG_L1/',
          'RandomForestGini_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/RandomFore
        stGini_BAG_L1/',
          'RandomForestEntr_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/RandomFore
        stEntr_BAG_L1/',
          'CatBoost_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/CatBoost_BAG_L1/',
          'ExtraTreesGini_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/ExtraTreesGi
        ni_BAG_L1/',
          'ExtraTreesEntr_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/ExtraTreesEn
        tr_BAG_L1/',
          'NeuralNetFastAI_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/NeuralNetFa
        stAI_BAG_L1/',
          'XGBoost_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/XGBoost_BAG_L1/',
          'NeuralNetTorch_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/NeuralNetTor
        ch_BAG_L1/',
          'LightGBMLarge_BAG_L1': 'AutogluonModels/ag-20231014_034024/models/LightGBMLarge
        _BAG_L1/',
          'WeightedEnsemble_L2': 'AutogluonModels/ag-20231014_034024/models/WeightedEnsemb
        le_L2/'},
         'model_fit_times': {'KNeighborsUnif_BAG_L1': 0.04454851150512695,
          'KNeighborsDist_BAG_L1': 0.042351722717285156,
```

```
  'LightGBMXT_BAG_L1': 20.928441524505615,
  'LightGBM_BAG_L1': 23.080156803131104,
  'RandomForestGini_BAG_L1': 0.7412242889404297,
  'RandomForestEntr_BAG_L1': 1.0661425590515137,
  'CatBoost_BAG_L1': 16.080907821655273,
  'ExtraTreesGini_BAG_L1': 0.727877140045166,
  'ExtraTreesEntr_BAG_L1': 0.8150041103363037,
  'NeuralNetFastAI_BAG_L1': 32.890708446502686,
  'XGBoost_BAG_L1': 9.833789825439453,
  'NeuralNetTorch_BAG_L1': 26.44101119041443,
  'LightGBMLarge_BAG_L1': 23.984498500823975,
  'WeightedEnsemble_L2': 1.9528734683990479},
 'model_pred_times': {'KNeighborsUnif_BAG_L1': 0.04517030715942383,
  'KNeighborsDist_BAG_L1': 0.04253053665161133,
  'LightGBMXT_BAG_L1': 0.015563249588012695,
  'LightGBM_BAG_L1': 0.019168376922607422,
  'RandomForestGini_BAG_L1': 0.2224414348602295,
  'RandomForestEntr_BAG_L1': 0.1864156723022461,
  'CatBoost_BAG_L1': 0.010322332382202148,
  'ExtraTreesGini_BAG_L1': 0.21265411376953125,
  'ExtraTreesEntr_BAG_L1': 0.15134000778198242,
  'NeuralNetFastAI_BAG_L1': 0.1121516227722168,
  'XGBoost_BAG_L1': 0.043222665786743164,
  'NeuralNetTorch_BAG_L1': 0.12597966194152832,
  'LightGBMLarge_BAG_L1': 0.026220083236694336,
  'WeightedEnsemble_L2': 0.0030808448791503906},
 'num_bag_folds': 6,
 'max_stack_level': 2,
 'num_classes': 2,
 'model_hyperparams': {'KNeighborsUnif_BAG_L1': {'use_orig_features': True,
   'max_base_models': 25,
   'max_base_models_per_type': 5,
   'save_bag_folds': True,
   'use_child_oof': True},
  'KNeighborsDist_BAG_L1': {'use_orig_features': True,
   'max_base_models': 25,
   'max_base_models_per_type': 5,
   'save_bag_folds': True,
   'use_child_oof': True},
  'LightGBMXT_BAG_L1': {'use_orig_features': True,
   'max_base_models': 25,
   'max_base_models_per_type': 5,
   'save_bag_folds': True},
  'LightGBM_BAG_L1': {'use_orig_features': True,
   'max_base_models': 25,
   'max_base_models_per_type': 5,
   'save_bag_folds': True},
  'RandomForestGini_BAG_L1': {'use_orig_features': True,
   'max_base_models': 25,
   'max_base_models_per_type': 5,
   'save_bag_folds': True,
   'use_child_oof': True},
  'RandomForestEntr_BAG_L1': {'use_orig_features': True,
   'max_base_models': 25,
   'max_base_models_per_type': 5,
   'save_bag_folds': True,
```

