

# ProdigyInfoTech Data-Science internship

## TASK-3

Build a decision tree classifier to predict whether a customer will purchase a product or service based on their demographic and behavioral data. Use a dataset such as the Bank Marketing dataset from the UCI Machine Learning Repository.

```
In [1]: import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
from sklearn.preprocessing import LabelEncoder
import matplotlib.pyplot as plt
from sklearn.tree import plot_tree
```

```
In [26]: pip install ucimlrepo

Collecting ucimlrepo
  Obtaining dependency information for ucimlrepo from https://files.pythonhosted.org/packages/3b/07/1252560194d
f2b4fad1cb3c46081b948331c63eb1bb0b97620d508d12a53/ucimlrepo-0.0.7-py3-none-any.whl.metadata
  Downloading ucimlrepo-0.0.7-py3-none-any.whl.metadata (5.5 kB)
Requirement already satisfied: pandas>=1.0.0 in c:\users\om\downloads\new folder\lib\site-packages (from ucimlr
epo) (2.0.3)
Requirement already satisfied: certifi>=2020.12.5 in c:\users\om\downloads\new folder\lib\site-packages (from u
cimlrepo) (2023.7.22)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\om\downloads\new folder\lib\site-packages (fr
om pandas>=1.0.0->ucimlrepo) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in c:\users\om\downloads\new folder\lib\site-packages (from pandas>
=1.0.0->ucimlrepo) (2023.3.post1)
Requirement already satisfied: tzdata>=2022.1 in c:\users\om\downloads\new folder\lib\site-packages (from panda
s>=1.0.0->ucimlrepo) (2023.3)
Requirement already satisfied: numpy>=1.21.0 in c:\users\om\downloads\new folder\lib\site-packages (from pandas
>=1.0.0->ucimlrepo) (1.24.3)
Requirement already satisfied: six>=1.5 in c:\users\om\downloads\new folder\lib\site-packages (from python-date
util>=2.8.2->pandas>=1.0.0->ucimlrepo) (1.16.0)
Downloading ucimlrepo-0.0.7-py3-none-any.whl (8.0 kB)
Installing collected packages: ucimlrepo
Successfully installed ucimlrepo-0.0.7
Note: you may need to restart the kernel to use updated packages.
```

```
In [28]: from ucimlrepo import fetch_ucirepo

# fetch dataset
bank_marketing = fetch_ucirepo(id=222)

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

# metadata
print(bank_marketing.metadata)

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

```
{'uci_id': 222, 'name': 'Bank Marketing', 'repository_url': 'https://archive.ics.uci.edu/dataset/222/bank+marke
ting', 'data_url': 'https://archive.ics.uci.edu/static/public/222/data.csv', 'abstract': 'The data is related w
ith direct marketing campaigns (phone calls) of a Portuguese banking institution. The classification goal is to
predict if the client will subscribe a term deposit (variable y).', 'area': 'Business', 'tasks': ['Classificati
on'], 'characteristics': ['Multivariate'], 'num_instances': 45211, 'num_features': 16, 'feature_types': ['Categ
orical', 'Integer'], 'demographics': ['Age', 'Occupation', 'Marital Status', 'Education Level'], 'target_col':
['y'], 'index_col': None, 'has_missing_values': 'yes', 'missing_values_symbol': 'NaN', 'year_of_dataset_creatio
n': 2014, 'last_updated': 'Fri Aug 18 2023', 'dataset_doi': '10.24432/C5K306', 'creators': ['S. Moro', 'P. Rita
', 'P. Cortez'], 'intro_paper': {'title': 'A data-driven approach to predict the success of bank telemarketing'
, 'authors': 'Sérgio Moro, P. Cortez, P. Rita', 'published_in': 'Decision Support Systems', 'year': 2014, 'url'
: 'https://www.semanticscholar.org/paper/cab86052882d126d43f72108c6cb41b295cc8a9e', 'doi': '10.1016/j.dss.2014.
03.001'}, 'additional_info': {'summary': "The data is related with direct marketing campaigns of a Portuguese b
anking institution. The marketing campaigns were based on phone calls. Often, more than one contact to the same
client was required, in order to access if the product (bank term deposit) would be ('yes') or not ('no') subsc
ribed. \n\nThere are four datasets: \n1) bank-additional-full.csv with all examples (41188) and 20 inputs, orde
red by date (from May 2008 to November 2010), very close to the data analyzed in [Moro et al., 2014]\n2) bank-a
dditional.csv with 10% of the examples (4119), randomly selected from 1), and 20 inputs.\n3) bank-full.csv with
all examples and 17 inputs, ordered by date (older version of this dataset with less inputs). \n4) bank.csv wit
h 10% of the examples and 17 inputs, randomly selected from 3 (older version of this dataset with less inputs).
\nThe smallest datasets are provided to test more computationally demanding machine learning algorithms (e.g.,
SVM). \n\nThe classification goal is to predict if the client will subscribe (yes/no) a term deposit (variable
y).", 'purpose': None, 'funded_by': None, 'instances_represent': None, 'recommended_data_splits': None, 'sensit
ive_data': None, 'preprocessing_description': None, 'variable_info': 'Input variables:\n # bank client data:\n
1 - age (numeric)\n 2 - job : type of job (categorical: "admin.", "unknown", "unemployed", "management", "hou
semaid", "entrepreneur", "student",\n "blue-collar", "self-employed", "retire
d", "technician", "services") \n 3 - marital : marital status (categorical: "married", "divorced", "single"; note
: "divorced" means divorced or widowed)\n 4 - education (categorical: "unknown", "secondary", "primary", "tertiar
y")\n 5 - default: has credit in default? (binary: "yes", "no")\n 6 - balance: average yearly balance, in e
uros (numeric)\n 7 - housing: has housing loan? (binary: "yes", "no")\n 8 - loan: has personal loan? (binar
y: "yes", "no")\n # related with the last contact of the current campaign:\n 9 - contact: contact communicat
ion type (categorical: "unknown", "telephone", "cellular") \n 10 - day: last contact day of the month (numeric)\n
11 - month: last contact month of year (categorical: "jan", "feb", "mar", ..., "nov", "dec")\n 12 - duratio
n: last contact duration, in seconds (numeric)\n # other attributes:\n 13 - campaign: number of contacts per
formed during this campaign and for this client (numeric, includes last contact)\n 14 - pdays: number of days
that passed by after the client was last contacted from a previous campaign (numeric, -1 means client was not p
reviously contacted)\n 15 - previous: number of contacts performed before this campaign and for this client (n
umeric)\n 16 - poutcome: outcome of the previous marketing campaign (categorical: "unknown", "other", "failure",
"success")\n\n Output variable (desired target):\n 17 - y - has the client subscribed a term deposit? (binary
: "yes", "no")\n', 'citation': None}}
```

	name	role	type	demographic \
0	age	Feature	Integer	Age
1	job	Feature	Categorical	Occupation
2	marital	Feature	Categorical	Marital Status
3	education	Feature	Categorical	Education Level
4	default	Feature	Binary	None
5	balance	Feature	Integer	None
6	housing	Feature	Binary	None
7	loan	Feature	Binary	None
8	contact	Feature	Categorical	None
9	day_of_week	Feature	Date	None
10	month	Feature	Date	None
11	duration	Feature	Integer	None
12	campaign	Feature	Integer	None
13	pdays	Feature	Integer	None
14	previous	Feature	Integer	None
15	poutcome	Feature	Categorical	None
16	y	Target	Binary	None

	description	units	missing_values
0	None	None	no
1	type of job (categorical: 'admin.', 'blue-colla...	None	no
2	marital status (categorical: 'divorced', 'marri...	None	no
3	(categorical: 'basic.4y', 'basic.6y', 'basic.9y'...	None	no
4	has credit in default?	None	no
5	average yearly balance	euros	no
6	has housing loan?	None	no
7	has personal loan?	None	no
8	contact communication type (categorical: 'cell...	None	yes
9	last contact day of the week	None	no
10	last contact month of year (categorical: 'jan'...	None	no
11	last contact duration, in seconds (numeric). ...	None	no
12	number of contacts performed during this campa...	None	no
13	number of days that passed by after the client...	None	yes
14	number of contacts performed before this campa...	None	no
15	outcome of the previous marketing campaign (ca...	None	yes
16	has the client subscribed a term deposit?	None	no

```
In [29]: from warnings import filterwarnings
filterwarnings("ignore")
# Load the data
data = pd.concat([bank_marketing.data.features, bank_marketing.data.targets], axis=1)
```

