

▼ Universidad del Valle de Guatemala

Data Science

Laboratorio #7

Autores

Cristian Eduardo Aguirre Duarte

Marco Antonio Jurado Velasquez

```
!pip install -U ipykernel
```

```
[?] 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-packages (from ipykernel) (0.1.4)
Requirement already satisfied: debugpy>=1.6.5 in /usr/local/lib/python3.10/dist-packages (from ipykernel) (1.6.6)
Requirement already satisfied: ipython>=7.23.1 in /usr/local/lib/python3.10/dist-packages (from ipykernel) (7.34.0)
Requirement already satisfied: jupyter-client>=6.1.12 in /usr/local/lib/python3.10/dist-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/dist-packages (from ipykernel) (0.1.6)
Requirement already satisfied: nest-asyncio in /usr/local/lib/python3.10/dist-packages (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 (from 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-packages (from ipykernel) (6.3.2)
Requirement already satisfied: traitlets>=5.4.0 in /usr/local/lib/python3.10/dist-packages (from ipykernel) (5.7.1)
Requirement already satisfied: setuptools>=18.5 in /usr/local/lib/python3.10/dist-packages (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-packages (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.
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-packages (from ipython>=7.23.1->ipykernel) (4.8.0)
Requirement already satisfied: python-dateutil>=2.1 in /usr/local/lib/python3.10/dist-packages (from jupyter-client>=6.1.12->ipykernel)
Requirement already satisfied: platformdirs>=2.5 in /usr/local/lib/python3.10/dist-packages (from jupyter-core!=5.0.*,>=4.12->ipykernel)
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->ipykern
Requirement already satisfied: ptyprocess>=0.5 in /usr/local/lib/python3.10/dist-packages (from pexpect>4.3->ipython>=7.23.1->ipykernel)
Requirement already satisfied: wcwidth in /usr/local/lib/python3.10/dist-packages (from prompt-toolkit!=3.0.0,!<3.0.1,<3.1.0,>=2.0.0->ip
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.1->jupyter-client>=6.1.12->i
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It i
```

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

```

Requirement already satisfied: pip in /usr/local/lib/python3.10/dist-packages (23.3)
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It is
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (60.2.0)
Collecting setuptools
  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 (0.41.2)
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 packages that are installed. This behaviour is the source of
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 3.20.0
Successfully installed setuptools-68.2.2
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It is
Requirement already satisfied: mxnet<2.0.0 in /usr/local/lib/python3.10/dist-packages (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/dist-packages (from mxnet<2.0.0) (0.8.4)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.20.0->mxnet<2.0.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (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/dist-packages (from requests<3,>=2.20.0->mxnet<2.0.0)
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) (2017.4.17)
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It is
Collecting autogluon
  Downloading autogluon-0.8.2-py3-none-any.whl.metadata (11 kB)
Collecting autogluon.core==0.8.2 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading autogluon.core-0.8.2-py3-none-any.whl.metadata (12 kB)
Collecting autogluon.features==0.8.2 (from autogluon)
  Downloading autogluon.features-0.8.2-py3-none-any.whl.metadata (11 kB)
Collecting autogluon.tabular==0.8.2 (from autogluon.tabular[all]==0.8.2->autogluon)
  Downloading autogluon.tabular-0.8.2-py3-none-any.whl.metadata (13 kB)
Collecting autogluon.multimodal==0.8.2 (from autogluon)
  Downloading autogluon.multimodal-0.8.2-py3-none-any.whl.metadata (13 kB)
Collecting autogluon.timeseries==0.8.2 (from autogluon.timeseries[all]==0.8.2->autogluon)
  Downloading autogluon.timeseries-0.8.2-py3-none-any.whl.metadata (12 kB)
Requirement already satisfied: numpy<1.27,>=1.21 in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: scipy<1.12,>=1.5.4 in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: scikit-learn<1.3,>=1.0 in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: networkx<4,>=3.0 in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: pandas<1.6,>=1.4.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: tqdm<5,>=4.38 in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
Collecting boto3<2,>=1.10 (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
  Downloading boto3-1.28.63-py3-none-any.whl.metadata (6.7 kB)
Collecting autogluon.common==0.8.2 (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
  Downloading autogluon.common-0.8.2-py3-none-any.whl.metadata (11 kB)
Requirement already satisfied: hyperopt<0.2.8,>=0.2.7 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: ray<2.4,>=2.3 in /usr/local/lib/python3.10/dist-packages (from ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: pydantic<2.0,>=1.10.4 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->autogluon)
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)
Requirement already satisfied: Pillow<9.6,>=9.3 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: jsonschema<4.18,>=4.14 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: seqeval<1.3.0,>=1.2.2 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->autogluon)
Collecting evaluate<0.4.0,>=0.2.2 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading evaluate-0.3.0-py3-none-any.whl (72 kB)
    72.9/72.9 kB 3.9 MB/s eta 0:00:00
Collecting accelerate<0.17,>=0.9 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading accelerate-0.16.0-py3-none-any.whl (199 kB)
    199.7/199.7 kB 10.6 MB/s eta 0:00:00
Collecting timm<0.10.0,>=0.9.2 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading timm-0.9.7-py3-none-any.whl.metadata (58 kB)
    58.8/58.8 kB 60.9 MB/s eta 0:00:00
Collecting torch<1.14,>=1.9 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading torch-1.13.1-cp310-cp310-manylinux1_x86_64.whl (887.5 MB)
    887.5/887.5 kB 5.7 MB/s eta 0:00:00
Collecting torchvision<0.15.0 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading torchvision-0.14.1-cp310-cp310-manylinux1_x86_64.whl (24.2 MB)
    24.2/24.2 kB 213.6 MB/s eta 0:00:00
Requirement already satisfied: scikit-image<0.20.0,>=0.19.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->autogluon)
Collecting pytorch-lightning<1.10.0,>=1.9.0 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading pytorch_lightning-1.9.5-py3-none-any.whl (829 kB)
    829.5/829.5 kB 317.7 MB/s eta 0:00:00
Requirement already satisfied: text-unicode<1.4,>=1.3 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->autogluon)
Collecting torchmetrics<0.12.0,>=0.11.0 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading torchmetrics-0.11.4-py3-none-any.whl (519 kB)
    519.2/519.2 kB 220.1 MB/s eta 0:00:00
Collecting transformers<4.27.0,>=4.23.0 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading transformers-4.26.1-py3-none-any.whl (6.3 MB)
    6.3/6.3 kB 199.6 MB/s eta 0:00:00
Requirement already satisfied: nptyping<2.5.0,>=1.4.4 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: omegaconf<2.3.0,>=2.1.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->autogluon)

```

```

Collecting pytorch-metric-learning<2.0,>=1.3.0 (from autogluon.multimodal==0.8.2->autogluon)
  Downloading pytorch_metric_learning-1.7.3-py3-none-any.whl (112 kB)
    ━━━━━━━━━━━━━━━━ 112.2/112.2 kB 261.3 MB/s eta 0:00:00
Collecting nlpauge<1.2.0,>=1.1.10 (from autogluon.multimodal==0.8.2->autogluon)
  Downloading nlpauge-1.1.11-py3-none-any.whl (410 kB)
    ━━━━━━━━━━━━━━ 410.5/410.5 kB 319.1 MB/s eta 0:00:00
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)
Collecting openmim<0.4.0,>=0.3.7 (from autogluon.multimodal==0.8.2->autogluon)
  Downloading openmim-0.3.9-py2.py3-none-any.whl.metadata (16 kB)
Requirement already satisfied: defusedxml<0.7.2,>=0.7.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: jinja2<3.2,>=3.0.3 in /usr/local/lib/python3.10/dist-packages (from autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: tensorboard<3.2,>=2.9 in /usr/local/lib/python3.10/dist-packages (from autogluon.multimodal==0.8.2->autogluon)
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)
Requirement already satisfied: lightgbm<3.4,>=3.3 in /usr/local/lib/python3.10/dist-packages (from autogluon.tabular[all]==0.8.2->autogluon)
Requirement already satisfied: xgboost<1.8,>=1.6 in /usr/local/lib/python3.10/dist-packages (from autogluon.tabular[all]==0.8.2->autogluon)
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)
Collecting catboost<1.3,>=1.1 (from autogluon.tabular[all]==0.8.2->autogluon)
  Downloading catboost-1.2.2-cp310-cp310-manylinux2014_x86_64.whl.metadata (1.2 kB)
Requirement already satisfied: joblib<2,>=1.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.timeseries==0.8.2->autogluon)
Requirement already satisfied: statsmodels<0.15,>=0.13.0 in /usr/local/lib/python3.10/dist-packages (from autogluon.timeseries==0.8.2->autogluon)
Collecting gluonts<0.14,>=0.13.1 (from autogluon.timeseries==0.8.2->autogluon.timeseries[all]==0.8.2->autogluon)
  Downloading gluonts-0.13.5-py3-none-any.whl.metadata (9.4 kB)
Collecting statsforecast<1.5,>=1.4.0 (from autogluon.timeseries==0.8.2->autogluon.timeseries[all]==0.8.2->autogluon)
  Downloading statsforecast-1.4.0-py3-none-any.whl (91 kB)
    ━━━━━━━━━━━━ 92.0/92.0 kB 232.0 MB/s eta 0:00:00
Collecting mlforecast<0.7.4,>=0.7.0 (from autogluon.timeseries==0.8.2->autogluon.timeseries[all]==0.8.2->autogluon)
  Downloading mlforecast-0.7.3-py3-none-any.whl.metadata (13 kB)
Requirement already satisfied: ujson<6,>=5 in /usr/local/lib/python3.10/dist-packages (from autogluon.timeseries==0.8.2->autogluon.timeseries[all]==0.8.2->autogluon)
Requirement already satisfied: psutil<6,>=5.7.3 in /usr/local/lib/python3.10/dist-packages (from autogluon.common==0.8.2->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (from autogluon.common==0.8.2->autogluon.core==0.8.2->autogluon)
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)
Requirement already satisfied: pyyaml in /usr/local/lib/python3.10/dist-packages (from accelerate<0.17,>=0.9->autogluon.multimodal==0.8.2->autogluon)
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==0.8.2->autogluon)
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==0.8.2->autogluon)
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==0.8.2->autogluon)
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)
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)
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)
Collecting datasets>=2.0.0 (from evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->autogluon)
  Downloading datasets-2.14.5-py3-none-any.whl.metadata (19 kB)
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)
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)
Requirement already satisfied: multiprocessing in /usr/local/lib/python3.10/dist-packages (from evaluate<0.4.0,>=0.2.2->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: fsspec>=2021.05.0 in /usr/local/lib/python3.10/dist-packages (from fsspec[http]>=2021.05.0->evaluate<0.4.0,>=0.2.2->autogluon)
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)
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)
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)
Requirement already satisfied: fastdownload<2,>=0.5 in /usr/local/lib/python3.10/dist-packages (from fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluon)
Requirement already satisfied: fastcore<1.6,>=1.5.29 in /usr/local/lib/python3.10/dist-packages (from fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluon)
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)
Requirement already satisfied: spacy<4 in /usr/local/lib/python3.10/dist-packages (from fastai<2.8,>=2.3.1->autogluon.tabular[all]==0.8.2->autogluon)
Requirement already satisfied: toolz<=0.10 in /usr/local/lib/python3.10/dist-packages (from gluonts<0.14,>=0.13.1->autogluon.timeseries==0.8.2->autogluon)
Requirement already satisfied: typing-extensions<=4.0 in /usr/local/lib/python3.10/dist-packages (from gluonts<0.14,>=0.13.1->autogluon.timeseries==0.8.2->autogluon)
Requirement already satisfied: future in /usr/local/lib/python3.10/dist-packages (from hyperopt<0.2.8,>=0.2.7->autogluon.core[all]==0.8.2->autogluon)
Requirement already satisfied: cloudpickle in /usr/local/lib/python3.10/dist-packages (from hyperopt<0.2.8,>=0.2.7->autogluon.core[all]==0.8.2->autogluon)
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)
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.10/dist-packages (from jinja2<2.3,>=3.0.3->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: attrs>=17.4.0 in /usr/local/lib/python3.10/dist-packages (from jsonschema<4.18,>=4.14->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: pyrsistent!=0.17.0,!0.17.1,!0.17.2,>=0.14.0 in /usr/local/lib/python3.10/dist-packages (from jsonschema<4.18,>=4.14->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: wheel in /usr/local/lib/python3.10/dist-packages (from lightgbm<3.4,>=3.3->autogluon.tabular[all]==0.8.2->autogluon)
Requirement already satisfied: numba in /usr/local/lib/python3.10/dist-packages (from mlforecast<0.7.4,>=0.7.0->autogluon.timeseries==0.8.2->autogluon)
Requirement already satisfied: window-ops in /usr/local/lib/python3.10/dist-packages (from mlforecast<0.7.4,>=0.7.0->autogluon.timeseries==0.8.2->autogluon)
Requirement already satisfied: gdown>=4.0.0 in /usr/local/lib/python3.10/dist-packages (from nlpauge<1.2.0,>=1.1.10->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: click in /usr/local/lib/python3.10/dist-packages (from nltk<4.0.0,>=3.4.5->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: regex>=2021.8.3 in /usr/local/lib/python3.10/dist-packages (from nltk<4.0.0,>=3.4.5->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: antlr4-python3-runtime==4.9.* in /usr/local/lib/python3.10/dist-packages (from omegaconf<2.3.0,>=2.1.1->autogluon)
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)
Requirement already satisfied: model-index in /usr/local/lib/python3.10/dist-packages (from openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon)
Collecting opendatalab (from openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon)
  Downloading opendatalab-0.0.10-py3-none-any.whl.metadata (6.4 kB)
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)
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)
Requirement already satisfied: python-dateutil>=2.8.1 in /usr/local/lib/python3.10/dist-packages (from pandas<1.6,>=1.4.1->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas<1.6,>=1.4.1->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: lightning-utilities>=0.6.0.post0 in /usr/local/lib/python3.10/dist-packages (from pytorch-lightning<1.10.0,>=1.9.0->autogluon)
Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages (from ray<2.4,>=2.3->ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: msgpack<2.0.0,>=1.0.0 in /usr/local/lib/python3.10/dist-packages (from ray<2.4,>=2.3->ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: protobuf!=3.19.5,>=3.15.3 in /usr/local/lib/python3.10/dist-packages (from ray<2.4,>=2.3->ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: aiosignal in /usr/local/lib/python3.10/dist-packages (from ray<2.4,>=2.3->ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: frozenlist in /usr/local/lib/python3.10/dist-packages (from ray<2.4,>=2.3->ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: virtualenv>=20.0.24 in /usr/local/lib/python3.10/dist-packages (from ray<2.4,>=2.3->ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: aiohttp>=3.7 in /usr/local/lib/python3.10/dist-packages (from ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Collecting aiohttp-cors (from ray[default]<2.4,>=2.3; extra == "all"->autogluon)
  Downloading aiohttp_cors-0.7.0-py3-none-any.whl (27 kB)
Requirement already satisfied: colorfor in /usr/local/lib/python3.10/dist-packages (from ray[default]<2.4,>=2.3; extra == "all"->autogluon)