```
      'use_child_oof': True},
   'CatBoost_BAG_L1': {'use_orig_features': True,
    'max_base_models': 25,
    'max_base_models_per_type': 5,
    'save_bag_folds': True},
   'ExtraTreesGini_BAG_L1': {'use_orig_features': True,
    'max_base_models': 25,
    'max_base_models_per_type': 5,
    'save_bag_folds': True,
    'use_child_oof': True},
   'ExtraTreesEntr_BAG_L1': {'use_orig_features': True,
    'max_base_models': 25,
    'max_base_models_per_type': 5,
    'save_bag_folds': True,
    'use_child_oof': True},
   'NeuralNetFastAI_BAG_L1': {'use_orig_features': True,
    'max_base_models': 25,
    'max_base_models_per_type': 5,
    'save_bag_folds': True},
   'XGBoost_BAG_L1': {'use_orig_features': True,
    'max_base_models': 25,
    'max_base_models_per_type': 5,
    'save_bag_folds': True},
   'NeuralNetTorch_BAG_L1': {'use_orig_features': True,
    'max_base_models': 25,
    'max_base_models_per_type': 5,
    'save_bag_folds': True},
   'LightGBMLarge_BAG_L1': {'use_orig_features': True,
    'max_base_models': 25,
    'max_base_models_per_type': 5,
    'save_bag_folds': True},
   'WeightedEnsemble_L2': {'use_orig_features': False,
    'max_base_models': 25,
    'max_base_models_per_type': 5,
    'save_bag_folds': True}},
  'leaderboard':                        model   score_val  pred_time_val   fit_time
\
   0        WeightedEnsemble_L2    0.793160       0.158455   44.677372
   1     NeuralNetFastAI_BAG_L1    0.788274       0.112152   32.890708
   2           CatBoost_BAG_L1    0.781759       0.010322   16.080908
   3          LightGBMXT_BAG_L1    0.780130       0.015563   20.928442
   4            LightGBM_BAG_L1    0.780130       0.019168   23.080157
   5            XGBoost_BAG_L1    0.773616       0.043223    9.833790
   6       LightGBMLarge_BAG_L1    0.763844       0.026220   23.984499
   7      NeuralNetTorch_BAG_L1    0.763844       0.125980   26.441011
   8     RandomForestEntr_BAG_L1   0.757329       0.186416    1.066143
   9     RandomForestGini_BAG_L1   0.745928       0.222441    0.741224
   10      ExtraTreesGini_BAG_L1   0.741042       0.212654    0.727877
   11      ExtraTreesEntr_BAG_L1   0.739414       0.151340    0.815004
   12     KNeighborsUnif_BAG_L1    0.700326       0.045170    0.044549
   13     KNeighborsDist_BAG_L1    0.697068       0.042531    0.042352

       pred_time_val_marginal   fit_time_marginal   stack_level   can_infer  \
   0                 0.003081             1.952873             2        True
   1                 0.112152            32.890708             1        True
   2                 0.010322            16.080908             1        True
```

3	0.015563	20.928442	1	True
4	0.019168	23.080157	1	True
5	0.043223	9.833790	1	True
6	0.026220	23.984499	1	True
7	0.125980	26.441011	1	True
8	0.186416	1.066143	1	True
9	0.222441	0.741224	1	True
10	0.212654	0.727877	1	True
11	0.151340	0.815004	1	True
12	0.045170	0.044549	1	True
13	0.042531	0.042352	1	True

```
        fit_order
0          14
1          10
2           7
3           3
4           4
5          11
6          13
7          12
8           6
9           5
10          8
11          9
12          1
13          2  }
```

Evaluación de rendimiento