```
In [30]: # Handle missing values (if any)
data.fillna(method='ffill', inplace=True)
```

```
In [31]: # Convert categorical features to numerical values
label_encoders = {}
for column in data.columns:
```

```

--- duration <= 510.50
--- poutcome <= 2.50
--- poutcome <= 1.50
--- housing <= 0.50
--- duration <= 153.50
--- duration <= 94.50
--- duration <= 77.50
--- day_of_week <= 30.50
--- age <= 23.50
--- day_of_week <= 25.50
--- class: 0
--- day_of_week > 25.50
--- class: 1
--- age > 23.50
--- balance <= 10251.50
--- duration <= 62.50
--- class: 0
--- duration > 62.50
--- truncated branch of depth 5
--- balance > 10251.50
--- balance <= 10533.50
--- class: 1
--- balance > 10533.50
--- class: 0
--- day_of_week > 30.50
--- loan <= 0.50
--- class: 0
--- loan > 0.50
--- class: 1
--- duration > 77.50
--- pdays <= 372.00
--- day_of_week <= 17.50
--- age <= 28.50
--- duration <= 86.50
--- class: 0
--- duration > 86.50
--- truncated branch of depth 4
--- age > 28.50
--- day_of_week <= 1.50
--- truncated branch of depth 2
--- day_of_week > 1.50
--- truncated branch of depth 6

```

```

|--- day_of_week > 17.50
|--- pdays <= 280.00
|--- age <= 28.50
|--- truncated branch of depth 3
|--- age > 28.50
|--- class: 0
|--- pdays > 280.00
|--- age <= 33.50
|--- class: 1
|--- age > 33.50
|--- class: 0
|--- pdays > 372.00
|--- class: 1
--- duration > 94.50
--- month <= 0.50
--- age <= 34.50
--- day_of_week <= 28.50
--- previous <= 0.50
--- balance <= 2055.00
--- truncated branch of depth 8
--- balance > 2055.00
--- truncated branch of depth 3
--- previous > 0.50
--- day_of_week <= 21.00
--- class: 0
--- day_of_week > 21.00
--- class: 1
--- day_of_week > 28.50
--- class: 0
--- age > 34.50
--- marital <= 0.50
--- balance <= 642.00
--- class: 1
--- balance > 642.00
--- duration <= 138.50
--- class: 0
--- duration > 138.50
--- class: 1
--- marital > 0.50
--- balance <= 2974.50
--- duration <= 149.50
--- truncated branch of depth 3
--- duration > 149.50
--- truncated branch of depth 2
--- balance > 2974.50
--- age <= 48.00
--- class: 0
--- age > 48.00
--- truncated branch of depth 3
--- month > 0.50
--- age <= 60.50
--- month <= 9.50
--- month <= 7.50
--- month <= 6.50
--- truncated branch of depth 11
--- month > 6.50
--- truncated branch of depth 9
--- month > 7.50
--- day_of_week <= 3.50
--- truncated branch of depth 2
--- day_of_week > 3.50
--- truncated branch of depth 6
--- month > 9.50
--- day_of_week <= 26.50
--- job <= 8.50
--- truncated branch of depth 4
--- job > 8.50
--- truncated branch of depth 2
--- day_of_week > 26.50
--- balance <= 12244.50
--- truncated branch of depth 2
--- balance > 12244.50
--- class: 0
--- age > 60.50
--- day_of_week <= 9.00
--- campaign <= 2.50
--- class: 0
--- campaign > 2.50
--- poutcome <= 0.50
--- truncated branch of depth 2
--- poutcome > 0.50
--- class: 0
--- day_of_week > 9.00
--- age <= 61.50
--- duration <= 149.50
--- class: 1
--- duration > 149.50
--- class: 0
--- age > 61.50

```

```

|--- day_of_week <= 26.50
|--- truncated branch of depth 7
|--- day_of_week > 26.50
|--- truncated branch of depth 2
--- duration > 153.50
|--- month <= 2.50
|--- duration <= 305.50
|--- day_of_week <= 13.50
|--- balance <= 65.00
|--- class: 0
|--- balance > 65.00
|--- day_of_week <= 10.50
|--- marital <= 0.50
|--- truncated branch of depth 2
|--- marital > 0.50
|--- truncated branch of depth 10
|--- day_of_week > 10.50
|--- campaign <= 1.50
|--- truncated branch of depth 5
|--- campaign > 1.50
|--- truncated branch of depth 4
|--- day_of_week > 13.50
|--- job <= 7.50
|--- pdays <= 98.50
|--- day_of_week <= 23.50
|--- truncated branch of depth 9
|--- day_of_week > 23.50
|--- truncated branch of depth 7
|--- pdays > 98.50
|--- day_of_week <= 25.00
|--- truncated branch of depth 3
|--- day_of_week > 25.00
|--- truncated branch of depth 4
|--- job > 7.50
|--- balance <= 128.50
|--- contact <= 0.50
|--- truncated branch of depth 3
|--- contact > 0.50
|--- class: 0
|--- balance > 128.50
|--- duration <= 194.00
|--- truncated branch of depth 3
|--- duration > 194.00
|--- truncated branch of depth 6
--- duration > 305.50
|--- balance <= 46.50
|--- age <= 46.00
|--- campaign <= 2.50
|--- class: 0
|--- campaign > 2.50
|--- duration <= 384.50
|--- class: 1
|--- duration > 384.50
|--- class: 0
|--- age > 46.00
|--- marital <= 0.50
|--- class: 0
|--- marital > 0.50
|--- class: 1
|--- balance > 46.50
|--- campaign <= 5.50
|--- balance <= 4048.00
|--- pdays <= 352.00
|--- truncated branch of depth 12
|--- pdays > 352.00
|--- class: 1
|--- balance > 4048.00
|--- balance <= 9263.00
|--- truncated branch of depth 4
|--- balance > 9263.00
|--- truncated branch of depth 2
|--- campaign > 5.50
|--- class: 0
--- month > 2.50
|--- month <= 9.50
|--- month <= 8.50
|--- month <= 4.50
|--- age <= 61.50
|--- pdays <= 275.50
|--- truncated branch of depth 12
|--- pdays > 275.50
|--- truncated branch of depth 3
|--- age > 61.50
|--- duration <= 313.00
|--- truncated branch of depth 5
|--- duration > 313.00
|--- truncated branch of depth 4
|--- month > 4.50
|--- month <= 7.50

```

```

|--- duration <= 224.50
|--- truncated branch of depth 11
|--- duration > 224.50
|--- truncated branch of depth 15
|--- month > 7.50
|--- duration <= 472.00
|--- truncated branch of depth 10
|--- duration > 472.00
|--- truncated branch of depth 5
|--- month > 8.50
|--- day_of_week <= 16.50
|--- job <= 4.50
|--- duration <= 440.50
|--- truncated branch of depth 5
|--- duration > 440.50
|--- truncated branch of depth 2
|--- job > 4.50
|--- age <= 29.50
|--- truncated branch of depth 3
|--- age > 29.50
|--- truncated branch of depth 5
|--- day_of_week > 16.50
|--- duration <= 452.50
|--- day_of_week <= 24.50
|--- truncated branch of depth 10
|--- day_of_week > 24.50
|--- truncated branch of depth 3
|--- duration > 452.50
|--- education <= 0.50
|--- truncated branch of depth 3
|--- education > 0.50
|--- truncated branch of depth 4
|--- month > 9.50
|--- duration <= 251.50
|--- duration <= 172.50
|--- duration <= 160.00
|--- pdays <= 123.50
|--- truncated branch of depth 3
|--- pdays > 123.50
|--- class: 0
|--- duration > 160.00
|--- class: 0
|--- duration > 172.50
|--- day_of_week <= 7.50
|--- loan <= 0.50
|--- truncated branch of depth 5
|--- loan > 0.50
|--- class: 1
|--- day_of_week > 7.50
|--- education <= 1.50
|--- truncated branch of depth 9
|--- education > 1.50
|--- truncated branch of depth 7
|--- duration > 251.50
|--- pdays <= 98.00
|--- day_of_week <= 15.50
|--- balance <= 911.00
|--- truncated branch of depth 5
|--- balance > 911.00
|--- truncated branch of depth 4
|--- day_of_week > 15.50
|--- day_of_week <= 23.50
|--- truncated branch of depth 4
|--- day_of_week > 23.50
|--- truncated branch of depth 4
|--- pdays > 98.00
|--- pdays <= 209.00
|--- duration <= 256.50
|--- class: 0
|--- duration > 256.50
|--- truncated branch of depth 3
|--- pdays > 209.00
|--- job <= 1.00
|--- class: 0
|--- job > 1.00
|--- truncated branch of depth 4
|--- housing > 0.50
|--- duration <= 363.50
|--- month <= 9.50
|--- pdays <= 384.50
|--- month <= 7.50
|--- month <= 4.50
|--- age <= 65.00
|--- pdays <= 349.50
|--- truncated branch of depth 17
|--- pdays > 349.50
|--- truncated branch of depth 2
|--- age > 65.00
|--- day_of_week <= 27.50

```