```

```

Requirement already satisfied: py-spy>=0.2.0 in /usr/local/lib/python3.10/dist-packages (from ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: gpustat>=1.0.0 in /usr/local/lib/python3.10/dist-packages (from ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Collecting opencensus (from ray[default]<2.4,>=2.3; extra == "all"->autogluon.core[all]==0.8.2->autogluon)
    Downloading opencensus-0.11.3-py2.py3-none-any.whl.metadata (12 kB)
Requirement already satisfied: prometheus-client>=0.7.1 in /usr/local/lib/python3.10/dist-packages (from ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: smart-open in /usr/local/lib/python3.10/dist-packages (from ray[default]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: tensorflowX>=1.9 in /usr/local/lib/python3.10/dist-packages (from ray[tune]<2.4,>=2.3; extra == "all"->autogluon)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: imageio>=2.4.1 in /usr/local/lib/python3.10/dist-packages (from scikit-image<0.20.0,>=0.19.1->autogluon.mli)
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)
Requirement already satisfied: PyWavelets>=1.1.1 in /usr/local/lib/python3.10/dist-packages (from scikit-image<0.20.0,>=0.19.1->autogluon)
Requirement already satisfied: threadpoolctl>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from scikit-learn<1.3,>=1.0->autogluon.core)
Requirement already satisfied: patsy>=0.5.2 in /usr/local/lib/python3.10/dist-packages (from statsmodels<0.15,>=0.13.0->autogluon.timeseries)
Requirement already satisfied: absl-py>=0.4 in /usr/local/lib/python3.10/dist-packages (from tensorflow<3,>=2.9->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3.10/dist-packages (from tensorflow<3,>=2.9->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: google-auth-oauthlib<1.1,>=0.5 in /usr/local/lib/python3.10/dist-packages (from tensorflow<3,>=2.9->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.10/dist-packages (from tensorflow<3,>=2.9->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: tensorflow-data-server<0.8.0,>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow<3,>=2.9->autogluon)
Requirement already satisfied: werkzeug>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow<3,>=2.9->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: safetensors in /usr/local/lib/python3.10/dist-packages (from timm<0.10.0,>=0.9.2->autogluon.multimodal==0.8.2->autogluon)
Requirement already satisfied: nvidia-cuda-runtime-cu11=>11.7.99 in /usr/local/lib/python3.10/dist-packages (from torch<1.14,>=1.9->autogluon)
Requirement already satisfied: nvidia-cudnn-cu11=>8.5.0.96 in /usr/local/lib/python3.10/dist-packages (from torch<1.14,>=1.9->autogluon)
Requirement already satisfied: nvidia-cublas-cu11=>11.10.3.66 in /usr/local/lib/python3.10/dist-packages (from torch<1.14,>=1.9->autogluon)
Requirement already satisfied: nvidia-cuda-nvrtc-cu11=>11.7.99 in /usr/local/lib/python3.10/dist-packages (from torch<1.14,>=1.9->autogluon)
Requirement already satisfied: tokenizers!=0.11.3,<0.14,>=0.11.1 in /usr/local/lib/python3.10/dist-packages (from transformers<4.27.0,>=4.27.1->autogluon)
Requirement already satisfied: sentencepiece!=0.1.92,>=0.1.91 in /usr/local/lib/python3.10/dist-packages (from transformers[sentencepiece])
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packages (from matplotlib->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib->autogluon.core==0.8.2->autogluon)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib->autogluon.core==0.8.2->autogluon)
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)
Requirement already satisfied: asyncio-timeout<5.0,>=4.0.0a3 in /usr/local/lib/python3.10/dist-packages (from aiohttp>=3.7->ray[default]<2.4,>=2.3)
Requirement already satisfied: yarl<2.0,>=1.0 in /usr/local/lib/python3.10/dist-packages (from aiohttp>=3.7->ray[default]<2.4,>=2.3; ext)
Requirement already satisfied: pyarrow>=8.0.0 in /usr/local/lib/python3.10/dist-packages (from datasets>=2.0.0->evaluate<0.4.0,>=0.2.2->autogluon)
Requirement already satisfied: beautifulsoup4 in /usr/local/lib/python3.10/dist-packages (from gdown>=4.0.0->nlpauge<1.2.0,>=1.1.10->autogluon)
Requirement already satisfied: cachetools<6.0,>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensorboard)
Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensorboard)
Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensorboard)
Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from google-auth-oauthlib<1.1,>=0.5->autogluon)
Requirement already satisfied: nvidia-ml-py>=11.450.129 in /usr/local/lib/python3.10/dist-packages (from gpustat>=1.0.0->ray[default]<2.4,>=2.3)
Requirement already satisfied: blessed>=1.17.1 in /usr/local/lib/python3.10/dist-packages (from gpustat>=1.0.0->ray[default]<2.4,>=2.3; ext)
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)
Requirement already satisfied: spacy-legacy<3.1.0,>=3.0.11 in /usr/local/lib/python3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon)
Requirement already satisfied: spacy-loggers<2.0.0,>=1.0.0 in /usr/local/lib/python3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon)
Requirement already satisfied: murmurhash<1.1.0,>=0.28.0 in /usr/local/lib/python3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon)
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)
Requirement already satisfied: preshed<3.1.0,>=3.0.2 in /usr/local/lib/python3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon)
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)
Requirement already satisfied: wasabi<1.2.0,>=0.9.1 in /usr/local/lib/python3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon)
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)
Requirement already satisfied: catalogue<2.1.0,>=2.0.6 in /usr/local/lib/python3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon)
Requirement already satisfied: typer<0.10.0,>=0.3.0 in /usr/local/lib/python3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon)
Requirement already satisfied: pathy>=0.10.0 in /usr/local/lib/python3.10/dist-packages (from spacy<4->fastai<2.8,>=2.3.1->autogluon)
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)
Requirement already satisfied: distlib<1,>=0.3.7 in /usr/local/lib/python3.10/dist-packages (from virtualenv>=20.0.24->ray<2.4,>=2.4.1->autogluon)
Requirement already satisfied: platformdirs<4,>=3.9.1 in /usr/local/lib/python3.10/dist-packages (from virtualenv>=20.0.24->ray<2.4,>=2.4.1->autogluon)
Requirement already satisfied: ordered-set in /usr/local/lib/python3.10/dist-packages (from model-index->openmim<0.4.0,>=0.3.7->autogluon)
Requirement already satisfied: opencensus-context>=0.1.3 in /usr/local/lib/python3.10/dist-packages (from opencensus->ray[default]<2.4,>=2.4.1->autogluon)
Requirement already satisfied: google-api-core<3.0.0,>=1.0.0 in /usr/local/lib/python3.10/dist-packages (from opencensus->ray[default]<2.4,>=2.4.1->autogluon)
Requirement already satisfied: pycryptodome in /usr/local/lib/python3.10/dist-packages (from opendatalab->openmim<0.4.0,>=0.3.7->autogluon)
Collecting openxlab (from opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon)
    Downloading openxlab-0.0.26-py3-none-any.whl.metadata (3.7 kB)
Requirement already satisfied: tenacity>=6.2.0 in /usr/local/lib/python3.10/dist-packages (from plotly->catboost<1.3,>=1.1->autogluon.taylor)
Requirement already satisfied: markdown-it-py>=2.2.0 in /usr/local/lib/python3.10/dist-packages (from rich->openmim<0.4.0,>=0.3.7->autogluon)
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)
Requirement already satisfied: wcwidth>=0.1.4 in /usr/local/lib/python3.10/dist-packages (from blessed>=1.17.1->gpustat>=1.0.0->ray[default])
Requirement already satisfied: googleapis-common-protos<2.0.dev0,>=1.56.2 in /usr/local/lib/python3.10/dist-packages (from google-api-common-protos)
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)
Requirement already satisfied: pyasn1<0.6.0,>=0.4.6 in /usr/local/lib/python3.10/dist-packages (from pyasn1-modules>=0.2.1->google-auth<3,>=3.0.0->autogluon)
Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.10/dist-packages (from requests-oauthlib>=0.7.0->google-auth-oauthlib)
Requirement already satisfied: bliss<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)
Requirement already satisfied: confection<1.0.0,>=0.0.1 in /usr/local/lib/python3.10/dist-packages (from thinc<8.2.0,>=8.1.8->spacy<4->fastai)
Requirement already satisfied: soupsieve>1.2 in /usr/local/lib/python3.10/dist-packages (from beautifulsoup4->gdown>=4.0.0->nlpauge<1.2.0)
Collecting oss2~>2.17.0 (from openxlab->opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->autogluon)
    Downloading oss2-2.17.0.tar.gz (259 kB)

```

259.5/259.5 kB 158.4 MB/s eta 0:00:00

Preparing metadata (setup.py) ... done

Collecting setuptools (from autogluon.common==0.8.2->autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)

Downloading setuptools-60.2.0-py3-none-any.whl (953 kB)