```
In [ ]: predictor.leaderboard()
```

	model	score_val	pred_time_val	fit_time	pred_time_val_marg
inal	fit_time_marginal	stack_level	can_infer	fit_order	
0	WeightedEnsemble_L2	0.793160	0.158455	44.677372	0.00
3081	1.952873	2	True	14	
1	NeuralNetFastAI_BAG_L1	0.788274	0.112152	32.890708	0.11
2152	32.890708	1	True	10	
2	CatBoost_BAG_L1	0.781759	0.010322	16.080908	0.01
0322	16.080908	1	True	7	
3	LightGBMXT_BAG_L1	0.780130	0.015563	20.928442	0.01
5563	20.928442	1	True	3	
4	LightGBM_BAG_L1	0.780130	0.019168	23.080157	0.01
9168	23.080157	1	True	4	
5	XGBoost_BAG_L1	0.773616	0.043223	9.833790	0.04
3223	9.833790	1	True	11	
6	LightGBMLarge_BAG_L1	0.763844	0.026220	23.984499	0.02
6220	23.984499	1	True	13	
7	NeuralNetTorch_BAG_L1	0.763844	0.125980	26.441011	0.12
5980	26.441011	1	True	12	
8	RandomForestEntr_BAG_L1	0.757329	0.186416	1.066143	0.18
6416	1.066143	1	True	6	
9	RandomForestGini_BAG_L1	0.745928	0.222441	0.741224	0.22
2441	0.741224	1	True	5	
10	ExtraTreesGini_BAG_L1	0.741042	0.212654	0.727877	0.21
2654	0.727877	1	True	8	
11	ExtraTreesEntr_BAG_L1	0.739414	0.151340	0.815004	0.15
1340	0.815004	1	True	9	
12	KNeighborsUnif_BAG_L1	0.700326	0.045170	0.044549	0.04
5170	0.044549	1	True	1	
13	KNeighborsDist_BAG_L1	0.697068	0.042531	0.042352	0.04
2531	0.042352	1	True	2	

Out[ ]:

	model	score_val	pred_time_val	fit_time	pred_time_val_marginal	
0	WeightedEnsemble_L2	0.793160	0.158455	44.677372	0.003081	
1	NeuralNetFastAI_BAG_L1	0.788274	0.112152	32.890708	0.112152	
2	CatBoost_BAG_L1	0.781759	0.010322	16.080908	0.010322	
3	LightGBMXT_BAG_L1	0.780130	0.015563	20.928442	0.015563	
4	LightGBM_BAG_L1	0.780130	0.019168	23.080157	0.019168	
5	XGBoost_BAG_L1	0.773616	0.043223	9.833790	0.043223	
6	LightGBMLarge_BAG_L1	0.763844	0.026220	23.984499	0.026220	
7	NeuralNetTorch_BAG_L1	0.763844	0.125980	26.441011	0.125980	
8	RandomForestEntr_BAG_L1	0.757329	0.186416	1.066143	0.186416	
9	RandomForestGini_BAG_L1	0.745928	0.222441	0.741224	0.222441	
10	ExtraTreesGini_BAG_L1	0.741042	0.212654	0.727877	0.212654	
11	ExtraTreesEntr_BAG_L1	0.739414	0.151340	0.815004	0.151340	
12	KNeighborsUnif_BAG_L1	0.700326	0.045170	0.044549	0.045170	
13	KNeighborsDist_BAG_L1	0.697068	0.042531	0.042352	0.042531	

In [ ]:
```python
f, ax = plt.subplots(figsize = (15, 6))
sns.barplot(x = "model", y = "score_val", data = predictor.leaderboard(), color = "
ax.set(ylabel = "Performance Metric (R2)", xlabel = "Regression Models")
plt.xticks(rotation = 45);
```

	model	score_val	pred_time_val	fit_time	pred_time_val_marginal	fit_time_marginal	stack_level	can_infer	fit_order
0	WeightedEnsemble_L2	0.793160	0.158455	44.677372	0.003081	1.952873	2	True	14
1	NeuralNetFastAI_BAG_L1	0.788274	0.112152	32.890708	0.112152	32.890708	1	True	10
2	CatBoost_BAG_L1	0.781759	0.010322	16.080908	0.010322	16.080908	1	True	7
3	LightGBMXT_BAG_L1	0.780130	0.015563	20.928442	0.015563	20.928442	1	True	3
4	LightGBM_BAG_L1	0.780130	0.019168	23.080157	0.019168	23.080157	1	True	4
5	XGBoost_BAG_L1	0.773616	0.043223	9.833790	0.043223	9.833790	1	True	11
6	LightGBMLarge_BAG_L1	0.763844	0.026220	23.984499	0.026220	23.984499	1	True	13
7	NeuralNetTorch_BAG_L1	0.763844	0.125980	26.441011	0.125980	26.441011	1	True	12
8	RandomForestEntr_BAG_L1	0.757329	0.186416	1.066143	0.186416	1.066143	1	True	6
9	RandomForestGini_BAG_L1	0.745928	0.222441	0.741224	0.222441	0.741224	1	True	5
10	ExtraTreesGini_BAG_L1	0.741042	0.212654	0.727877	0.212654	0.727877	1	True	8
11	ExtraTreesEntr_BAG_L1	0.739414	0.151340	0.815004	0.151340	0.815004	1	True	9
12	KNeighborsUnif_BAG_L1	0.700326	0.045170	0.044549	0.045170	0.044549	1	True	1
13	KNeighborsDist_BAG_L1	0.697068	0.042531	0.042352	0.042531	0.042352	1	True	2