```

|--- class: 1
|--- day_of_week > 27.50
|--- class: 0
|--- month > 4.50
|--- duration <= 161.50
|--- balance <= -102.00
|--- class: 1
|--- balance > -102.00
|--- truncated branch of depth 8
|--- duration > 161.50
|--- day_of_week <= 27.50
|--- truncated branch of depth 11
|--- day_of_week > 27.50
|--- truncated branch of depth 3
|--- month > 7.50
|--- day_of_week <= 21.50
|--- duration <= 252.50
|--- day_of_week <= 3.50
|--- truncated branch of depth 2
|--- day_of_week > 3.50
|--- truncated branch of depth 12
|--- duration > 252.50
|--- day_of_week <= 4.50
|--- truncated branch of depth 2
|--- day_of_week > 4.50
|--- truncated branch of depth 18
|--- day_of_week > 21.50
|--- duration <= 159.00
|--- day_of_week <= 27.50
|--- class: 0
|--- day_of_week > 27.50
|--- truncated branch of depth 3
|--- duration > 159.00
|--- balance <= 17.00
|--- class: 0
|--- balance > 17.00
|--- truncated branch of depth 6
|--- pdays > 384.50
|--- duration <= 167.50
|--- age <= 59.50
|--- balance <= 0.50
|--- class: 1
|--- balance > 0.50
|--- day_of_week <= 5.50
|--- truncated branch of depth 2
|--- day_of_week > 5.50
|--- class: 0
|--- age > 59.50
|--- class: 1
|--- duration > 167.50
|--- balance <= 942.00
|--- education <= 1.50
|--- contact <= 0.50
|--- class: 1
|--- contact > 0.50
|--- class: 0
|--- education > 1.50
|--- class: 0
|--- balance > 942.00
|--- class: 1
|--- month > 9.50
|--- duration <= 129.50
|--- age <= 43.50
|--- balance <= 1.50
|--- marital <= 1.50
|--- class: 0
|--- marital > 1.50
|--- class: 1
|--- balance > 1.50
|--- class: 0
|--- age > 43.50
|--- age <= 47.50
|--- month <= 10.50
|--- marital <= 0.50
|--- class: 1
|--- marital > 0.50
|--- class: 0
|--- month > 10.50
|--- class: 1
|--- age > 47.50
|--- class: 0
|--- duration > 129.50
|--- pdays <= 92.50
|--- day_of_week <= 11.50
|--- marital <= 1.50
|--- class: 0
|--- marital > 1.50
|--- class: 1
|--- day_of_week > 11.50

```

```

|--- balance <= 9994.50
|--- age <= 32.50
|--- truncated branch of depth 2
|--- age > 32.50
|--- class: 1
|--- balance > 9994.50
|--- duration <= 200.00
|--- class: 0
|--- duration > 200.00
|--- class: 1
|--- pdays > 92.50
|--- duration <= 308.50
|--- balance <= 104.00
|--- job <= 6.00
|--- truncated branch of depth 2
|--- job > 6.00
|--- class: 0
|--- balance > 104.00
|--- duration <= 130.50
|--- class: 1
|--- duration > 130.50
|--- class: 0
|--- duration > 308.50
|--- age <= 31.50
|--- class: 0
|--- age > 31.50
|--- class: 1
|--- duration > 363.50
|--- pdays <= 492.50
|--- age <= 59.50
|--- age <= 30.50
|--- balance <= 339.00
|--- duration <= 365.00
|--- class: 1
|--- duration > 365.00
|--- age <= 22.00
|--- class: 1
|--- age > 22.00
|--- truncated branch of depth 6
|--- balance > 339.00
|--- day_of_week <= 20.50
|--- balance <= 1198.00
|--- truncated branch of depth 8
|--- balance > 1198.00
|--- truncated branch of depth 3
|--- day_of_week > 20.50
|--- pdays <= 213.00
|--- truncated branch of depth 3
|--- pdays > 213.00
|--- class: 0
|--- age > 30.50
|--- balance <= -718.50
|--- class: 1
|--- balance > -718.50
|--- duration <= 439.50
|--- day_of_week <= 21.50
|--- truncated branch of depth 13
|--- day_of_week > 21.50
|--- truncated branch of depth 5
|--- duration > 439.50
|--- campaign <= 1.50
|--- truncated branch of depth 11
|--- campaign > 1.50
|--- truncated branch of depth 9
|--- age > 59.50
|--- job <= 5.50
|--- class: 1
|--- job > 5.50
|--- class: 0
|--- pdays > 492.50
|--- class: 1
|--- poutcome > 1.50
|--- duration <= 163.50
|--- pdays <= 0.00
|--- duration <= 93.50
|--- balance <= 8702.00
|--- education <= 1.50
|--- class: 0
|--- education > 1.50
|--- month <= 0.50
|--- duration <= 66.00
|--- class: 1
|--- duration > 66.00
|--- class: 0
|--- month > 0.50
|--- duration <= 83.50
|--- class: 0
|--- duration > 83.50
|--- duration <= 85.00

```



```

|--- class: 1
|--- duration > 85.00
|--- class: 0
|--- balance > 8702.00
|--- job <= 4.50
|--- class: 1
|--- job > 4.50
|--- class: 0
|--- duration > 93.50
|--- month <= 7.50
|--- day_of_week <= 21.50
|--- day_of_week <= 6.50
|--- job <= 8.50
|--- duration <= 94.50
|--- class: 1
|--- duration > 94.50
|--- truncated branch of depth 3
|--- job > 8.50
|--- education <= 1.50
|--- truncated branch of depth 2
|--- education > 1.50
|--- class: 0
|--- day_of_week > 6.50
|--- balance <= 1063.50
|--- marital <= 1.50
|--- truncated branch of depth 6
|--- marital > 1.50
|--- truncated branch of depth 4
|--- balance > 1063.50
|--- day_of_week <= 19.50
|--- truncated branch of depth 5
|--- day_of_week > 19.50
|--- class: 1
|--- day_of_week > 21.50
|--- month <= 3.50
|--- class: 0
|--- month > 3.50
|--- age <= 39.50
|--- class: 1
|--- age > 39.50
|--- class: 0
|--- month > 7.50
|--- day_of_week <= 28.50
|--- age <= 77.00
|--- month <= 9.50
|--- age <= 24.50
|--- truncated branch of depth 2
|--- age > 24.50
|--- truncated branch of depth 4
|--- month > 9.50
|--- housing <= 0.50
|--- truncated branch of depth 4
|--- housing > 0.50
|--- truncated branch of depth 2
|--- age > 77.00
|--- class: 1
|--- day_of_week > 28.50
|--- class: 1
|--- pdays > 0.00
|--- duration <= 132.50
|--- month <= 10.50
|--- pdays <= 98.50
|--- age <= 34.50
|--- duration <= 113.50
|--- day_of_week <= 4.50
|--- class: 0
|--- day_of_week > 4.50
|--- truncated branch of depth 4
|--- duration > 113.50
|--- class: 1
|--- age > 34.50
|--- pdays <= 95.50
|--- pdays <= 7.00
|--- class: 1
|--- pdays > 7.00
|--- truncated branch of depth 5
|--- pdays > 95.50
|--- day_of_week <= 8.00
|--- class: 1
|--- day_of_week > 8.00
|--- class: 0
|--- pdays > 98.50
|--- balance <= 5078.00
|--- pdays <= 179.00
|--- class: 0
|--- pdays > 179.00
|--- job <= 3.50
|--- class: 0
|--- job > 3.50

```