953.1/953.1 kB 324.9 MB/s eta 0:00:00

Requirement already satisfied: PySocks!=1.5.7,>=1.5.6 in /usr/local/lib/python3.10/dist-packages (from requests[socks]->gdown>=4.0.0->nlpauge<1.2.0)

https://colab.research.google.com/drive/1I_M_koN4UGGZQIqQMW1mtzfyRLY64vEg?authuser=1#scrollTo=WiehiMSVgum4&printMode=true

```

Requirement already satisfied: crcmod>=1.7 in /usr/local/lib/python3.10/dist-packages (from oss2~=2.17.0->openxlab->opendatalab->openmim)
Collecting aliyun-python-sdk-kms>=2.4.1 (from oss2~=2.17.0->openxlab->opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2->ai
  Downloading aliyun_python_sdk_kms-2.16.2-py2.py3-none-any.whl.metadata (1.5 kB)
Collecting aliyun-python-sdk-core>=2.13.12 (from oss2~=2.17.0->openxlab->opendatalab->openmim<0.4.0,>=0.3.7->autogluon.multimodal==0.8.2
  Downloading aliyun-python-sdk-core-2.14.0.tar.gz (443 kB)
   └── 443.0/443.0 kB 301.6 MB/s eta 0:00:00
    Preparing metadata (setup.py) ... done
Requirement already satisfied: cryptography>=2.6.0 in /usr/local/lib/python3.10/dist-packages (from aliyun-python-sdk-core>=2.13.12->oss
Requirement already satisfied: cffi>=1.12 in /usr/local/lib/python3.10/dist-packages (from cryptography>=2.6.0->aliyun-python-sdk-core>=
Requirement already satisfied: pycparser in /usr/local/lib/python3.10/dist-packages (from cffi>=1.12->cryptography>=2.6.0->aliyun-python
Downloading autogluon-0.8.2-py3-none-any.whl (9.7 kB)
  Downloading autogluon.core-0.8.2-py3-none-any.whl (224 kB)
   └── 224.0/224.0 kB 263.3 MB/s eta 0:00:00
Downloading autogluon.features-0.8.2-py3-none-any.whl (62 kB)
   └── 62.1/62.1 kB 183.0 MB/s eta 0:00:00
Downloading autogluon.multimodal-0.8.2-py3-none-any.whl (372 kB)
   └── 372.3/372.3 kB 279.5 MB/s eta 0:00:00
Downloading autogluon.tabular-0.8.2-py3-none-any.whl (285 kB)
   └── 285.7/285.7 kB 273.6 MB/s eta 0:00:00
Downloading autogluon.timeseries-0.8.2-py3-none-any.whl (116 kB)
   └── 116.3/116.3 kB 255.7 MB/s eta 0:00:00
Downloading autogluon.common-0.8.2-py3-none-any.whl (61 kB)
   └── 61.1/61.1 kB 212.9 MB/s eta 0:00:00
Downloading boto3-1.28.63-py3-none-any.whl (135 kB)
   └── 135.8/135.8 kB 161.1 MB/s eta 0:00:00
Downloading catboost-1.2.2-cp310-cp310-manylinux2014_x86_64.whl (98.7 MB)
   └── 98.7/98.7 MB 107.8 MB/s eta 0:00:00
Downloading gluonts-0.13.5-py3-none-any.whl (1.5 MB)
   └── 1.5/1.5 MB 135.1 MB/s eta 0:00:00
Downloading mlforecast-0.7.3-py3-none-any.whl (43 kB)
   └── 43.5/43.5 kB 90.2 MB/s eta 0:00:00
Downloading openmim-0.3.9-py2.py3-none-any.whl (52 kB)
   └── 52.7/52.7 kB 179.3 MB/s eta 0:00:00
Downloading timm-0.9.7-py3-none-any.whl (2.2 MB)
   └── 2.2/2.2 MB 167.6 MB/s eta 0:00:00
Downloading datasets-2.14.5-py3-none-any.whl (519 kB)
   └── 519.6/519.6 kB 142.0 MB/s eta 0:00:00
Downloading opencensus-0.11.3-py2.py3-none-any.whl (128 kB)
   └── 128.2/128.2 kB 181.7 MB/s eta 0:00:00
Downloading opendatalab-0.0.10-py3-none-any.whl (29 kB)
  Downloading openxlab-0.0.26-py3-none-any.whl (295 kB)
   └── 295.9/295.9 kB 121.5 MB/s eta 0:00:00
  Downloading aliyun_python_sdk_kms-2.16.2-py2.py3-none-any.whl (94 kB)
   └── 94.0/94.0 kB 188.3 MB/s eta 0:00:00
Building wheels for collected packages: oss2, aliyun-python-sdk-core
  Building wheel for oss2 (setup.py) ... done
    Created wheel for oss2: filename=oss2-2.17.0-py3-none-any.whl size=112271 checksum=3a71cafa0ad53671ha1ah038266723f852d7d7192a6fc126a17
!pip install autogluon autogluon.tabular "mxnet<2.0.0"

```

```

Collecting autogluon
  Using cached autogluon-0.8.2-py3-none-any.whl.metadata (11 kB)
Collecting autogluon.tabular
  Downloading autogluon.tabular-0.8.2-py3-none-any.whl.metadata (13 kB)
Requirement already satisfied: mxnet<2.0.0 in /usr/local/lib/python3.10/dist-packages (1.9.1)
Collecting autogluon.core==0.8.2 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading autogluon.core-0.8.2-py3-none-any.whl.metadata (12 kB)
Collecting autogluon.features==0.8.2 (from autogluon)
  Downloading autogluon.features-0.8.2-py3-none-any.whl.metadata (11 kB)
Collecting autogluon.multimodal==0.8.2 (from autogluon)
  Downloading autogluon.multimodal-0.8.2-py3-none-any.whl.metadata (13 kB)
Collecting autogluon.timeseries==0.8.2 (from autogluon.timeseries[all]==0.8.2->autogluon)
  Downloading autogluon.timeseries-0.8.2-py3-none-any.whl.metadata (12 kB)
Requirement already satisfied: numpy<1.27,>=1.21 in /usr/local/lib/python3.10/dist-packages (from autogluon.tabular) (1.23.5)
Requirement already satisfied: scipy<1.12,>=1.5.4 in /usr/local/lib/python3.10/dist-packages (from autogluon.tabular) (1.11.3)
Requirement already satisfied: pandas<1.6,>=1.4.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.tabular) (1.5.3)
Requirement already satisfied: scikit-learn<1.3,>=1.0 in /usr/local/lib/python3.10/dist-packages (from autogluon.tabular) (1.2.2)
Requirement already satisfied: networkx<4,>=3.0 in /usr/local/lib/python3.10/dist-packages (from autogluon.tabular) (3.1)
Requirement already satisfied: tqdm<5,>=4.38 in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[a
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-packages (from autogluon.core==0.8.2->autogluon.core[all]==
Collecting boto3<2,>=1.10 (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
  Downloading boto3-1.28.63-py3-none-any.whl.metadata (6.7 kB)
Collecting autogluon.common==0.8.2 (from autogluon.core==0.8.2->autogluon.core[all]==0.8.2->autogluon)
  Downloading autogluon.common-0.8.2-py3-none-any.whl.metadata (11 kB)
Requirement already satisfied: hyperopt<0.2.8,>=0.2.7 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->au
Collecting ray<2.4,>=2.3 (from ray[default]<2.4,>=2.3; extra == "all"->autogluon.core[all]==0.8.2->autogluon)
  Downloading ray-2.3.1-cp310-cp310-manylinux2014_x86_64.whl (58.5 MB)
   └── 58.5/58.5 kB 12.1 MB/s eta 0:00:00
Requirement already satisfied: pydantic<2.0,>=1.10.4 in /usr/local/lib/python3.10/dist-packages (from autogluon.core[all]==0.8.2->aut
Collecting grpcio<1.50.0,>=1.42.0 (from autogluon.core[all]==0.8.2->autogluon)
  Downloading grpcio-1.50.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (4.7 MB)
   └── 4.7/4.7 kB 97.8 MB/s eta 0:00:00
Requirement already satisfied: Pillow<9.6,>=9.3 in /usr/local/lib/python3.10/dist-packages (from autogluon.multimodal==0.8.2->autoglu
Collecting jsonschema<4.18,>=4.14 (from autogluon.multimodal==0.8.2->autogluon)

```

```
Downloading jsonschema-4.17.3-py3-none-any.whl (90 kB) 90.4/90.4 kB 6.3 MB/s eta 0:00:00
Collecting seqeval<1.3.0,>=1.2.2 (from autogluon.multimodal==0.8.2->autogluon)
  Downloading seqeval-1.2.2.tar.gz (43 kB) 43.6/43.6 kB 3.0 MB/s eta 0:00:00
    Preparing metadata (setup.py) ... done
Collecting evaluate<0.4.0,>=0.2.2 (from autogluon.multimodal==0.8.2->autogluon)
  Downloading evaluate-0.3.0-py3-none-any.whl (72 kB) 72.9/72.9 kB 4.9 MB/s eta 0:00:00
Collecting accelerate<0.17,>=0.9 (from autogluon.multimodal==0.8.2->autogluon)
  Downloading accelerate-0.16.0-py3-none-any.whl (199 kB) 199.7/199.7 kB 14.8 MB/s eta 0:00:00
Collecting timm<0.10.0,>=0.9.2 (from autogluon.multimodal==0.8.2->autogluon)
  Downloading timm-0.9.7-py3-none-any.whl.metadata (58 kB) 58.8/58.8 kB 4.2 MB/s eta 0:00:00
Collecting torch<1.14,>=1.9 (from autogluon.multimodal==0.8.2->autogluon)
  Downloading torch-1.13.1-cp310-cp310-manylinux1_x86_64.whl (887.5 MB) 887.5/887.5 MB 2.2 MB/s eta 0:00:00
Collecting torchvision<0.15.0 (from autogluon.multimodal==0.8.2->autogluon)
  Downloading torchvision-0.14.1-cp310-cp310-manylinux1_x86_64.whl (24.2 MB) 24.2/24.2 MB 82.3 MB/s eta 0:00:00
Requirement already satisfied: scikit-image<0.20.0.>=0.19.1 in /usr/local/lib/python3.10/dist-packages (from autogluon.multimodal==0.8.2)
```

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from autogluon.tabular import TabularDataset, TabularPredictor

import warnings
warnings.filterwarnings('ignore')

from google.colab import drive
drive.mount('/content/drive')
```

Mounted at /content/drive

▼ Carga del Conjunto de Datos

```
diabetes = pd.read_csv('/content/drive/MyDrive/Datasets/diabetes.csv')
```

▼ Análisis Exploratorio de Datos (EDA)

```
diabetes.head()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome	
0	6	148	72	35	0	33.6		0.627	50	1
1	1	85	66	29	0	26.6		0.351	31	0
2	8	183	64	0	0	23.3		0.672	32	1
3	1	89	66	23	94	28.1		0.167	21	0
4	0	137	40	35	168	43.1		2.288	33	1

```
diabetes.tail()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome	
763	10	101	76	48	180	32.9		0.171	63	0
764	2	122	70	27	0	36.8		0.340	27	0
765	5	121	72	23	112	26.2		0.245	30	0
766	1	126	60	0	0	30.1		0.349	47	1
767	1	93	70	31	0	30.4		0.315	23	0

```
# Generar un resumen estadístico
diabetes.describe()
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
count	768.000000	768.000000	768.000000	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	0.471876	33.240885	0.348958
std	3.369578	31.972618	19.355807	15.952218	115.244002	7.884160	0.331329	11.760232	0.476951
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.078000	21.000000	0.000000
25%	1.000000	99.000000	62.000000	0.000000	0.000000	27.300000	0.243750	24.000000	0.000000
50%	3.000000	117.000000	72.000000	23.000000	30.500000	32.000000	0.372500	29.000000	0.000000
75%	6.000000	140.250000	80.000000	32.000000	127.250000	36.600000	0.626250	41.000000	1.000000
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.100000	2.420000	81.000000	1.000000

```
# Obtener información del conjunto de datos
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
```

```
# Agrupar por región para ver si hay alguna relación entre region y charges
# Parece ser que la región south east tiene los cargos y los índices de masa corporal más altos
```

```
df_diabetes = diabetes.groupby('Age').describe()
df_diabetes
df_diabetes["Glucose"]["mean"].head()
```

