SUPERVISED LEARNING

Given is the 'Portugal Bank Marketing' dataset:

Bank client data:
https://raw.githubusercontent.com/aishuej/dataset/main/bank.csv

1) **age** (numeric)

2) **job:** type of job
(categorical:"admin.","bluecollar","entrepreneur","housemaid","management","retired","self-employed","services","student","technician","unemployed","unknown")

3) **marital:** marital status (categorical: "divorced","married","single","unknown"; note: "divorced" means divorced or widowed)

4) **education:** education of individual (categorical:
"basic.4y","basic.6y","basic.9y","high.school","illiterate","professional.course","university.degree","unknown")

5) **default:** has credit in default? (categorical: "no","yes","unknown")

6) **housing:** has housing loan? (categorical: "no","yes","unknown")

7) **loan:** has personal loan? (categorical: "no","yes","unknown")

Related with the last contact of the current campaign:

8) **contact:** contact communication type (categorical: "cellular","telephone")

9) **month:** last contact month of year (categorical: "jan", "feb", "mar", …, "nov", "dec")

10) **dayofweek:** last contact day of the week (categorical: "mon","tue","wed","thu","fri")

11) **duration:** last contact duration, in seconds (numeric). Important note: this attribute highly affects the output target (e.g., if duration=0 then y="no"). Yet, the duration is not known before a call is performed. Also, after the end of the call y is obviously known. Thus, this input should only be included for benchmark purposes and should be discarded if the intention is to have a realistic predictive model.

Other attributes:

12) **campaign:** number of contacts performed during this campaign and for this client (numeric, includes last contact)

13) **pdays:** number of days that passed by after the client was last contacted from a previous campaign (numeric; 999 means client was not previously contacted)

14) **previous:** number of contacts performed before this campaign and for this client (numeric)

15) **poutcome:** outcome of the previous marketing campaign (categorical: "failure","nonexistent","success")

Social and economic context attributes

16) **emp.var.rate:** employment variation rate - quarterly indicator (numeric)

17) **cons.price.idx:** consumer price index - monthly indicator (numeric)

18) **cons.conf.idx:** consumer confidence index - monthly indicator (numeric)

19) **concave points_se:** standard error for number of concave portions of the contour

20) **euribor3m:** euribor 3 month rate - daily indicator (numeric)

21) **nr.employed:** number of employees - quarterly indicator (numeric)

Output variable (desired target):

22) **y:** has the client subscribed a term deposit? (binary: "yes","no")