```
| | | | |--- truncated branch of depth 5  
| | | | --- balance > 5078.00  
| | | | |--- month <= 7.50  
| | | | |   |--- class: 1  
| | | | |--- month > 7.50  
| | | | |   |--- class: 0  
| | | --- month > 10.50  
| | | |--- campaign <= 2.50  
| | | |   |--- pdays <= 149.00  
| | | |     |--- job <= 0.50  
| | | |       |--- class: 0  
| | | |     |--- job > 0.50  
| | | |       |--- class: 1  
| | | |   |--- pdays > 149.00  
| | | |     |--- class: 0  
| | | |--- campaign > 2.50  
| | | |   |--- class: 0  
|--- duration > 132.50  
| |--- day_of_week <= 24.50  
| | |--- balance <= 380.00  
| | |   |--- balance <= -56.50  
| | |     |--- class: 0  
| | |   |--- balance > -56.50  
| | |     |--- campaign <= 2.50  
| | |       |--- class: 1  
| | |     |--- campaign > 2.50  
| | |       |--- job <= 6.50  
| | |         |--- class: 1  
| | |       |--- job > 6.50  
| | |         |--- class: 0  
| | |   |--- balance > 380.00  
| | |     |--- day_of_week <= 20.50  
| | |       |--- housing <= 0.50  
| | |         |--- age <= 49.00  
| | |           |--- truncated branch of depth 5  
| | |         |--- age > 49.00  
| | |           |--- truncated branch of depth 3  
| | |       |--- housing > 0.50  
| | |         |--- marital <= 0.50  
| | |           |--- class: 1  
| | |         |--- marital > 0.50  
| | |           |--- class: 0  
| | |     |--- day_of_week > 20.50  
| | |       |--- class: 1  
| | |--- day_of_week > 24.50  
| | |   |--- job <= 3.50  
| | |     |--- class: 0  
| | |   |--- job > 3.50  
| | |     |--- day_of_week <= 29.50  
| | |       |--- day_of_week <= 26.50  
| | |         |--- age <= 26.00  
| | |           |--- class: 1  
| | |         |--- age > 26.00  
| | |           |--- class: 0  
| | |       |--- day_of_week > 26.50  
| | |         |--- class: 1  
| | |     |--- day_of_week > 29.50  
| | |       |--- class: 0  
--- duration > 163.50  
|--- pdays <= 32.00  
| |--- duration <= 392.50  
| | |--- housing <= 0.50  
| | |   |--- balance <= 363.50  
| | |     |--- day_of_week <= 16.50  
| | |       |--- education <= 0.50  
| | |         |--- month <= 2.50  
| | |           |--- truncated branch of depth 2  
| | |         |--- month > 2.50  
| | |           |--- class: 0  
| | |       |--- education > 0.50  
| | |         |--- duration <= 269.50  
| | |           |--- truncated branch of depth 6  
| | |         |--- duration > 269.50  
| | |           |--- truncated branch of depth 5  
| | |     |--- day_of_week > 16.50  
| | |       |--- marital <= 0.50  
| | |         |--- age <= 39.50  
| | |           |--- class: 0  
| | |         |--- age > 39.50  
| | |           |--- class: 1  
| | |       |--- marital > 0.50  
| | |         |--- duration <= 342.00  
| | |           |--- truncated branch of depth 3  
| | |         |--- duration > 342.00  
| | |           |--- truncated branch of depth 3  
| | |     |--- balance > 363.50  
| | |       |--- duration <= 198.00  
| | |         |--- duration <= 178.50  
| | |           |--- job <= 3.50
```

[illegible]

```

|--- class: 1
|--- day_of_week > 13.50
|--- duration <= 476.00
|--- class: 1
|--- duration > 476.00
|--- class: 0
--- pdays > 32.00
|--- pdays <= 222.50
|--- campaign <= 4.50
|--- balance <= -141.00
|--- class: 0
|--- balance > -141.00
|--- balance <= 662.00
|--- balance <= 563.50
|--- pdays <= 86.50
|--- truncated branch of depth 6
|--- pdays > 86.50
|--- truncated branch of depth 12
|--- balance > 563.50
|--- class: 1
|--- balance > 662.00
|--- pdays <= 96.50
|--- duration <= 213.00
|--- truncated branch of depth 6
|--- duration > 213.00
|--- truncated branch of depth 8
|--- pdays > 96.50
|--- pdays <= 176.50
|--- truncated branch of depth 7
|--- pdays > 176.50
|--- truncated branch of depth 12
|--- campaign > 4.50
|--- duration <= 198.50
|--- class: 1
|--- duration > 198.50
|--- previous <= 4.50
|--- balance <= 1700.50
|--- class: 1
|--- balance > 1700.50
|--- month <= 7.50
|--- truncated branch of depth 2
|--- month > 7.50
|--- class: 0
|--- previous > 4.50
|--- class: 0
--- pdays > 222.50
|--- duration <= 324.50
|--- month <= 7.50
|--- pdays <= 273.50
|--- balance <= 222.00
|--- class: 1
|--- balance > 222.00
|--- class: 0
|--- pdays > 273.50
|--- balance <= 3392.50
|--- month <= 0.50
|--- truncated branch of depth 2
|--- month > 0.50
|--- truncated branch of depth 4
|--- balance > 3392.50
|--- age <= 66.50
|--- class: 0
|--- age > 66.50
|--- class: 1
|--- month > 7.50
|--- month <= 8.50
|--- balance <= 167.50
|--- job <= 0.50
|--- class: 0
|--- job > 0.50
|--- class: 1
|--- balance > 167.50
|--- duration <= 305.00
|--- class: 0
|--- duration > 305.00
|--- truncated branch of depth 2
|--- month > 8.50
|--- housing <= 0.50
|--- previous <= 3.50
|--- class: 0
|--- previous > 3.50
|--- class: 1
|--- housing > 0.50
|--- class: 1
--- duration > 324.50
|--- age <= 36.50
|--- day_of_week <= 16.00
|--- duration <= 485.50
|--- class: 1

```

```

|--- duration > 485.50
|   |--- class: 0
|   |--- day_of_week > 16.00
|   |   |--- class: 0
|   |   |--- age > 36.50
|   |   |   |--- education <= 0.50
|   |   |   |--- month <= 6.00
|   |   |   |   |--- class: 1
|   |   |   |   |--- month > 6.00
|   |   |   |   |   |--- class: 0
|   |   |   |   |--- education > 0.50
|   |   |   |   |   |--- class: 1
|--- poutcome > 2.50
|   |--- duration <= 411.50
|   |   |--- month <= 9.00
|   |   |   |--- duration <= 355.50
|   |   |   |   |--- duration <= 227.50
|   |   |   |   |   |--- day_of_week <= 10.50
|   |   |   |   |   |   |--- day_of_week <= 9.50
|   |   |   |   |   |   |   |--- balance <= 1516.00
|   |   |   |   |   |   |   |   |--- marital <= 0.50
|   |   |   |   |   |   |   |   |   |--- job <= 0.50
|   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |   |--- job > 0.50
|   |   |   |   |   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |   |   |   |--- marital > 0.50
|   |   |   |   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |--- balance > 1516.00
|   |   |   |   |   |   |   |--- balance <= 1519.00
|   |   |   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |   |   |--- balance > 1519.00
|   |   |   |   |   |   |   |   |--- balance <= 1697.50
|   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- balance > 1697.50
|   |   |   |   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |--- day_of_week > 9.50
|   |   |   |   |   |--- duration <= 40.00
|   |   |   |   |   |   |--- age <= 43.00
|   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |--- age > 43.00
|   |   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |--- duration > 40.00
|   |   |   |   |   |   |--- class: 0
|   |   |   |--- day_of_week > 10.50
|   |   |   |   |--- age <= 54.50
|   |   |   |   |   |--- class: 0
|   |   |   |   |--- age > 54.50
|   |   |   |   |   |--- age <= 55.50
|   |   |   |   |   |   |--- campaign <= 1.50
|   |   |   |   |   |   |   |--- month <= 3.00
|   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |--- month > 3.00
|   |   |   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |   |--- campaign > 1.50
|   |   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |--- age > 55.50
|   |   |   |   |   |   |--- class: 0
|   |   |--- duration > 227.50
|   |   |   |--- duration <= 228.50
|   |   |   |   |--- age <= 28.00
|   |   |   |   |   |--- class: 1
|   |   |   |   |--- age > 28.00
|   |   |   |   |   |--- class: 0
|   |   |--- duration > 228.50
|   |   |   |--- day_of_week <= 2.50
|   |   |   |   |--- duration <= 230.50
|   |   |   |   |   |--- education <= 1.50
|   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |--- education > 1.50
|   |   |   |   |   |   |--- class: 1
|   |   |   |   |--- duration > 230.50
|   |   |   |   |   |--- class: 0
|   |   |   |--- day_of_week > 2.50
|   |   |   |   |--- contact <= 1.50
|   |   |   |   |   |--- duration <= 277.50
|   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |--- duration > 277.50
|   |   |   |   |   |   |--- duration <= 279.50
|   |   |   |   |   |   |   |--- truncated branch of depth 4
|   |   |   |   |   |   |   |--- duration > 279.50
|   |   |   |   |   |   |   |   |--- truncated branch of depth 8
|   |   |   |   |   |--- contact > 1.50
|   |   |   |   |   |   |--- class: 0
|   |--- duration > 355.50
|   |   |--- campaign <= 3.50
|   |   |   |--- age <= 23.50
|   |   |   |   |--- day_of_week <= 14.50
|   |   |   |   |   |--- class: 1
|   |   |   |   |--- day_of_week > 14.50

```

[illegible]

[illegible]