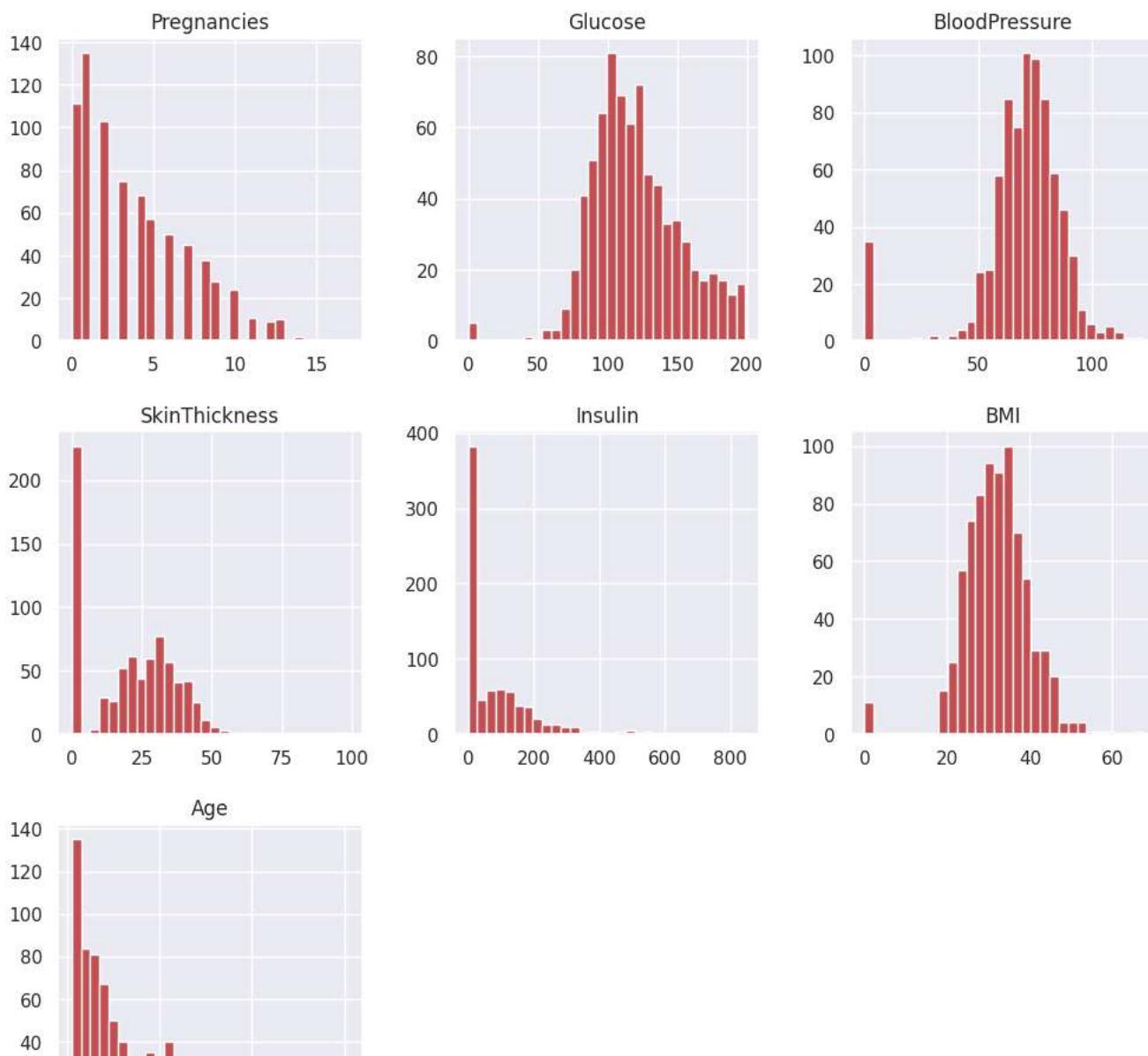
```
Age
21    108.317460
22    108.208333
23    111.578947
24    117.891304
25    110.083333
Name: mean, dtype: float64
```

```
# Ver si hay valores nulos "NULL"
```

```
diabetes.isnull().sum()
```

```
Pregnancies      0
Glucose          0
BloodPressure    0
SkinThickness    0
Insulin          0
BMI              0
DiabetesPedigreeFunction 0
Age              0
Outcome          0
dtype: int64
```

```
diabetes[['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'Insulin', 'BMI', 'Age']].hist(bins = 30, figsize = (12, 12), color = 'r')
```



```
# Cuenta la cantidad de pacientes con y sin diabetes
case1 = diabetes[diabetes['Outcome'] == 1]['Outcome'].count()
case2 = diabetes[diabetes['Outcome'] == 0]['Outcome'].count()
# Imprime los valores
print(f'Pacientes con diabetes: {case1}')
print(f'Pacientes sin diabetes: {case2}'')
```

```
Pacientes con diabetes: 268
Pacientes sin diabetes: 500
```

```
import pandas as pd
from sklearn.utils import resample

# Divide el conjunto de datos en las dos clases
diabetes_majority = diabetes[diabetes['Outcome'] == 0]
diabetes_minority = diabetes[diabetes['Outcome'] == 1]

# Realiza un sobremuestreo de la clase minoritaria para igualar la cantidad de muestras en ambas clases
diabetes_minority_resampled = resample(diabetes_minority, replace=True, n_samples=case2, random_state=42)

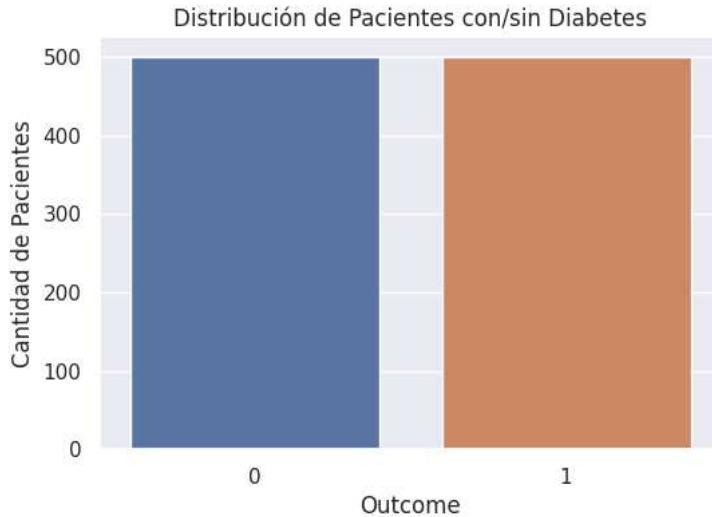
# Combina las dos clases equilibradas
diabetes = pd.concat([diabetes_majority, diabetes_minority_resampled])

# Verifica la cantidad de muestras en cada clase
diabetes['Outcome'].value_counts()
```

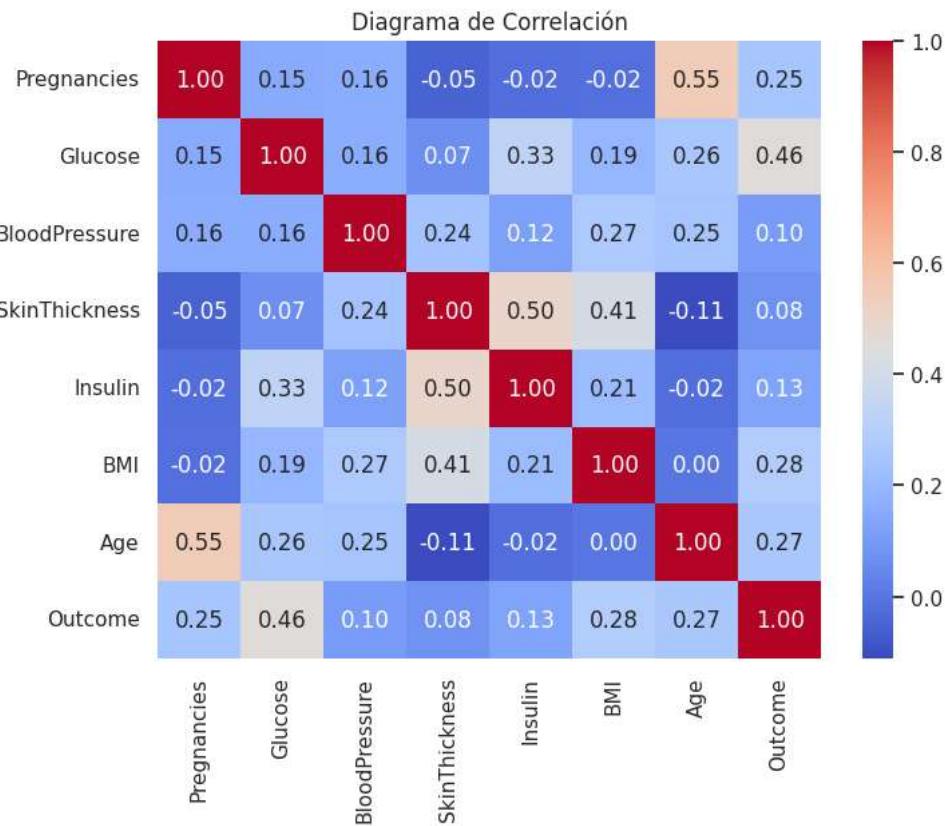
0	500
1	500

```
Name: Outcome, dtype: int64
```

```
# Gráfico de Barras para Outcome
plt.figure(figsize=(6, 4))
sns.countplot(x='Outcome', data=diabetes)
plt.title('Distribución de Pacientes con/sin Diabetes')
plt.xlabel('Outcome')
plt.ylabel('Cantidad de Pacientes')
plt.show()
```



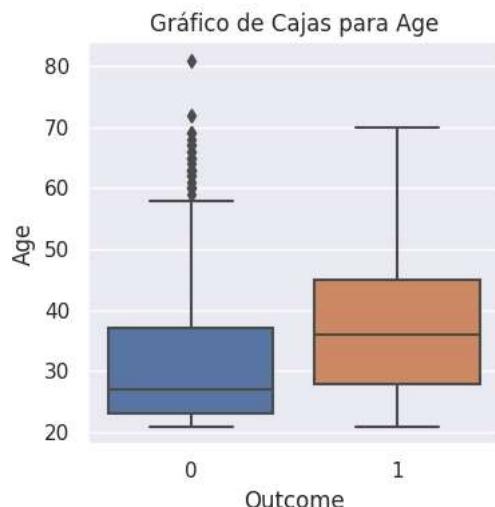
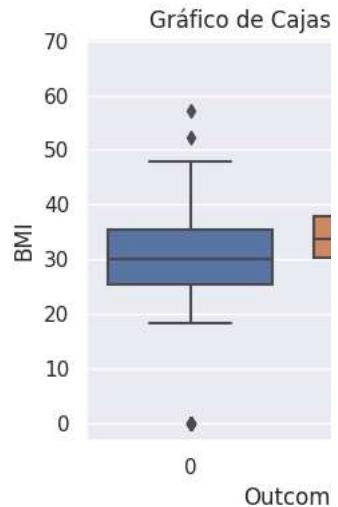
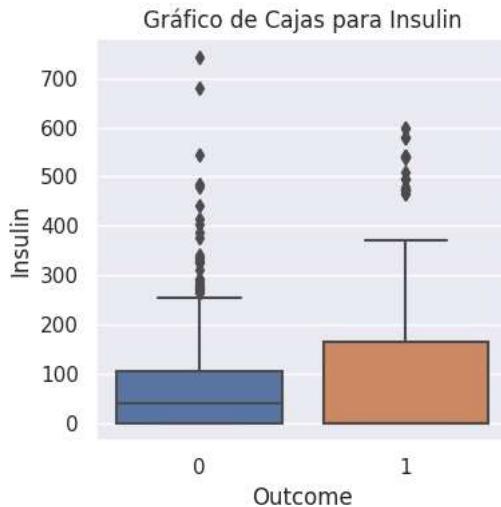
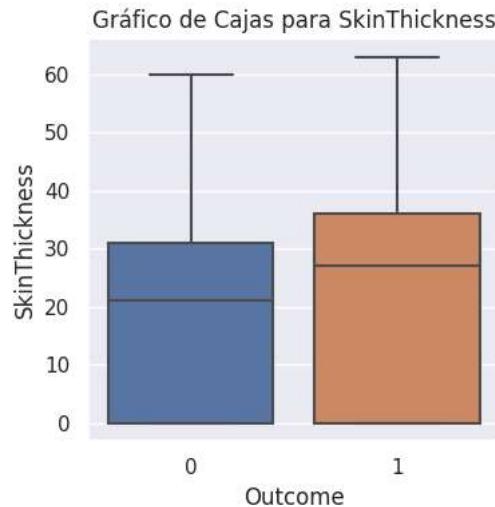
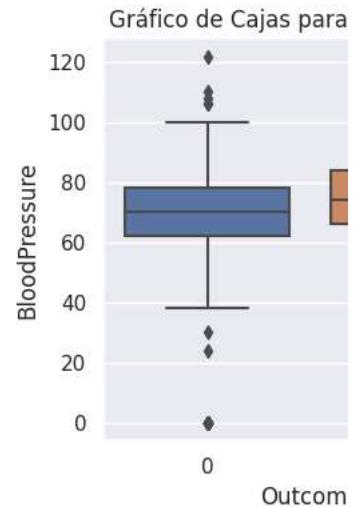
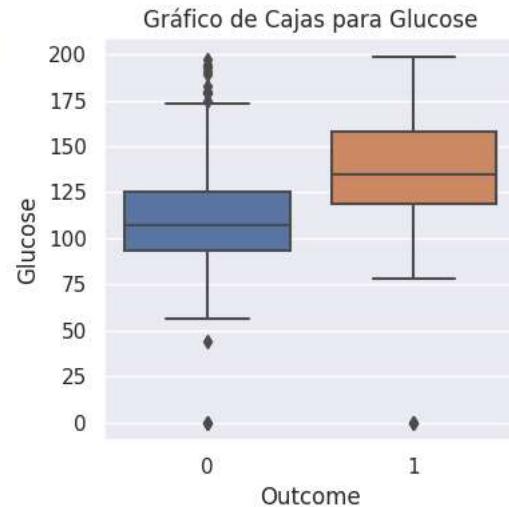
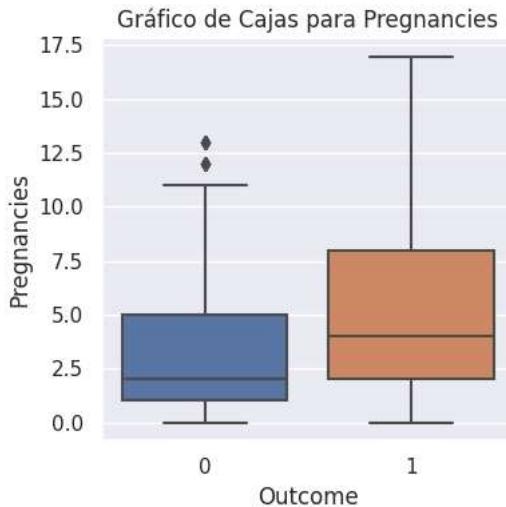
```
# Diagrama de Correlación
correlation_matrix = diabetes[['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'Insulin', 'BMI', 'Age', 'Outcome']].corr()
plt.figure(figsize=(8, 6))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt=".2f")
plt.title('Diagrama de Correlación')
plt.show()
```



