



# Bank Marketing Project: Presentation 1

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- 1 Overview of Variables
- 2 Basic Analysis of Numeric Data
- 3 Overview of Categorical Variables
- 4 Classification Models



- Age
- Duration of phone call
- Number of previous contacts
- Days since previously contacted
- Number of contacts
- Employment Variation Rate
- Consumer Price Index
- Consumer Confidence Index
- Euribor 3-month Rate
- Number of employees



Yes:

- Median: 37
- Mean: 40.91
- SD: 13.83748

No:

- Median: 38
- Mean: 39.91
- SD: 9.898132



Yes:

- Median: 2.0
- Mean: 2.052
- SD: 1.666245

No:

- Median: 2.0
- Mean: 2.633
- SD: 2.873438

# Days Since Previously Contacted



Yes:

- Median: 999
- Mean: 792
- SD: 403.4072

No:

- Median: 999
- Mean: 984.1
- SD: 120.6569

# Number of Previous Contacts



Yes:

- Median: 0
- Mean: 0.4927
- SD: 0.8603441

No:

- Median: 0
- Mean: 0.1324
- SD: 0.4091992



Yes:

- Median: -1.800
- Mean: -1.233
- SD: 1.623626

No:

- Median: 1.1000
- Mean: 0.2489
- SD: 1.482932





Yes:

- Median: 93.20
- Mean: 93.35
- SD: 1.482932

No:

- Median: 93.92
- Mean: 93.60
- SD: 0.5589929



Yes:

- Median: -40.40
- Mean: -39.79
- SD: 6.139668

No:

- Median: -41.80
- Mean: -40.59
- SD: 4.391155

# Euro Interbank Offer Rate for 3 Months



Yes:

- Median: 1.266
- Mean: 2.123
- SD: 1.742598

No:

- Median: 4.857
- Mean: 3.811
- SD: 1.638187

# Number of Employees



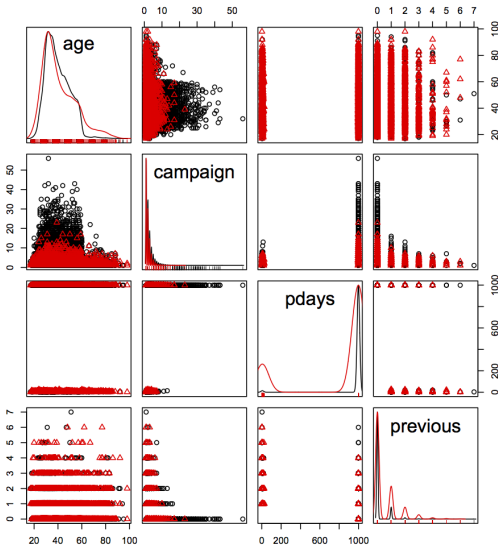
Yes:

- Median: 5099
- Mean: 5095
- SD: 87.57264

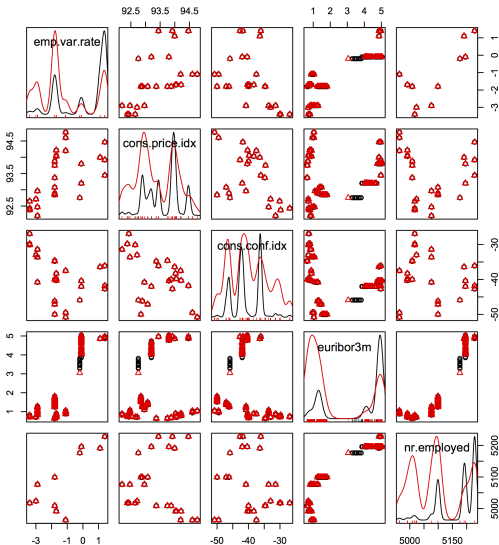
No:

- Median: 5196
- Mean: 5176
- SD: 64.57198

# Graph of Numeric Variables



# Graph of Numeric Variables





job	y	
	no	yes
admin.	9070	1352
blue-collar	8616	638
entrepreneur	1332	124
housemaid	954	106
management	2596	328
retired	1286	434
self-employed	1272	149
services	3646	323
student	600	275
technician	6013	730
unemployed	870	144
unknown	293	37

X-squared = 961.24, df = 11, p-value < 2.2e-16



marital	no	yes
divorced	4136	476
married	22396	2532
single	9948	1620
unknown	68	12

X-squared = 122.66, df = 3, p-value < 2.2e-16





	y	
education	no	yes
basic.4y	3748	428
basic.6y	2104	188
basic.9y	5572	473
high.school	8484	1031
illiterate	14	4
professional.course	4648	595
university.degree	10498	1670
unknown	1480	251

X-squared = 193.11, df = 7, p-value < 2.2e-16



	y	
default	no	yes
no	28391	4197
unknown	8154	443
yes	3	0

X-squared = 406.58, df = 2, p-value < 2.2e-16



	y	
housing	no	yes
no	16596	2026
unknown	883	107
yes	19069	2507

X-squared = 5.6845, df = 2, p-value = 0.05829



loan	y	
	no	yes
no	30100	3850
unknown	883	107
yes	5565	683

X-squared = 1.094, df = 2, p-value = 0.5787



contact	y	
	no	yes
cellular	22291	3853
telephone	14257	787

X-squared = 862.32, df = 1, p-value < 2.2e-16



y		
month	no	yes
apr	2093	539
aug	5523	655
dec	93	89
jul	6525	649
jun	4759	559
mar	270	276
may	12883	886
nov	3685	416
oct	403	315
sep	314	256

X-squared = 3101.1, df = 9, p-value < 2.2e-16



	y	
day_of_week	no	yes
fri	6981	846
mon	7667	847
thu	7578	1045
tue	7137	953
wed	7185	949

X-squared = 26.145, df = 4, p-value = 2.958e-05

## Previous Campaign Outcome



	y	
poutcome	no	yes
failure	3647	605
nonexistent	32422	3141
success	479	894

X-squared = 4230.5, df = 2, p-value < 2.2e-16



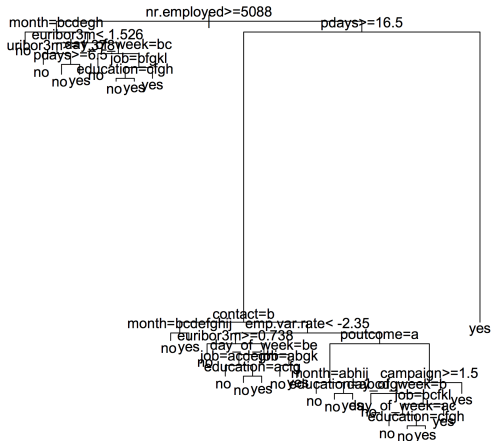


- Decision Tree
- Neural Net
- Support Vector Machine

# Decision Tree



# Labeled Decision Tree



# Cross Validation of Decision Tree