```
| | | | | |-- class: 1  
| | | | | --- duration > 454.50  
| | | | | --- duration <= 459.50  
| | | | | |--- age <= 47.50  
| | | | | |   |-- class: 0  
| | | | | |   --- age > 47.50  
| | | | | |     |-- day_of_week <= 7.50  
| | | | | |     |--- class: 0  
| | | | | |     --- day_of_week > 7.50  
| | | | | |       |-- job <= 3.50  
| | | | | |       |--- class: 0  
| | | | | |       --- job > 3.50  
| | | | | |         |-- class: 1  
| | | | | --- duration > 459.50  
| | | | | --- marital <= 1.50  
| | | | | |--- job <= 1.50  
| | | | | |   |-- housing <= 0.50  
| | | | | |   |--- truncated branch of depth 3  
| | | | | |   --- housing > 0.50  
| | | | | |     |-- truncated branch of depth 2  
| | | | | |     --- job > 1.50  
| | | | | |       |-- class: 0  
| | | | | --- marital > 1.50  
| | | | | |--- balance <= 3043.00  
| | | | | |   |-- day_of_week <= 6.50  
| | | | | |   |--- truncated branch of depth 2  
| | | | | |   --- day_of_week > 6.50  
| | | | | |     |-- truncated branch of depth 3  
| | | | | |     --- balance > 3043.00  
| | | | | |       |-- class: 1  
| | | | --- contact > 0.50  
| | | | --- month <= 9.00  
| | | | |--- marital <= 0.50  
| | | | | |--- balance <= -291.50  
| | | | | | |--- job <= 7.00  
| | | | | | |   |-- class: 1  
| | | | | | |   --- job > 7.00  
| | | | | | |     |-- class: 0  
| | | | | --- balance > -291.50  
| | | | | |--- age <= 28.50  
| | | | | | |--- day_of_week <= 5.50  
| | | | | | |   |-- class: 0  
| | | | | | |   --- day_of_week > 5.50  
| | | | | | |     |-- class: 1  
| | | | | --- age > 28.50  
| | | | | |--- age <= 52.50  
| | | | | | |--- age <= 39.00  
| | | | | | |   |-- balance <= 322.00  
| | | | | | |   |--- truncated branch of depth 2  
| | | | | | |   --- balance > 322.00  
| | | | | | |     |-- class: 0  
| | | | | | |     --- age > 39.00  
| | | | | | |       |-- class: 0  
| | | | | --- age > 52.50  
| | | | | |--- balance <= 3895.00  
| | | | | | |--- job <= 7.00  
| | | | | | |   |-- class: 0  
| | | | | | |   --- job > 7.00  
| | | | | | |     |-- class: 1  
| | | | | | |     --- balance > 3895.00  
| | | | | | |       |-- class: 1  
| | | | --- marital > 0.50  
| | | | |--- default <= 0.50  
| | | | | |--- campaign <= 5.50  
| | | | | | |--- duration <= 506.50  
| | | | | | | |--- duration <= 414.50  
| | | | | | | |   |-- age <= 30.50  
| | | | | | | |   |--- truncated branch of depth 2  
| | | | | | | |   --- age > 30.50  
| | | | | | | |     |-- class: 0  
| | | | | | | --- duration > 414.50  
| | | | | | | |--- balance <= 146.50  
| | | | | | | |   |-- truncated branch of depth 4  
| | | | | | | |   --- balance > 146.50  
| | | | | | | |     |-- class: 0  
| | | | | | --- duration > 506.50  
| | | | | | |--- age <= 29.50  
| | | | | | | |--- age <= 25.50  
| | | | | | | |   |-- class: 0  
| | | | | | | |   --- age > 25.50  
| | | | | | | |     |-- class: 1  
| | | | | | | --- age > 29.50  
| | | | | | |   |-- class: 0  
| | | | --- campaign > 5.50  
| | | | |--- balance <= -278.00  
| | | | | |--- class: 1  
| | | | | --- balance > -278.00  
| | | | | |--- day_of_week <= 1.50  
| | | | | |   |-- class: 1
```



```

--- day_of_week > 1.50
|--- duration <= 490.50
|   |--- class: 0
|   |--- duration > 490.50
|       |--- truncated branch of depth 2
|--- default > 0.50
|   |--- marital <= 1.50
|   |   |--- class: 0
|   |   |--- marital > 1.50
|       |--- class: 1
|--- month > 9.00
|   |--- class: 1
--- duration > 510.50
|--- duration <= 853.50
|   |--- contact <= 1.50
|       |--- duration <= 636.50
|           |--- poutcome <= 2.50
|               |--- poutcome <= 1.50
|                   |--- pdays <= 370.50
|                       |--- month <= 4.50
|                           |--- month <= 2.50
|                               |--- housing <= 0.50
|                                   |--- day_of_week <= 11.50
|                                       |--- truncated branch of depth 2
|                                           |--- day_of_week > 11.50
|                                               |--- truncated branch of depth 5
|--- housing > 0.50
|   |--- balance <= 421.50
|       |--- truncated branch of depth 6
|       |--- balance > 421.50
|           |--- truncated branch of depth 5
|--- month > 2.50
|   |--- day_of_week <= 1.50
|   |   |--- class: 1
|   |   |--- day_of_week > 1.50
|       |--- campaign <= 1.50
|           |--- truncated branch of depth 6
|           |--- campaign > 1.50
|               |--- truncated branch of depth 6
|--- month > 4.50
|   |--- month <= 7.50
|       |--- loan <= 0.50
|           |--- pdays <= 313.00
|               |--- truncated branch of depth 5
|               |--- pdays > 313.00
|                   |--- class: 0
|                   |--- loan > 0.50
|                       |--- class: 0
|--- month > 7.50
|   |--- day_of_week <= 20.50
|       |--- day_of_week <= 6.50
|           |--- truncated branch of depth 7
|       |--- day_of_week > 6.50
|           |--- truncated branch of depth 13
|--- day_of_week > 20.50
|   |--- balance <= 3199.00
|       |--- truncated branch of depth 5
|       |--- balance > 3199.00
|           |--- truncated branch of depth 4
|--- pdays > 370.50
|   |--- month <= 9.00
|       |--- class: 1
|       |--- month > 9.00
|           |--- class: 0
|--- poutcome > 1.50
|   |--- pdays <= 70.50
|       |--- balance <= 3583.00
|           |--- pdays <= 22.50
|               |--- duration <= 524.50
|                   |--- day_of_week <= 25.00
|                       |--- class: 0
|                       |--- day_of_week > 25.00
|                           |--- class: 1
|--- duration > 524.50
|   |--- campaign <= 3.50
|       |--- truncated branch of depth 6
|       |--- campaign > 3.50
|           |--- truncated branch of depth 2
|--- pdays > 22.50
|   |--- class: 0
|--- balance > 3583.00
|   |--- age <= 70.50
|       |--- class: 0
|       |--- age > 70.50
|           |--- class: 1
|--- pdays > 70.50
|   |--- housing <= 0.50
|       |--- previous <= 8.50
|           |--- class: 1

```