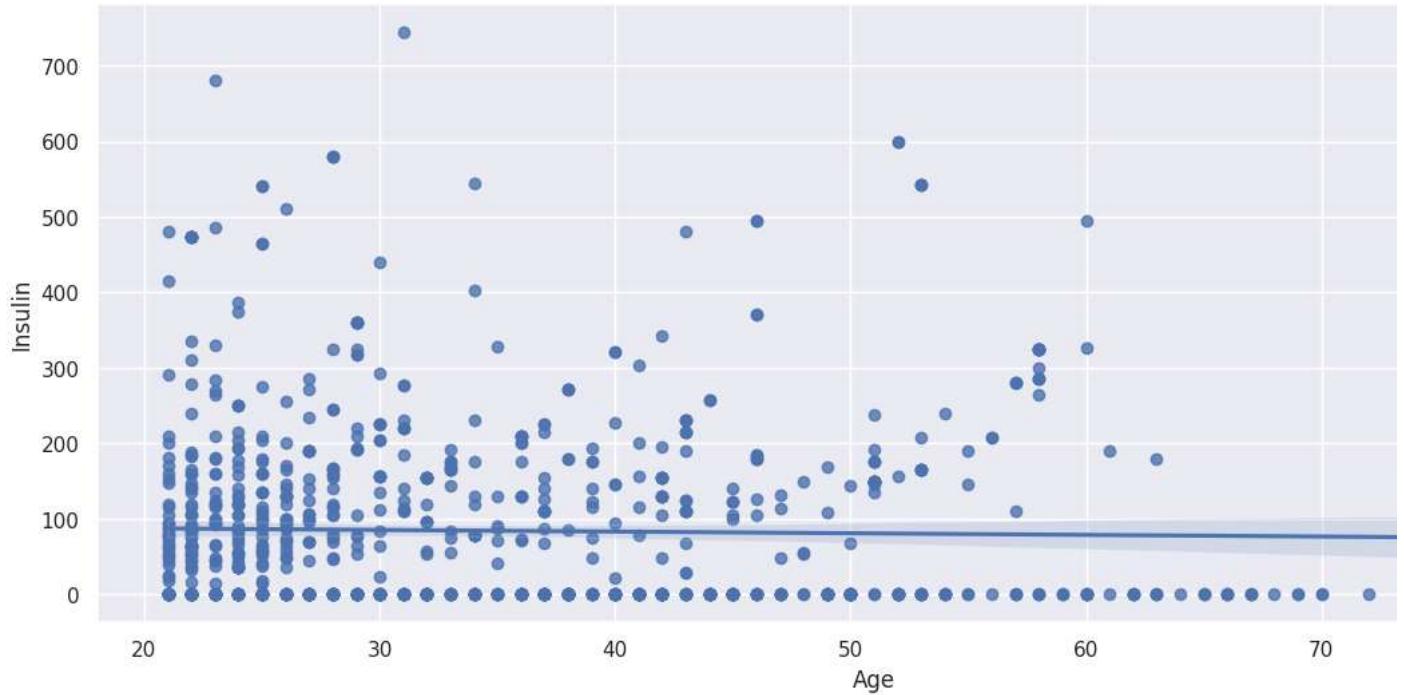
```
variables_numericas = ['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'Insulin', 'BMI', 'Age']
```

```
# Crea gráficos de cajas para todas las variables numéricas
plt.figure(figsize=(12, 12))
for i, variable in enumerate(variables_numericas):
    plt.subplot(3, 3, i + 1)
    sns.boxplot(x='Outcome', y=variable, data=diabetes)
    plt.title(f'Gráfico de Cajas para {variable}')
    plt.xlabel('Outcome')
    plt.ylabel(variable)

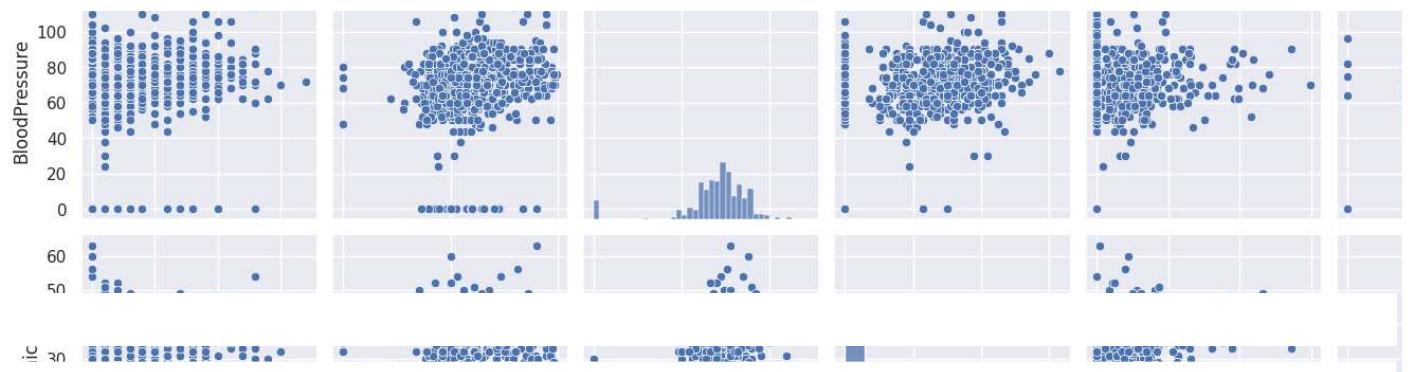
plt.tight_layout()
plt.show()
```



```
plt.figure(figsize = (15, 6))
sns.regplot(x = 'Age', y = 'Insulin', data = diabetes)
plt.show()
```



```
sns.pairplot(diabetes)
```



▼ ENTRENAR MULTIPLES MODELOS UTILANDO AUTOGLUON

```
# Dividir los datos en un 80% para entrenamiento y 20% para pruebas
```

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

```
X_entreno
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
761	9	170	74	31	0	44.0		0.403	43
269	2	146	0	0	0	27.5		0.240	28
519	6	129	90	7	326	19.6		0.582	60
642	6	147	80	0	0	29.5		0.178	50
237	0	179	90	27	0	44.1		0.686	23
...
189	5	139	80	35	160	31.6		0.361	25
313	3	113	50	10	85	29.5		0.626	25
301	2	144	58	33	135	31.6		0.422	25
630	7	114	64	0	0	27.4		0.732	34
326	1	122	64	32	156	35.1		0.692	30

800 rows × 9 columns

```
— u.u
```

```
X_prueba
```

Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome	
391	5	166	76	0	0	45.7	0.340	27	1
648	11	136	84	35	130	28.3	0.260	42	1
474	4	114	64	0	0	28.9	0.126	24	0
730	3	130	78	23	79	28.4	0.323	34	1
695	7	142	90	24	480	30.4	0.128	43	1
...
388	5	144	82	26	285	32.0	0.452	58	1
443	8	108	70	0	0	30.5	0.955	33	1
348	3	99	62	19	74	21.8	0.279	26	0
332	1	180	0	0	0	43.3	0.282	41	1

```
predictor = TabularPredictor(label="Outcome",
                             problem_type = 'binary',
                             eval_metric = 'accuracy').fit(train_data = X_entreno,
                                               time_limit = 200,
                                               presets = "best_quality")
```

Fitting 13 L1 models ...

Fitting model: KNeighborsUnif_BAG_L1 ... Training model for up to 199.86s of the 199.84s of remaining time.
0.73 = Validation score (accuracy)

```

predictor.fit_summary()

'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},
'WeightedEnsemble_L2': {'use_orig_features': False,
'max_base_models': 25,
'max_base_models_per_type': 5,
'save_bag_folds': True}},

'leaderboard':
WeightedEnsemble_L2    0.88125   0.985595  60.557527
0  RandomForestEntr_BAG_L1  0.87125   0.179025  1.318101
1  ExtraTreesEntr_BAG_L1  0.87125   0.298354  1.442329
2  RandomForestGini_BAG_L1  0.86875   0.234266  1.078708
3  XGBoost_BAG_L1        0.86375   0.234254  22.984496
4  ExtraTreesGini_BAG_L1  0.86125   0.300019  1.401104
5  LightGBM_BAG_L1       0.86000   0.034987  32.017888
6  CatBoost_BAG_L1        0.85750   0.011816  34.859099
7  LightGBMXT_BAG_L1     0.84375   0.076281  33.761010
8  NeuralNetFastAI_BAG_L1  0.81125   0.177790  54.861538
9  KNeighborsDist_BAG_L1  0.79500   0.025308  0.008354
10 KNeighborsUnif_BAG_L1  0.73000   0.039006  0.025450

pred_time_val_marginal  fit_time_marginal  stack_level  can_infer \
0  0.003044           1.757230          2  True
1  0.179025           1.318101          1  True
2  0.298354           1.442329          1  True
3  0.234266           1.078708          1  True
4  0.234254           22.984496          1  True
5  0.300019           1.401104          1  True
6  0.034987           32.017888          1  True
7  0.011816           34.859099          1  True
8  0.076281           33.761010          1  True
9  0.177790           54.861538          1  True
10 0.025308           0.008354          1  True
11 0.039006           0.025450          1  True

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

```

▼ EVALUAR EL RENDIMIENTO DE LOS MODELOS ENTRENADOS

```

# Obtén el leaderboard de AutoGluon
leaderboard = predictor.leaderboard()
leaderboard

```

	model	score_val	pred_time_val	fit_time	pred_time_val_marginal	fit_time_marginal	stack_level	can_infer	fit_
0	WeightedEnsemble_L2	0.88125	0.985595	60.557527	0.003044	1.757230	2	True	
1	RandomForestEntr_BAG_L1	0.87125	0.179025	1.318101	0.179025	1.318101	1	True	
2	ExtraTreesEntr_BAG_L1	0.87125	0.298354	1.442329	0.298354	1.442329	1	True	
3	RandomForestGini_BAG_L1	0.86875	0.234266	1.078708	0.234266	1.078708	1	True	
4	XGBoost_BAG_L1	0.86375	0.234254	22.984496	0.234254	22.984496	1	True	
5	ExtraTreesGini_BAG_L1	0.86125	0.300019	1.401104	0.300019	1.401104	1	True	
6	LightGBM_BAG_L1	0.86000	0.034987	32.017888	0.034987	32.017888	1	True	
7	CatBoost_BAG_L1	0.85750	0.011816	34.859099	0.011816	34.859099	1	True	
8	LightGBMXT_BAG_L1	0.84375	0.076281	33.761010	0.076281	33.761010	1	True	
9	NeuralNetFastAI_BAG_L1	0.81125	0.177790	54.861538	0.177790	54.861538	1	True	
10	KNeighborsDist_BAG_L1	0.79500	0.025308	0.008354	0.025308	0.008354	1	True	
11	KNeighborsUnif_BAG_L1	0.73000	0.039006	0.025450	0.039006	0.025450	1	True	

	model	score_val	pred_time_val	fit_time	pred_time_val_marginal	fit_time_marginal	stack_level	can_infer	fit_
0	WeightedEnsemble_L2	0.88125	0.985595	60.557527	0.003044	1.757230	2	True	
1	RandomForestEntr_BAG_L1	0.87125	0.179025	1.318101	0.179025	1.318101	1	True	
2	ExtraTreesEntr_BAG_L1	0.87125	0.298354	1.442329	0.298354	1.442329	1	True	
3	RandomForestGini_BAG_L1	0.86875	0.234266	1.078708	0.234266	1.078708	1	True	
4	XGBoost_BAG_L1	0.86375	0.234254	22.984496	0.234254	22.984496	1	True	
5	ExtraTreesGini_BAG_L1	0.86125	0.300019	1.401104	0.300019	1.401104	1	True	