```
In [ ]: predictor.evaluate(X_prueba)
```

```
Evaluation: accuracy on test data: 0.8311688311688312
Evaluations on test data:
{
    "accuracy": 0.8311688311688312,
    "balanced_accuracy": 0.7890236627560151,
    "mcc": 0.5933466528277093,
    "roc_auc": 0.86438655796381,
    "f1": 0.711111111111111,
    "precision": 0.7441860465116279,
    "recall": 0.6808510638297872
}
```

Out[ ]:   {'accuracy': 0.8311688311688312,
           'balanced_accuracy': 0.7890236627560151,
           'mcc': 0.5933466528277093,
           'roc_auc': 0.86438655796381,
           'f1': 0.711111111111111,
           'precision': 0.7441860465116279,
           'recall': 0.6808510638297872}

In [ ]:
```python
y_pred = predictor.predict(X_prueba)
print("Predictions:  ", list(y_pred)[:5])
```

Predictions: [1, 0, 0, 1, 0]

In [ ]:
```python
X_prueba
```

Out[ ]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFu
661	1	199	76	43	0	42.9	
122	2	107	74	30	100	33.6	
113	4	76	62	0	0	34.0	
14	5	166	72	19	175	25.8	
529	0	111	65	0	0	24.6	
...	...	...	...	...	...	...	
476	2	105	80	45	191	33.7	
482	4	85	58	22	49	27.8	
230	4	142	86	0	0	44.0	
527	3	116	74	15	105	26.3	
380	1	107	72	30	82	30.8	

154 rows × 9 columns

In [ ]:
```python
y_prueba = X_prueba['Outcome']
y_prueba
```
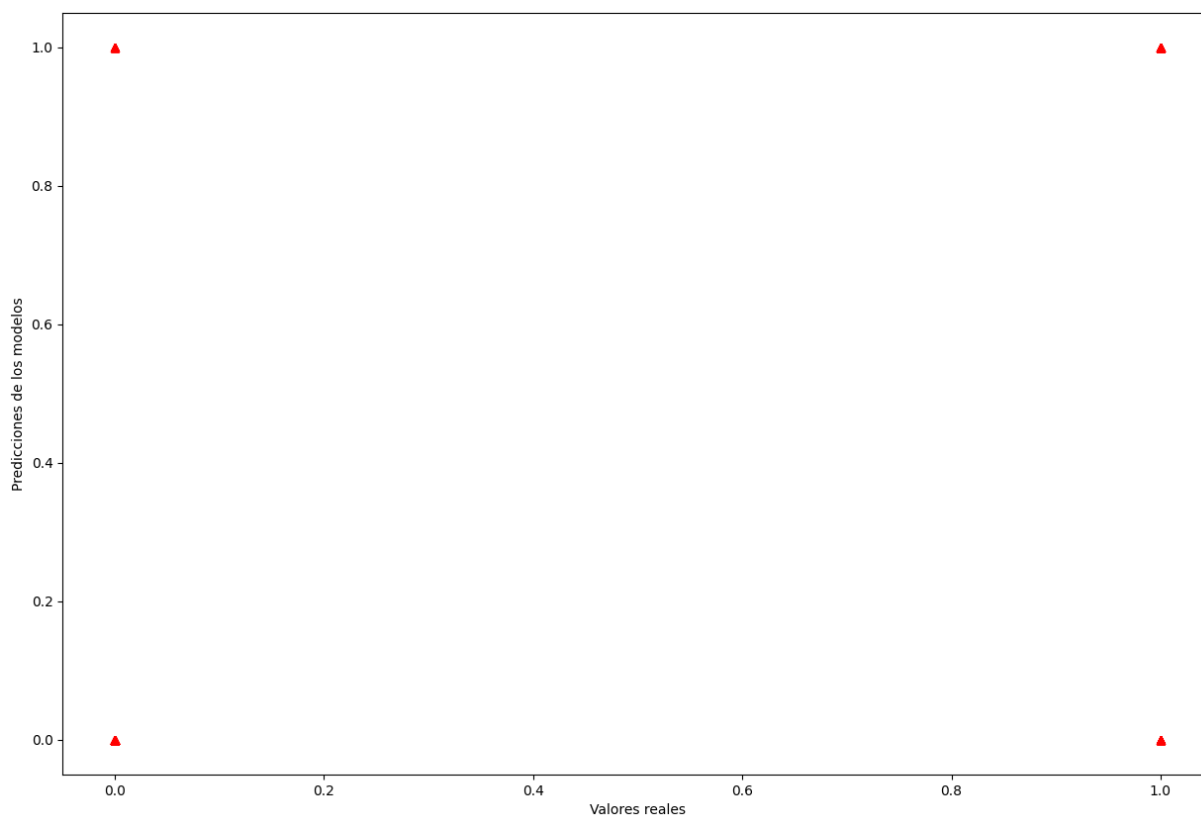
```
Out[ ]:  661    1
         122    0
         113    0
         14     1
         529    0
               ..
         476    1
         482    0
         230    1
         527    0
         380    0
         Name: Outcome, Length: 154, dtype: int64
```