```

--- previous > 8.50
|--- pdays <= 140.00
|--- class: 0
|--- pdays > 140.00
|--- class: 1
--- housing > 0.50
|--- age <= 41.50
|--- day_of_week <= 10.00
|--- age <= 40.50
|--- class: 1
|--- age > 40.50
|--- class: 0
|--- day_of_week > 10.00
|--- pdays <= 183.50
|--- truncated branch of depth 2
|--- pdays > 183.50
|--- class: 0
--- age > 41.50
|--- balance <= 5385.50
|--- class: 1
|--- balance > 5385.50
|--- class: 0
--- poutcome > 2.50
|--- duration <= 550.00
|--- housing <= 0.50
|--- age <= 28.50
|--- duration <= 527.00
|--- class: 0
|--- duration > 527.00
|--- class: 1
|--- age > 28.50
|--- campaign <= 14.00
|--- job <= 4.50
|--- age <= 57.50
|--- truncated branch of depth 7
|--- age > 57.50
|--- class: 1
|--- job > 4.50
|--- duration <= 534.50
|--- class: 0
|--- duration > 534.50
|--- truncated branch of depth 2
|--- campaign > 14.00
|--- class: 1
|--- housing > 0.50
|--- age <= 31.50
|--- marital <= 0.50
|--- class: 1
|--- marital > 0.50
|--- default <= 0.50
|--- class: 0
|--- default > 0.50
|--- class: 1
|--- age > 31.50
|--- balance <= 3411.50
|--- class: 0
|--- balance > 3411.50
|--- job <= 6.50
|--- class: 0
|--- job > 6.50
|--- class: 1
--- duration > 550.00
|--- campaign <= 4.50
|--- age <= 25.50
|--- job <= 0.50
|--- class: 0
|--- job > 0.50
|--- class: 1
|--- age > 25.50
|--- education <= 0.50
|--- balance <= 67.50
|--- class: 0
|--- balance > 67.50
|--- age <= 50.50
|--- truncated branch of depth 3
|--- age > 50.50
|--- class: 1
|--- education > 0.50
|--- job <= 5.50
|--- campaign <= 1.50
|--- truncated branch of depth 5
|--- campaign > 1.50
|--- truncated branch of depth 6
|--- job > 5.50
|--- day_of_week <= 27.00
|--- truncated branch of depth 8
|--- day_of_week > 27.00
|--- truncated branch of depth 2
--- campaign > 4.50

```

```

|--- balance <= 87.50
|   |--- job <= 0.50
|   |   |--- class: 1
|   |   |--- job > 0.50
|   |       |--- month <= 3.00
|   |       |   |--- class: 1
|   |       |   |--- month > 3.00
|   |       |       |--- class: 0
|   |--- balance > 87.50
|   |   |--- job <= 6.50
|   |       |--- day_of_week <= 30.00
|   |       |   |--- age <= 46.50
|   |       |       |--- truncated branch of depth 2
|   |       |   |--- age > 46.50
|   |       |       |--- truncated branch of depth 2
|   |       |--- day_of_week > 30.00
|   |       |   |--- class: 0
|   |--- job > 6.50
|   |   |--- age <= 38.00
|   |   |   |--- education <= 1.50
|   |   |       |--- class: 0
|   |   |       |--- education > 1.50
|   |   |           |--- class: 1
|   |   |--- age > 38.00
|   |       |--- class: 0
|--- duration > 636.50
|   |--- housing <= 0.50
|   |   |--- pdays <= 0.00
|   |       |--- balance <= 4728.00
|   |       |   |--- balance <= 3409.00
|   |       |       |--- duration <= 641.50
|   |       |       |   |--- day_of_week <= 27.00
|   |       |       |   |   |--- class: 1
|   |       |       |   |--- day_of_week > 27.00
|   |       |       |       |--- poutcome <= 2.50
|   |       |       |       |   |--- class: 1
|   |       |       |       |   |--- poutcome > 2.50
|   |       |       |       |       |--- class: 0
|   |       |   |--- duration > 641.50
|   |       |       |--- balance <= 1211.50
|   |       |       |   |--- duration <= 661.50
|   |       |       |       |--- truncated branch of depth 6
|   |       |       |   |--- duration > 661.50
|   |       |       |       |--- truncated branch of depth 16
|   |       |   |--- balance > 1211.50
|   |       |       |--- duration <= 755.50
|   |       |       |   |--- truncated branch of depth 8
|   |       |       |   |--- duration > 755.50
|   |       |       |       |--- truncated branch of depth 5
|   |       |--- balance > 3409.00
|   |       |   |--- education <= 0.50
|   |       |       |--- balance <= 3906.50
|   |       |       |   |--- class: 1
|   |       |       |   |--- balance > 3906.50
|   |       |       |       |--- class: 0
|   |       |   |--- education > 0.50
|   |       |       |--- age <= 48.50
|   |       |       |   |--- class: 1
|   |       |       |   |--- age > 48.50
|   |       |       |       |--- age <= 52.00
|   |       |       |       |   |--- class: 0
|   |       |       |       |   |--- age > 52.00
|   |       |       |       |       |--- class: 1
|   |--- balance > 4728.00
|   |   |--- month <= 8.50
|   |       |--- duration <= 672.00
|   |       |   |--- duration <= 653.50
|   |       |       |--- balance <= 6048.00
|   |       |       |   |--- class: 1
|   |       |       |   |--- balance > 6048.00
|   |       |       |       |--- class: 0
|   |       |   |--- duration > 653.50
|   |       |       |--- class: 1
|   |       |--- duration > 672.00
|   |       |   |--- balance <= 6053.00
|   |       |       |--- class: 0
|   |       |   |--- balance > 6053.00
|   |       |       |--- campaign <= 2.50
|   |       |       |   |--- truncated branch of depth 3
|   |       |       |   |--- campaign > 2.50
|   |       |       |       |--- truncated branch of depth 2
|   |   |--- month > 8.50
|   |       |--- class: 0
|--- pdays > 0.00
|   |--- pdays <= 314.50
|   |   |--- balance <= -99.50
|   |   |   |--- class: 0
|   |   |   |--- balance > -99.50
|   |       |--- day_of_week <= 10.00

```

```

|--- pdays <= 185.50
|   |--- job <= 4.50
|   |   |--- truncated branch of depth 2
|   |   |--- job > 4.50
|   |   |   |--- truncated branch of depth 4
|   |--- pdays > 185.50
|   |--- class: 0
|   |--- day_of_week > 10.00
|   |--- month <= 7.00
|   |   |--- class: 1
|   |--- month > 7.00
|   |   |--- pdays <= 89.50
|   |   |   |--- truncated branch of depth 2
|   |   |--- pdays > 89.50
|   |   |   |--- truncated branch of depth 5
|--- pdays > 314.50
|   |--- class: 0
|--- housing > 0.50
|   |--- day_of_week <= 15.50
|   |--- balance <= 2402.50
|   |   |--- campaign <= 1.50
|   |   |   |--- balance <= 937.00
|   |   |   |   |--- day_of_week <= 14.50
|   |   |   |   |   |--- duration <= 718.00
|   |   |   |   |   |   |--- truncated branch of depth 4
|   |   |   |   |   |--- duration > 718.00
|   |   |   |   |   |   |--- truncated branch of depth 6
|   |   |   |--- day_of_week > 14.50
|   |   |   |--- duration <= 650.50
|   |   |   |   |--- class: 0
|   |   |   |--- duration > 650.50
|   |   |   |   |--- class: 1
|   |   |--- balance > 937.00
|   |   |   |--- duration <= 797.50
|   |   |   |   |--- duration <= 725.00
|   |   |   |   |   |--- class: 0
|   |   |   |   |--- duration > 725.00
|   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |--- duration > 797.50
|   |   |   |   |--- class: 1
|   |--- campaign > 1.50
|   |   |--- poutcome <= 0.50
|   |   |   |--- duration <= 740.50
|   |   |   |   |--- age <= 57.50
|   |   |   |   |   |--- truncated branch of depth 4
|   |   |   |   |--- age > 57.50
|   |   |   |   |   |--- class: 1
|   |   |   |--- duration > 740.50
|   |   |   |   |--- duration <= 752.50
|   |   |   |   |   |--- class: 1
|   |   |   |   |--- duration > 752.50
|   |   |   |   |   |--- truncated branch of depth 6
|   |   |--- poutcome > 0.50
|   |   |   |--- duration <= 782.50
|   |   |   |   |--- day_of_week <= 4.50
|   |   |   |   |   |--- class: 1
|   |   |   |   |--- day_of_week > 4.50
|   |   |   |   |   |--- truncated branch of depth 7
|   |   |   |--- duration > 782.50
|   |   |   |   |--- marital <= 0.50
|   |   |   |   |   |--- class: 0
|   |   |   |   |--- marital > 0.50
|   |   |   |   |   |--- class: 1
|--- balance > 2402.50
|   |--- duration <= 642.00
|   |   |--- class: 0
|   |--- duration > 642.00
|   |   |--- campaign <= 5.50
|   |   |   |--- month <= 6.50
|   |   |   |   |--- job <= 1.50
|   |   |   |   |   |--- class: 0
|   |   |   |   |--- job > 1.50
|   |   |   |   |   |--- truncated branch of depth 4
|   |   |   |--- month > 6.50
|   |   |   |   |--- class: 1
|   |--- campaign > 5.50
|   |   |--- class: 0
|--- day_of_week > 15.50
|   |--- loan <= 0.50
|   |   |--- age <= 30.50
|   |   |   |--- balance <= 276.50
|   |   |   |   |--- campaign <= 1.50
|   |   |   |   |   |--- previous <= 1.00
|   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |--- previous > 1.00
|   |   |   |   |   |   |--- class: 1
|   |   |   |--- campaign > 1.50
|   |   |   |   |--- class: 1
|--- balance > 276.50

```