```
# Inicializar la figura de matplotlib
```

```
f, ax = plt.subplots(figsize = (15, 6))
sns.barplot(x = "model", y = "score_val", data = predictor.leaderboard(), color = "b")
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_
0 WeightedEnsemble_L2 0.88125 0.985595 60.557527 0.003044 1.757230 2 True

# Define las características que deseas utilizar
features = ['Pregnancies', 'Glucose', 'BloodPressure', 'SkinThickness', 'Insulin', 'BMI', 'DiabetesPedigreeFunction', 'Age']

# Inicializa la figura de matplotlib
f, axes = plt.subplots(len(leaderboard), 1, figsize=(10, 6 * len(leaderboard)))

# Itera a través de los modelos en el leaderboard
for i, row in enumerate(leaderboard.iterrows()):
    model = row[1]['model'] # Nombre del modelo
    ax = axes[i] # Subplot correspondiente al modelo
    sns.set(font_scale=1)

    # Realiza predicciones con el modelo
    predicciones = predictor.predict(diabetes[features], model=model)

    # Crea la matriz de confusión
    matriz_de_confusión = confusion_matrix(diabetes['Outcome'], predicciones)

    # Crea un heatmap de la matriz de confusión
    sns.heatmap(matriz_de_confusión, annot=True, fmt='d', cmap="Blues", ax=ax)

    ax.set_title(f"Matriz de Confusión - {model}")
    ax.set_xlabel("Predicción")
    ax.set_ylabel("Real")