```python
In [ ]:  y_predicc = predictor.predict(X_prueba)
         plt.figure(figsize = (15, 10))
         plt.plot(y_prueba, y_predicc, "^", color = 'r')
         plt.ylabel('Predicciones de los modelos')
         plt.xlabel('Valores reales')
```

Out[ ]: Text(0.5, 0, 'Valores reales')


```python
In [ ]:  from sklearn.metrics import accuracy_score, confusion_matrix, classification_report

         accuracy = accuracy_score(y_prueba, y_predicc)
         confusion = confusion_matrix(y_prueba, y_predicc)
         report = classification_report(y_prueba, y_predicc)

         print(f"Accuracy: {accuracy:.3f}")
         print("Confusion Matrix:\n", confusion)
         print("Classification Report:\n", report)
```

```
Accuracy: 0.831
Confusion Matrix:
 [[96 11]
 [15 32]]
Classification Report:
              precision    recall  f1-score   support

           0       0.86      0.90      0.88       107
           1       0.74      0.68      0.71        47

    accuracy                           0.83       154
   macro avg       0.80      0.79      0.80       154
weighted avg       0.83      0.83      0.83       154
```

Reflexion

Para esta semana, debido a la situacion del pais, fue un poco más difícil llevar la continuidad em virtual, ya que el foco de atención no es lo mismo en virtual que presencial Seguidamente el tema de AutoGluon, es muy interesante ya que es una herramienta que facilita y simplifica el proceso de construccion de modelos de aprendizaje automatico.

Ventajas

- Facilidad de uso: AutoGluon simplifica significativamente el proceso de modelado de aprendizaje automático al automatizar muchas tareas complejas, lo que lo hace accesible incluso para aquellos con poca experiencia en ciencia de datos.

- Optimización de hiperparámetros: Una de las características más útiles de AutoGluon es su capacidad para buscar de manera exhaustiva los mejores hiperparámetros para un modelo, lo que a menudo puede ser un proceso largo y complicado para los científicos de datos.

- Versatilidad: AutoGluon puede utilizarse para una variedad de tareas, incluyendo clasificación, regresión y modelado de series temporales, lo que lo convierte en una herramienta valiosa para una amplia gama de aplicaciones de aprendizaje automático.

Desventajas

- Falta de control personalizado: Aunque la automatización es beneficiosa, puede limitar la capacidad de los usuarios para realizar ajustes personalizados en el proceso de modelado, lo que podría ser un problema en aplicaciones más complejas que requieren un enfoque más específico.

- Poca transparencia en el proceso de modelado: Aunque AutoGluon ofrece resultados efectivos, la falta de transparencia en el proceso interno de modelado podría dificultar la comprensión de por qué un modelo en particular fue seleccionado o descartado.

- Requisitos de hardware y tiempo de ejecución: Algunos modelos generados por AutoGluon pueden requerir recursos computacionales significativos, lo que puede ser un obstáculo para aquellos con recursos limitados o restricciones de tiempo.