```

|--- month <= 6.50
|   |--- age <= 25.50
|   |   |--- truncated branch of depth 2
|   |   |--- age > 25.50
|   |   |   |--- class: 0
|   |   |--- month > 6.50
|   |   |   |--- job <= 2.50
|   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |--- job > 2.50
|   |   |   |   |--- class: 1
|   |--- age > 30.50
|   |   |--- pdays <= 340.00
|   |   |   |--- balance <= 957.00
|   |   |   |   |--- campaign <= 1.50
|   |   |   |   |   |--- truncated branch of depth 7
|   |   |   |   |   |--- campaign > 1.50
|   |   |   |   |   |   |--- truncated branch of depth 6
|   |   |   |   |   |--- balance > 957.00
|   |   |   |   |   |   |--- marital <= 0.50
|   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |--- marital > 0.50
|   |   |   |   |   |   |   |   |--- truncated branch of depth 10
|   |   |   |   |   |--- pdays > 340.00
|   |   |   |   |--- class: 1
|   |--- loan > 0.50
|   |   |--- duration <= 640.00
|   |   |   |--- class: 1
|   |   |--- duration > 640.00
|   |   |   |--- age <= 51.00
|   |   |   |   |--- education <= 0.50
|   |   |   |   |   |--- campaign <= 1.50
|   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |--- campaign > 1.50
|   |   |   |   |   |   |--- class: 0
|   |   |   |   |--- education > 0.50
|   |   |   |   |   |--- class: 0
|   |   |--- age > 51.00
|   |   |   |--- class: 1
|--- contact > 1.50
|   |--- duration <= 675.50
|   |   |--- balance <= 1499.00
|   |   |   |--- balance <= 1455.00
|   |   |   |   |--- campaign <= 30.00
|   |   |   |   |   |--- age <= 43.50
|   |   |   |   |   |   |--- default <= 0.50
|   |   |   |   |   |   |   |--- balance <= -3.00
|   |   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |   |--- balance > -3.00
|   |   |   |   |   |   |   |   |--- month <= 7.00
|   |   |   |   |   |   |   |   |   |--- truncated branch of depth 10
|   |   |   |   |   |   |   |   |--- month > 7.00
|   |   |   |   |   |   |   |   |   |--- truncated branch of depth 9
|   |   |   |   |   |--- default > 0.50
|   |   |   |   |   |   |--- campaign <= 6.00
|   |   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |--- campaign > 6.00
|   |   |   |   |   |   |--- class: 0
|   |   |--- age > 43.50
|   |   |   |--- day_of_week <= 8.50
|   |   |   |   |--- marital <= 0.50
|   |   |   |   |   |--- balance <= -311.00
|   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |--- balance > -311.00
|   |   |   |   |   |   |--- class: 1
|   |   |   |   |--- marital > 0.50
|   |   |   |   |   |--- job <= 0.50
|   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |--- job > 0.50
|   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |--- day_of_week > 8.50
|   |   |   |--- campaign <= 8.50
|   |   |   |   |--- balance <= 1399.00
|   |   |   |   |   |--- truncated branch of depth 4
|   |   |   |   |   |--- balance > 1399.00
|   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |--- campaign > 8.50
|   |   |   |   |   |   |--- job <= 3.00
|   |   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |   |--- job > 3.00
|   |   |   |   |   |   |   |--- class: 0
|   |   |--- campaign > 30.00
|   |   |   |--- class: 1
|   |--- balance <= 1455.00
|   |   |--- class: 1
|--- balance > 1499.00
|   |--- day_of_week <= 5.50
|   |   |--- month <= 7.00
|   |   |   |--- job <= 9.50
|   |   |   |   |--- duration <= 529.00

```

```

|--- age <= 38.00
|   |--- class: 0
|   |--- age > 38.00
|       |--- class: 1
|   |--- duration > 529.00
|       |--- class: 0
|   |--- job > 9.50
|       |--- day_of_week <= 3.50
|           |--- class: 1
|       |--- day_of_week > 3.50
|           |--- class: 0
|   |--- month > 7.00
|       |--- class: 1
|   |--- day_of_week > 5.50
|       |--- marital <= 0.50
|           |--- campaign <= 5.50
|               |--- class: 0
|           |--- campaign > 5.50
|               |--- class: 1
|       |--- marital > 0.50
|           |--- class: 0
|--- duration > 675.50
|   |--- balance <= 56.50
|       |--- duration <= 683.00
|           |--- job <= 4.00
|               |--- class: 0
|           |--- job > 4.00
|               |--- class: 1
|       |--- duration > 683.00
|           |--- age <= 33.50
|               |--- age <= 27.50
|                   |--- class: 0
|               |--- age > 27.50
|                   |--- duration <= 782.50
|                       |--- class: 1
|                   |--- duration > 782.50
|                       |--- age <= 29.50
|                           |--- class: 1
|                       |--- age > 29.50
|                           |--- class: 0
|               |--- age > 33.50
|                   |--- loan <= 0.50
|                       |--- class: 0
|                   |--- loan > 0.50
|                       |--- month <= 7.00
|                           |--- default <= 0.50
|                               |--- class: 1
|                           |--- default > 0.50
|                               |--- class: 0
|                       |--- month > 7.00
|                           |--- class: 0
|       |--- balance > 56.50
|           |--- age <= 38.50
|               |--- duration <= 804.00
|                   |--- duration <= 784.50
|                       |--- balance <= 3597.50
|                           |--- balance <= 2357.00
|                               |--- balance <= 146.00
|                                   |--- truncated branch of depth 4
|                               |--- balance > 146.00
|                                   |--- truncated branch of depth 6
|                           |--- balance > 2357.00
|                               |--- class: 1
|                       |--- balance > 3597.50
|                           |--- job <= 6.50
|                               |--- class: 0
|                           |--- job > 6.50
|                               |--- class: 1
|                   |--- duration > 784.50
|                       |--- class: 1
|               |--- duration > 804.00
|                   |--- balance <= 2520.00
|                       |--- class: 0
|                   |--- balance > 2520.00
|                       |--- class: 1
|           |--- age > 38.50
|               |--- balance <= 67.50
|                   |--- class: 1
|               |--- balance > 67.50
|                   |--- month <= 7.00
|                       |--- education <= 0.50
|                           |--- class: 0
|                       |--- education > 0.50
|                           |--- age <= 44.50
|                               |--- duration <= 677.00
|                                   |--- class: 1
|                               |--- duration > 677.00
|                                   |--- truncated branch of depth 5
|                           |--- age > 44.50

```

```

|--- campaign <= 1.50
|--- truncated branch of depth 2
|--- campaign > 1.50
|--- truncated branch of depth 4
|--- month > 7.00
|--- duration <= 744.00
|--- job <= 0.50
|--- age <= 41.50
|--- class: 1
|--- age > 41.50
|--- class: 0
|--- job > 0.50
|--- duration <= 684.00
|--- truncated branch of depth 2
|--- duration > 684.00
|--- class: 0
|--- duration > 744.00
|--- campaign <= 1.50
|--- marital <= 0.50
|--- class: 0
|--- marital > 0.50
|--- truncated branch of depth 4
|--- campaign > 1.50
|--- day_of_week <= 20.50
|--- class: 0
|--- day_of_week > 20.50
|--- truncated branch of depth 2
|--- duration > 853.50
|--- contact <= 1.50
|--- duration <= 3268.50
|--- age <= 53.50
|--- pdays <= 389.00
|--- day_of_week <= 15.50
|--- housing <= 0.50
|--- balance <= 1934.50
|--- day_of_week <= 3.50
|--- duration <= 1166.50
|--- truncated branch of depth 2
|--- duration > 1166.50
|--- truncated branch of depth 2
|--- day_of_week > 3.50
|--- education <= 0.50
|--- truncated branch of depth 5
|--- education > 0.50
|--- truncated branch of depth 11
|--- balance > 1934.50
|--- pdays <= 276.00
|--- class: 1
|--- pdays > 276.00
|--- class: 0
|--- housing > 0.50
|--- contact <= 0.50
|--- campaign <= 2.50
|--- duration <= 1800.50
|--- truncated branch of depth 13
|--- duration > 1800.50
|--- truncated branch of depth 2
|--- campaign > 2.50
|--- day_of_week <= 3.00
|--- truncated branch of depth 2
|--- day_of_week > 3.00
|--- truncated branch of depth 6
|--- contact > 0.50
|--- class: 0
|--- day_of_week > 15.50
|--- job <= 0.50
|--- day_of_week <= 16.50
|--- class: 0
|--- day_of_week > 16.50
|--- balance <= 483.00
|--- class: 1
|--- balance > 483.00
|--- month <= 6.50
|--- truncated branch of depth 3
|--- month > 6.50
|--- class: 1
|--- job > 0.50
|--- balance <= -12.50
|--- duration <= 960.50
|--- balance <= -1804.00
|--- class: 1
|--- balance > -1804.00
|--- class: 0
|--- duration > 960.50
|--- age <= 29.00
|--- class: 0
|--- age > 29.00
|--- truncated branch of depth 4
|--- balance > -12.50

```