plt.tight_layout()
plt.show()
```

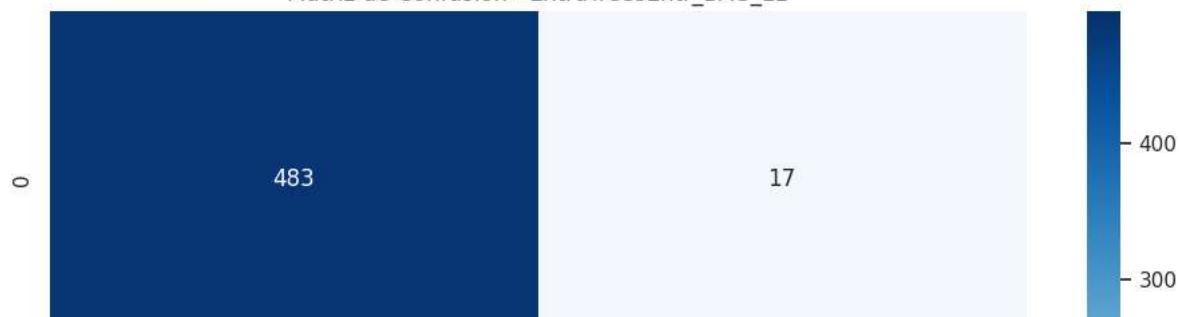
Matriz de Confusión - WeightedEnsemble_L2

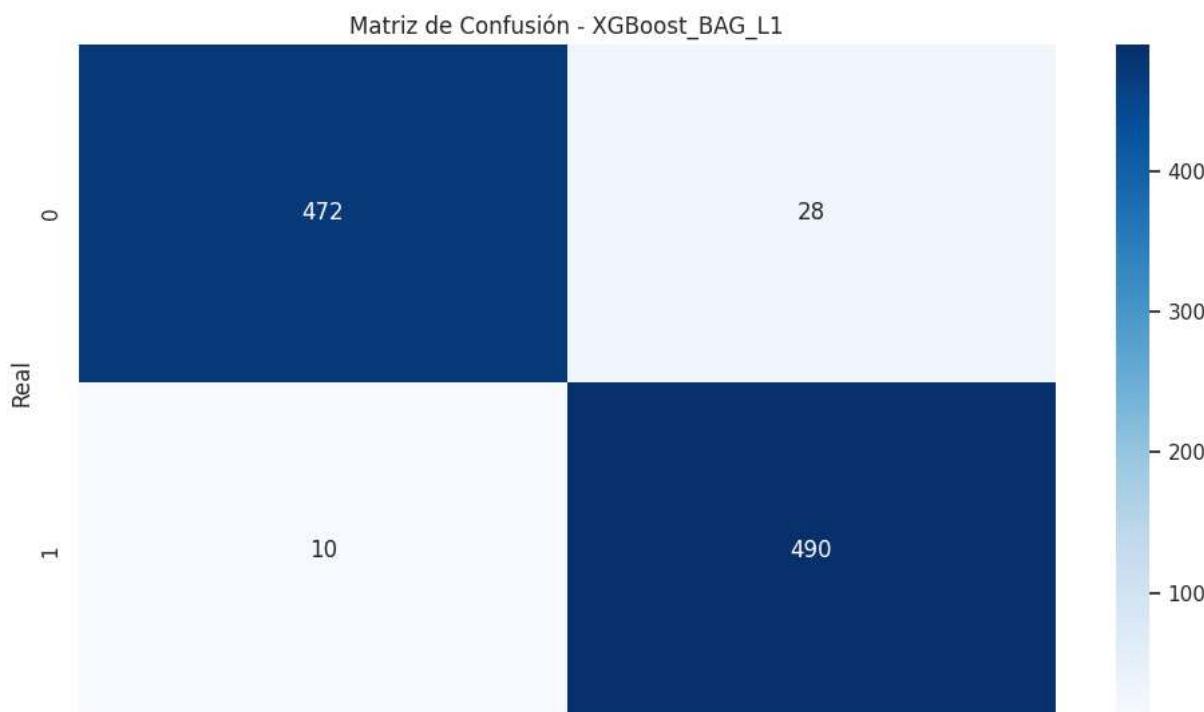
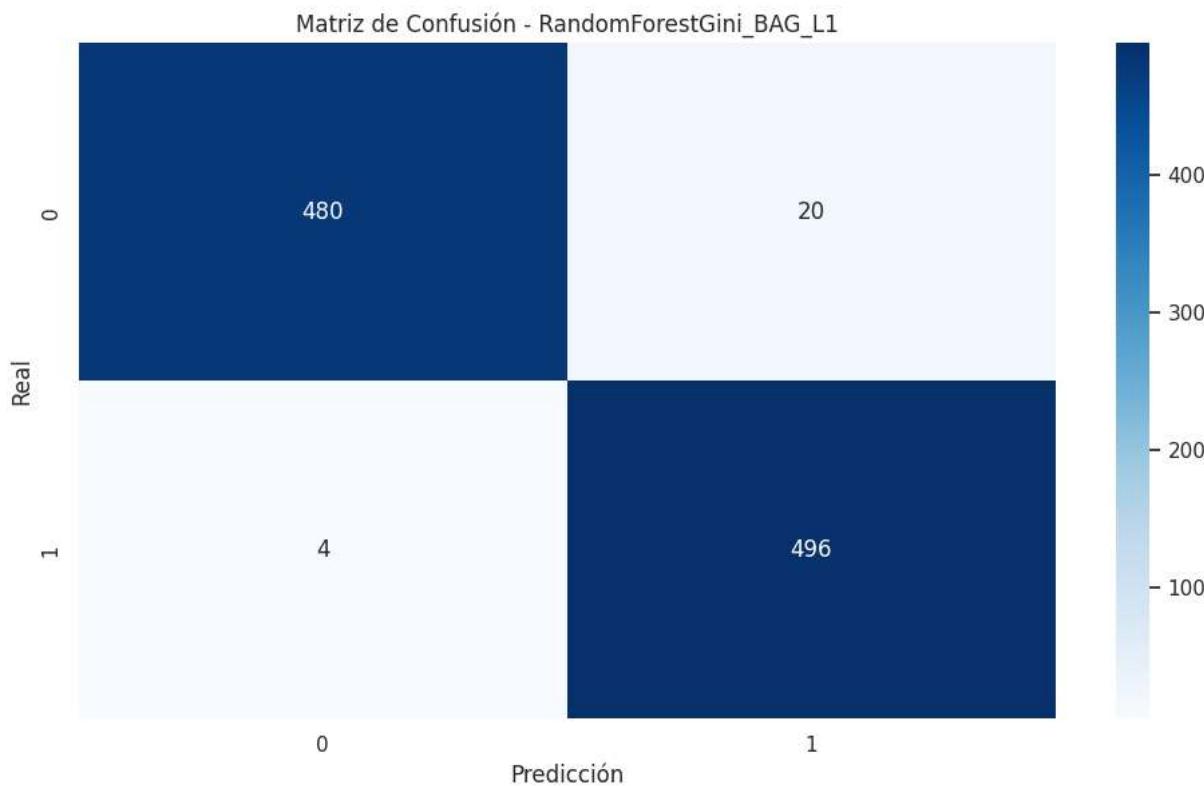
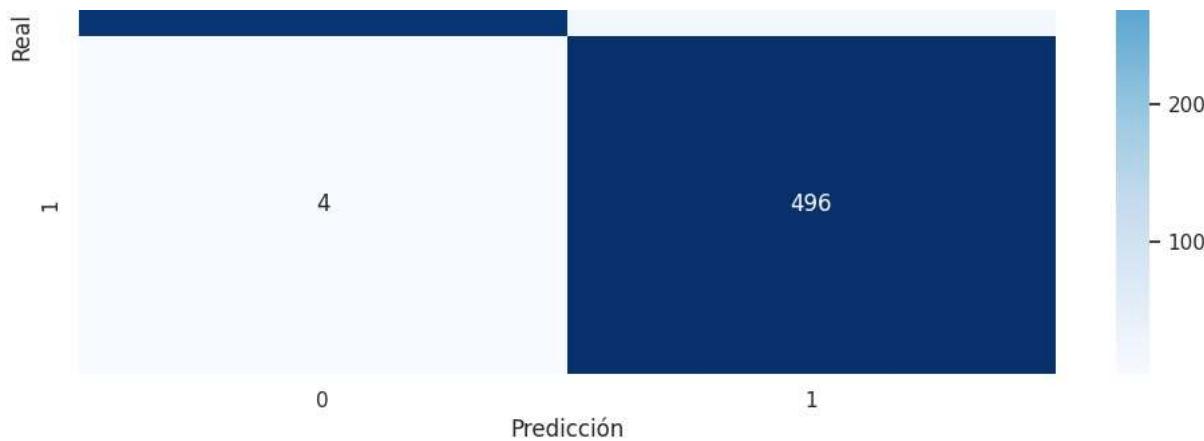


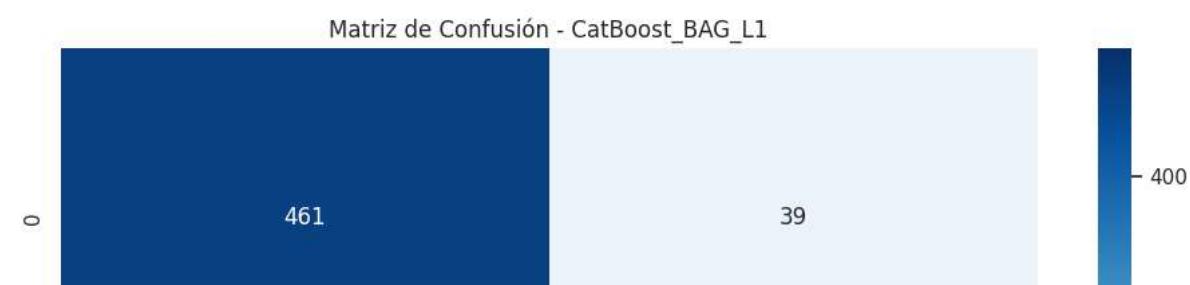
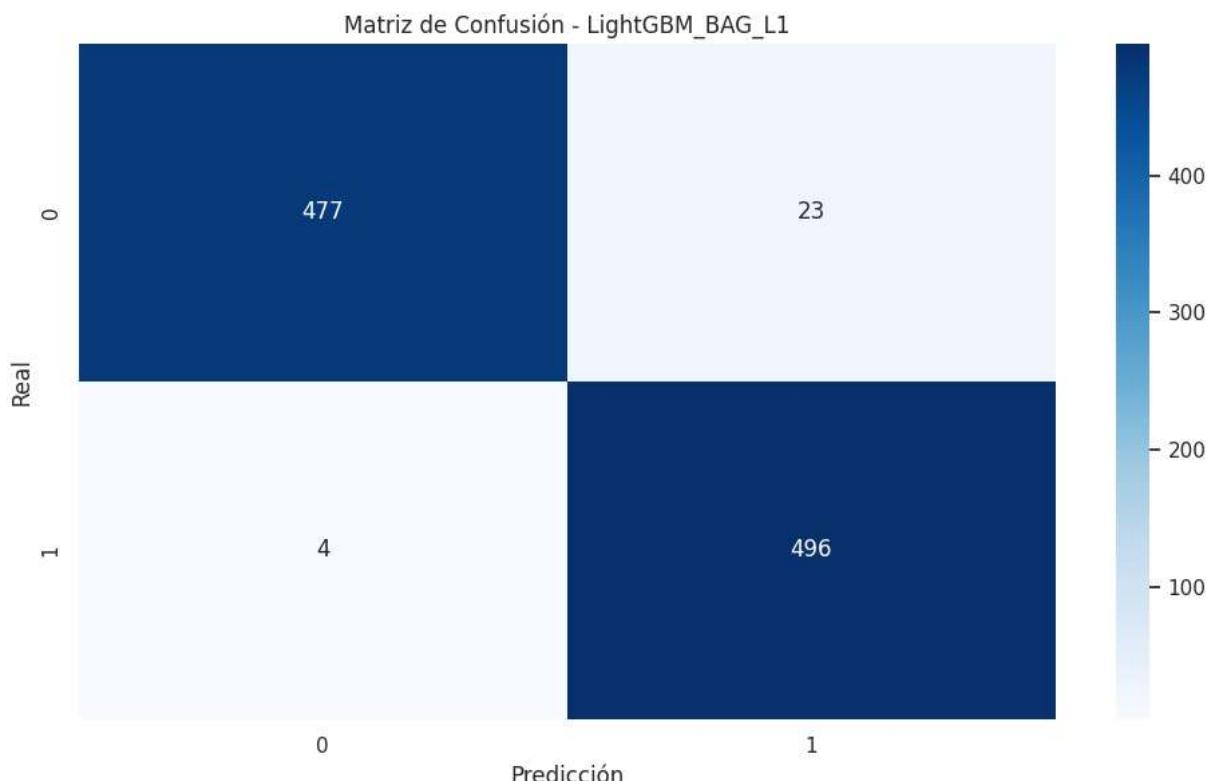
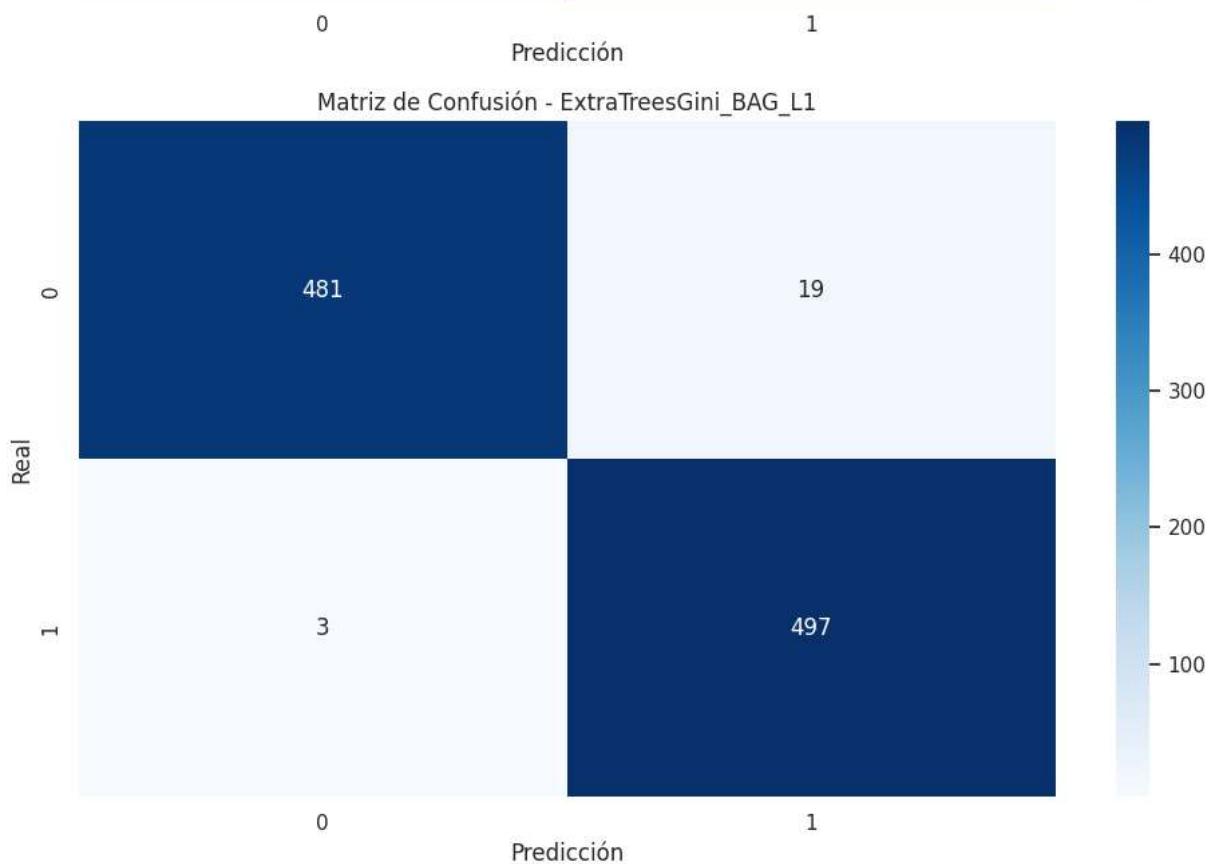
Matriz de Confusión - RandomForestEntr_BAG_L1

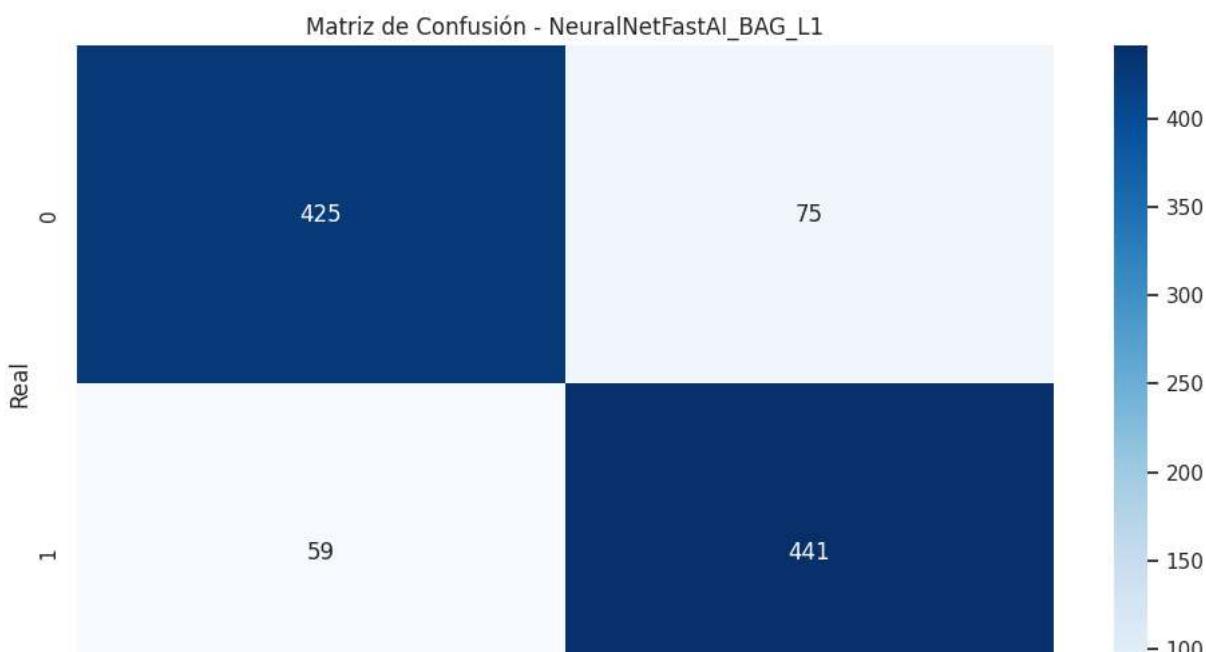
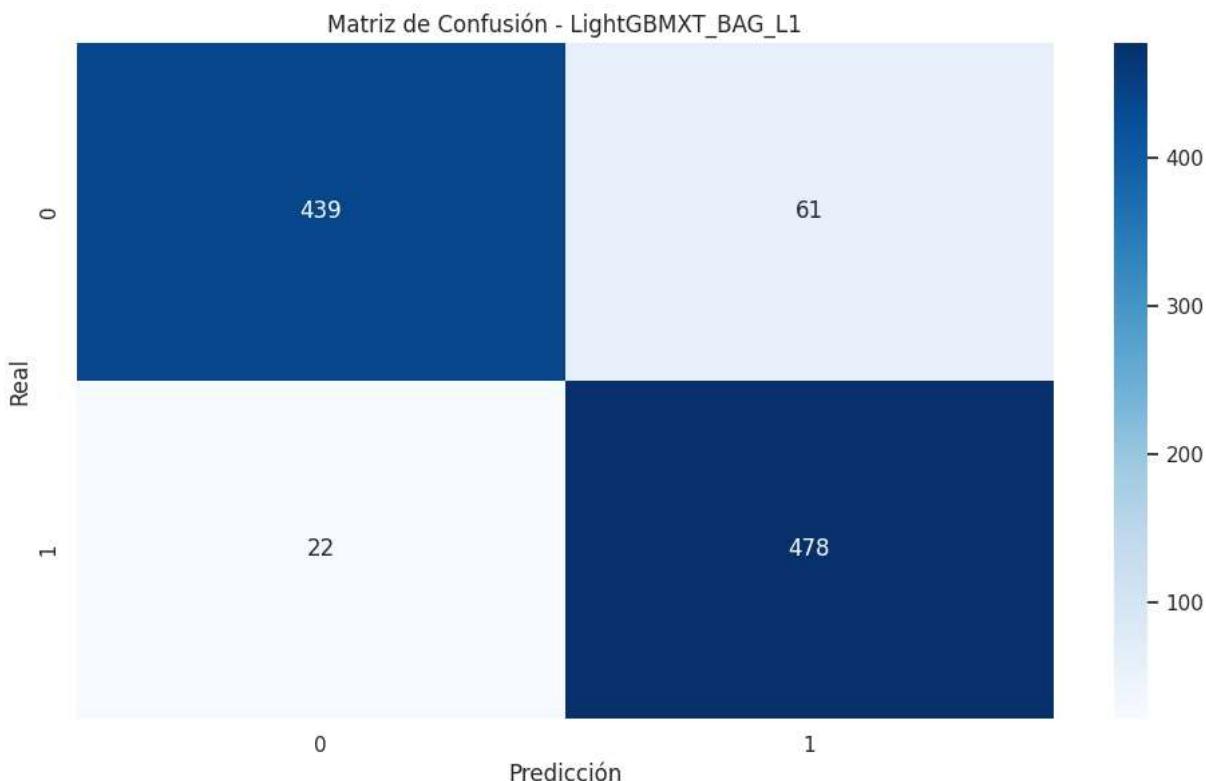
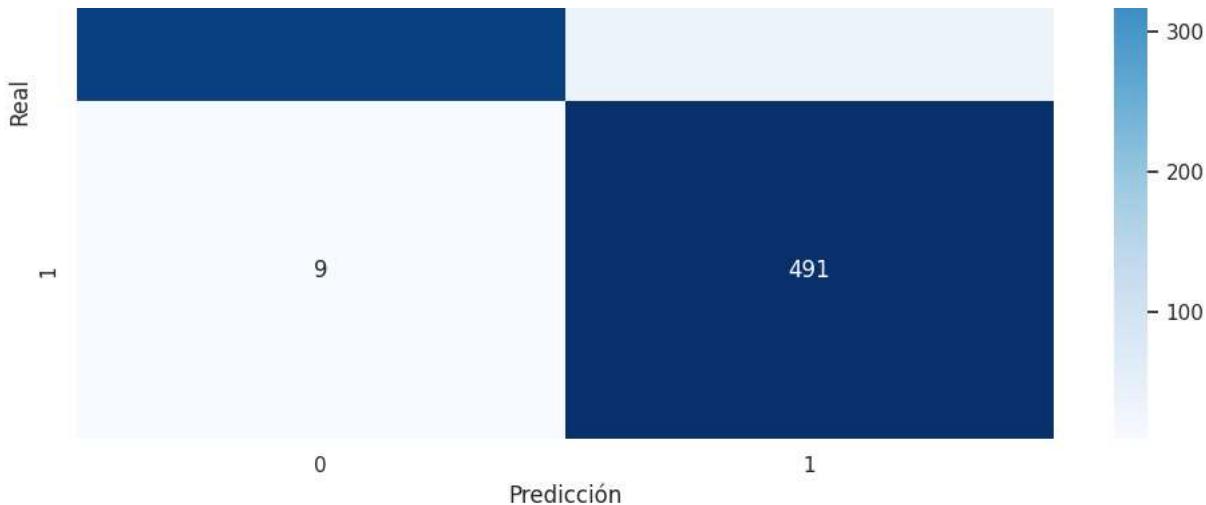


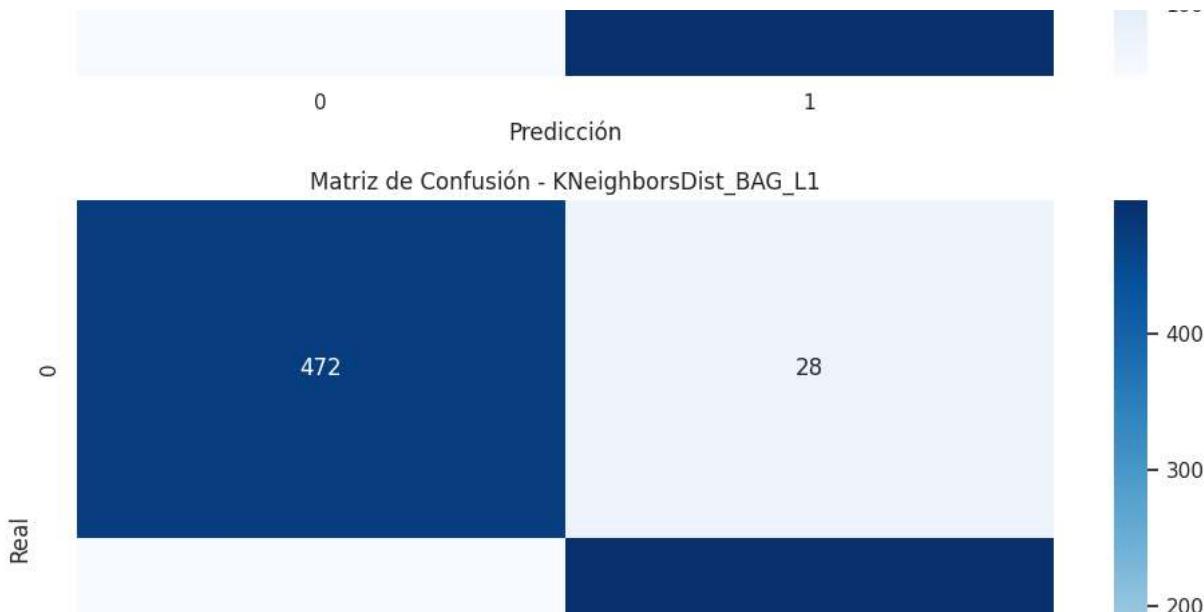
Matriz de Confusión - ExtraTreesEntr_BAG_L1