```

|--- job <= 6.50
|   |--- balance <= 306.50
|   |   |--- truncated branch of depth 8
|   |   |--- balance > 306.50
|   |   |   |--- truncated branch of depth 10
|   |   |--- job > 6.50
|   |   |   |--- balance <= 114.50
|   |   |   |   |--- truncated branch of depth 5
|   |   |   |   |--- balance > 114.50
|   |   |   |   |   |--- truncated branch of depth 7
|   |--- pdays > 389.00
|   |   |--- class: 0
|--- age > 53.50
|   |--- age <= 71.50
|   |   |--- month <= 8.50
|   |   |   |--- age <= 60.50
|   |   |   |   |--- balance <= 5706.00
|   |   |   |   |   |--- pdays <= 105.50
|   |   |   |   |   |   |--- education <= 0.50
|   |   |   |   |   |   |   |--- truncated branch of depth 7
|   |   |   |   |   |   |   |--- education > 0.50
|   |   |   |   |   |   |   |   |--- truncated branch of depth 9
|   |   |   |   |   |   |--- pdays > 105.50
|   |   |   |   |   |   |   |--- balance <= 556.00
|   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |--- balance > 556.00
|   |   |   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |--- balance > 5706.00
|   |   |   |   |   |   |   |--- day_of_week <= 7.50
|   |   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |   |--- day_of_week > 7.50
|   |   |   |   |   |   |   |   |--- class: 1
|   |   |   |--- age > 60.50
|   |   |   |   |--- age <= 69.50
|   |   |   |   |   |--- class: 1
|   |   |   |   |--- age > 69.50
|   |   |   |   |   |--- month <= 4.00
|   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |--- month > 4.00
|   |   |   |   |   |   |   |--- class: 1
|   |   |--- month > 8.50
|   |   |   |--- duration <= 902.50
|   |   |   |   |--- balance <= 937.50
|   |   |   |   |   |--- duration <= 867.50
|   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |   |--- duration > 867.50
|   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |--- balance > 937.50
|   |   |   |   |   |--- class: 1
|   |   |--- duration > 902.50
|   |   |   |--- housing <= 0.50
|   |   |   |   |--- pdays <= 187.50
|   |   |   |   |   |--- age <= 69.50
|   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |--- age > 69.50
|   |   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |--- pdays > 187.50
|   |   |   |   |   |   |--- class: 1
|   |   |   |--- housing > 0.50
|   |   |   |   |--- balance <= 1642.50
|   |   |   |   |   |--- class: 0
|   |   |   |   |--- balance > 1642.50
|   |   |   |   |   |--- class: 1
|   |--- age > 71.50
|   |   |--- day_of_week <= 2.50
|   |   |   |--- class: 0
|   |   |   |--- day_of_week > 2.50
|   |   |   |   |--- duration <= 1821.50
|   |   |   |   |   |--- class: 1
|   |   |   |   |--- duration > 1821.50
|   |   |   |   |   |--- class: 0
|--- duration > 3268.50
|   |--- class: 0
|--- contact > 1.50
|   |--- day_of_week <= 29.50
|   |   |--- balance <= 790.00
|   |   |   |--- day_of_week <= 17.50
|   |   |   |   |--- duration <= 2348.50
|   |   |   |   |   |--- campaign <= 2.50
|   |   |   |   |   |   |--- duration <= 919.00
|   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |   |--- duration > 919.00
|   |   |   |   |   |   |   |   |--- age <= 57.50
|   |   |   |   |   |   |   |   |   |--- duration <= 921.50
|   |   |   |   |   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |   |   |   |   |   |--- duration > 921.50
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 7
|   |   |   |   |   |   |   |   |   |--- age > 57.50
|   |   |   |   |   |   |   |   |   |   |--- class: 1

```



```

--- campaign > 2.50
|--- campaign <= 6.50
|   |--- marital <= 1.50
|   |   |--- class: 0
|   |   |--- marital > 1.50
|   |   |   |--- age <= 36.50
|   |   |   |   |--- class: 0
|   |   |   |   |--- age > 36.50
|   |   |   |   |--- truncated branch of depth 2
|   |   |--- campaign > 6.50
|   |   |--- campaign <= 12.00
|   |   |   |--- job <= 5.50
|   |   |   |   |--- truncated branch of depth 2
|   |   |   |--- job > 5.50
|   |   |   |   |--- class: 0
|   |   |--- campaign > 12.00
|   |   |   |--- class: 0
|--- duration > 2348.50
|   |--- class: 1
|--- day_of_week > 17.50
|   |--- duration <= 889.50
|   |   |--- job <= 0.50
|   |   |   |--- class: 1
|   |   |   |--- job > 0.50
|   |   |   |   |--- class: 0
|   |--- duration > 889.50
|   |   |--- campaign <= 7.50
|   |   |   |--- job <= 2.50
|   |   |   |   |--- duration <= 2326.00
|   |   |   |   |   |--- balance <= 506.00
|   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |--- balance > 506.00
|   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |--- duration > 2326.00
|   |   |   |   |   |--- class: 0
|   |   |--- job > 2.50
|   |   |   |--- campaign <= 1.50
|   |   |   |   |--- day_of_week <= 26.50
|   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |--- day_of_week > 26.50
|   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |--- campaign > 1.50
|   |   |   |   |--- duration <= 927.00
|   |   |   |   |   |--- class: 0
|   |   |   |   |--- duration > 927.00
|   |   |   |   |   |--- truncated branch of depth 3
|   |--- campaign > 7.50
|   |   |--- class: 0
|--- balance > 790.00
|   |--- day_of_week <= 22.00
|   |   |--- balance <= 1362.50
|   |   |   |--- age <= 28.50
|   |   |   |   |--- class: 0
|   |   |   |--- age > 28.50
|   |   |   |   |--- duration <= 1005.00
|   |   |   |   |   |--- duration <= 946.50
|   |   |   |   |   |   |--- class: 1
|   |   |   |   |   |--- duration > 946.50
|   |   |   |   |   |   |--- day_of_week <= 18.00
|   |   |   |   |   |   |   |--- class: 0
|   |   |   |   |   |   |--- day_of_week > 18.00
|   |   |   |   |   |   |   |--- class: 1
|   |   |   |--- duration > 1005.00
|   |   |   |   |--- class: 1
|   |--- balance > 1362.50
|   |   |--- balance <= 2920.00
|   |   |   |--- balance <= 2288.50
|   |   |   |   |--- day_of_week <= 13.50
|   |   |   |   |   |--- month <= 7.00
|   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |--- month > 7.00
|   |   |   |   |   |   |--- class: 0
|   |   |   |   |--- day_of_week > 13.50
|   |   |   |   |   |--- age <= 39.50
|   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |--- age > 39.50
|   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |--- balance > 2288.50
|   |   |   |--- class: 0
|   |--- balance > 2920.00
|   |   |--- education <= 1.50
|   |   |   |--- duration <= 1569.50
|   |   |   |   |--- marital <= 0.50
|   |   |   |   |   |--- class: 1
|   |   |   |   |--- marital > 0.50
|   |   |   |   |   |--- truncated branch of depth 5
|   |   |   |--- duration > 1569.50
|   |   |   |   |--- class: 1
|   |--- education > 1.50

```

[illegible]