```
predictor.evaluate(X_prueba)
```

```
Evaluation: accuracy on test data: 0.89
Evaluations on test data:
{
    "accuracy": 0.89,
    "balanced_accuracy": 0.8883553421368547,
    "mcc": 0.7894497165565227,
    "roc_auc": 0.9749899959983993,
    "f1": 0.9,
    "precision": 0.8389830508474576,
    "recall": 0.9705882352941176
}
{'accuracy': 0.89,
 'balanced_accuracy': 0.8883553421368547,
 'mcc': 0.7894497165565227,
 'roc_auc': 0.9749899959983993,
 'f1': 0.9,
 'precision': 0.8389830508474576,
 'recall': 0.9705882352941176}
```

```
# Evaluar el rendimiento de los modelos
# Seleccionar 5 observaciones del conjunto de datos de prueba y generar las predicciones
```

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

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

```
X_prueba
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome	
391	5	166	76	0	0	45.7		0.340	27	1
648	11	136	84	35	130	28.3		0.260	42	1
474	4	114	64	0	0	28.9		0.126	24	0
730	3	130	78	23	79	28.4		0.323	34	1
695	7	142	90	24	480	30.4		0.128	43	1
...
388	5	144	82	26	285	32.0		0.452	58	1
443	8	108	70	0	0	30.5		0.955	33	1
348	3	99	62	19	74	21.8		0.279	26	0
332	1	180	0	0	0	43.3		0.282	41	1
246	10	122	68	0	0	31.2		0.258	41	0

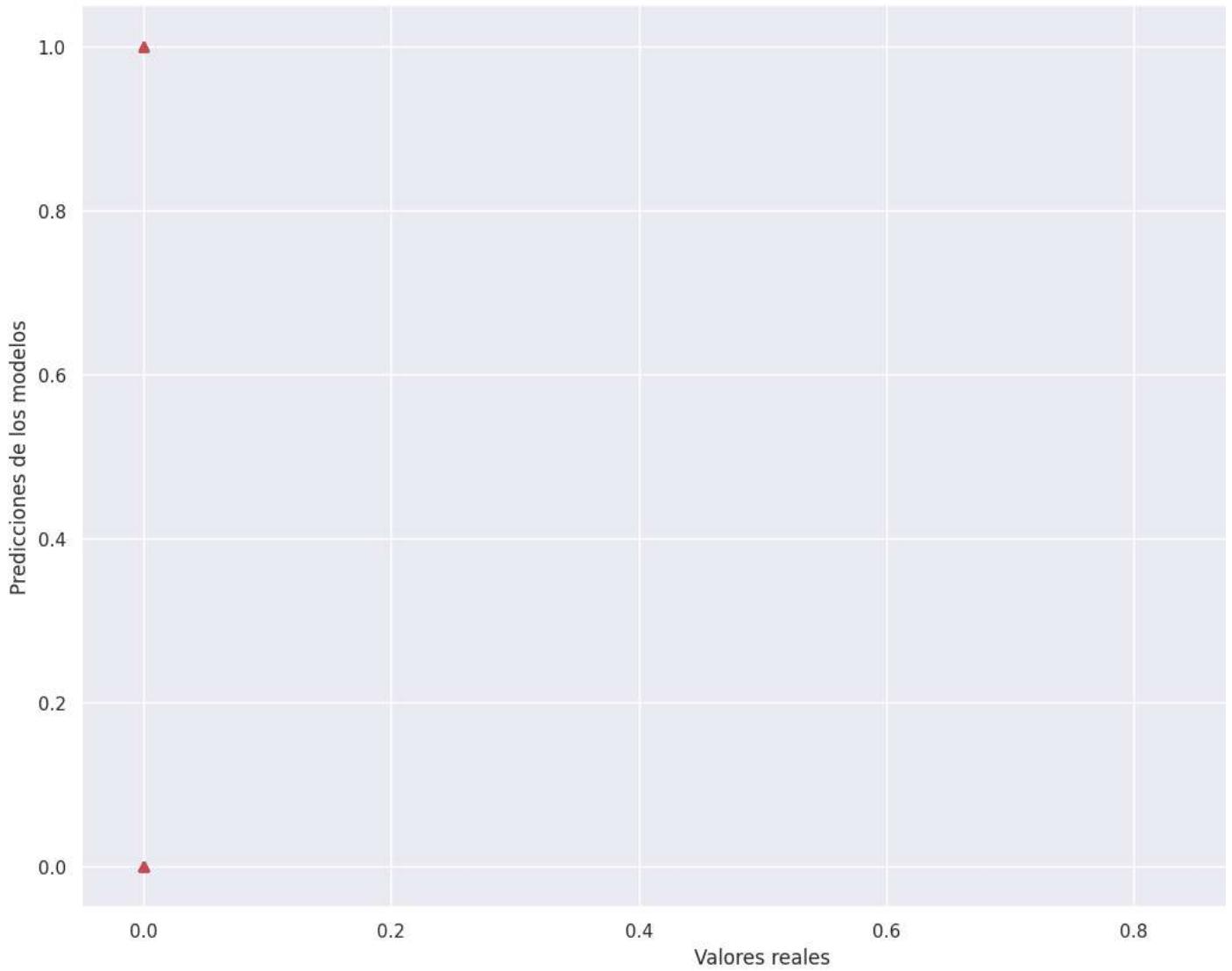
200 rows × 9 columns

```
y_prueba = X_prueba['Outcome']
y_prueba # valores correctos

391    1
648    1
474    0
730    1
695    1
...
388    1
443    1
348    0
332    1
246    0
Name: Outcome, Length: 200, dtype: int64
```

```
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')
```

Text(0.5, 0, 'Valores reales')



```
from sklearn.metrics import r2_score, mean_squared_error, mean_absolute_error
from math import sqrt

RMSE = float(format(np.sqrt(mean_squared_error(y_prueba, y_predicc)), '.3f'))
MSE = mean_squared_error(y_prueba, y_predicc)
MAE = mean_absolute_error(y_prueba, y_predicc)
r2 = r2_score(y_prueba, y_predicc)
```

```
print('RMSE = ',RMSE, '\nMSE = ',MSE, '\nMAE = ',MAE, '\nR2 = ', r2)
RMSE = 0.332
MSE = 0.11
MAE = 0.11
R2 = 0.5598239295718287
```

Reflexión

Últimas semanas en el curso

En las últimas semanas del curso, hemos notado un cambio en la metodología de enseñanza que consideramos muy beneficiosa. Esta nueva aproximación ha incorporado una mayor cantidad de práctica en los temas tratados en clase, lo cual ha mejorado significativamente nuestra comprensión. La aplicación práctica de conceptos y la realización de ejercicios concretos han hecho que los temas sean más claros y tangibles.

Sin embargo, uno de los aspectos que podríamos evaluar es la carga de trabajo. Aunque valoramos la metodología más práctica, es importante equilibrarla para que los trabajos asignados no sean excesivamente extensos. En el caso de este laboratorio, creemos que se pudo evaluar el tema de la semana de manera eficiente sin que supusiera una carga de trabajo abrumadora.

Apreciamos el enfoque práctico del curso y cómo ha mejorado nuestra comprensión. Al mismo tiempo, consideramos importante mantener un equilibrio en la carga de trabajo para que la experiencia siga siendo enriquecedora.

Autogloun

Desde una perspectiva general podemos decir que este laboratorio fue de gran ayuda para comprender el uso de esta herramienta, hemos notado que el paquete Autogloun simplifica significativamente el proceso de desarrollo y entrenamiento de modelos de aprendizaje automático.

Ventajas de AutoGluon:

- Debido a que nos permite automatizar muchas tareas de ajuste de hiperparámetros y selección de modelos, nos ahorra tiempo y esfuerzo en comparación con la configuración manual.
- Hace que el aprendizaje automático sea más sencillo de comprender.
- Nos permite construir modelos con un rendimiento lo suficientemente bueno en comparación con los modelos ajustados manualmente.
- Permite explorar y ajustar varios algoritmos de aprendizaje automático a la vez, lo que puede llevar a modelos más robustos y adaptables.

Desventajas de AutoGluon:

- Pueda que tengamos menos control sobre el proceso y los modelos, es decir no podemos tener un control total sobre los resultados que esperamos.
- Si bien puede funcionar bien en muchas tareas, no siempre garantiza el mejor rendimiento en problemas específicos.
- La automatización puede dificultar la interpretación de los modelos resultantes.

Después de finalizar satisfactoriamente con este laboratorio y haber alcanzado todos los objetivos que planteaba, podemos decir que las herramientas como autoGluon son valiosas para acelerar el proceso de desarrollo de modelos de aprendizaje automático, especialmente en escenarios en los que se busca un rendimiento aceptable con un mínimo esfuerzo. Sin embargo, es importante saber que estas herramientas no reemplazan la experiencia y el juicio humano, y que a menudo es necesario un ajuste y revisión extra así como una comprensión más profunda de los datos y el dominio para obtener los mejores resultados. Como lo hemos visto a lo largo de los temas de Data Science, estos trabajos requieren un análisis previo para poder encontrar la mejor solución a un determinado problema.