Project

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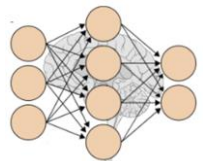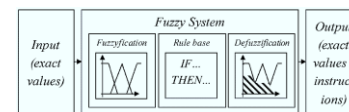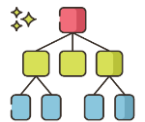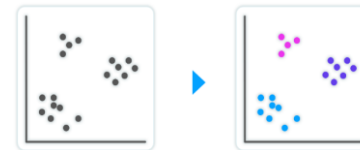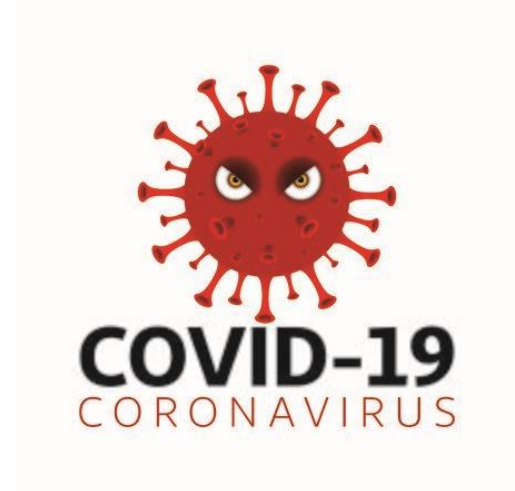
▲ Problem – Stratification of COVID patients

- Individuals with suspected COVID are admitted to the hospital emergency room

- At the time of admission, several variables/parameters are acquired (low cost and simple to acquire)

- Based on these variables, the health professional must decide whether the individual remains hospitalized for additional examinations or should return home.
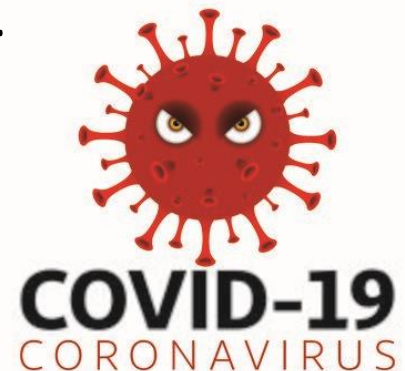
▲ **Stratification of COVID patients**

{0,1}
0 – Returns home
1 – Stays at hospital

Data set

- N=600

- Two independent datasets

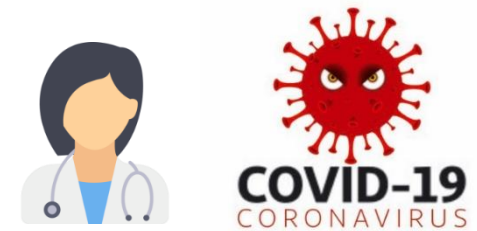**COVID_numerics.csv**
- Numeric: – 8 variables (scalars) + Target (NO, YES)

COVID_IMG.csv
- Matrix: – (21,21)

◤ Data set

- ▪ N=600

| COVID numerics			
	▪ **X1**	*Gender*	{0,1} = { Female, Male}
	▪ **X2**	*Age*	[31 .. 108]
	▪ **X3**	*Marital status*	{0,1} = { single, married}
	▪ **X4**	*Vaccinated*	{0,1} = { No, Yes}
	▪ **X5**	*Breathing difficulty*	{0,1,2,3} = { none, some, moderate, high}
	▪ **X6**	*Heart Rate*	[38.. 272]
	▪ **X7**	*Blood pressure*	[115.. 164]
	▪ **X8**	*Temperature*	[35.84 .. 39.12]
	▪ **T**	*Decision*	Final clinical decision {0,1} = { return home, stay at hospital }

COVID IMG			
	▪ **IMG**	*Image - ECG*	Phase space plot / time delay plot Binary matrix (21x21 pixels)

1| COVID_numerics.csv

- Screening

1| Gender
2| Age
3| Marital status
4| Vaccinated
5| Breathing difficulty
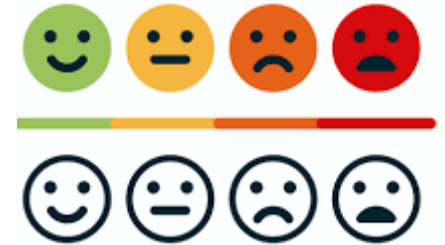
- Measurements

6| Heart rate
7| Blood pressure

8| Temperature

- Knowledge

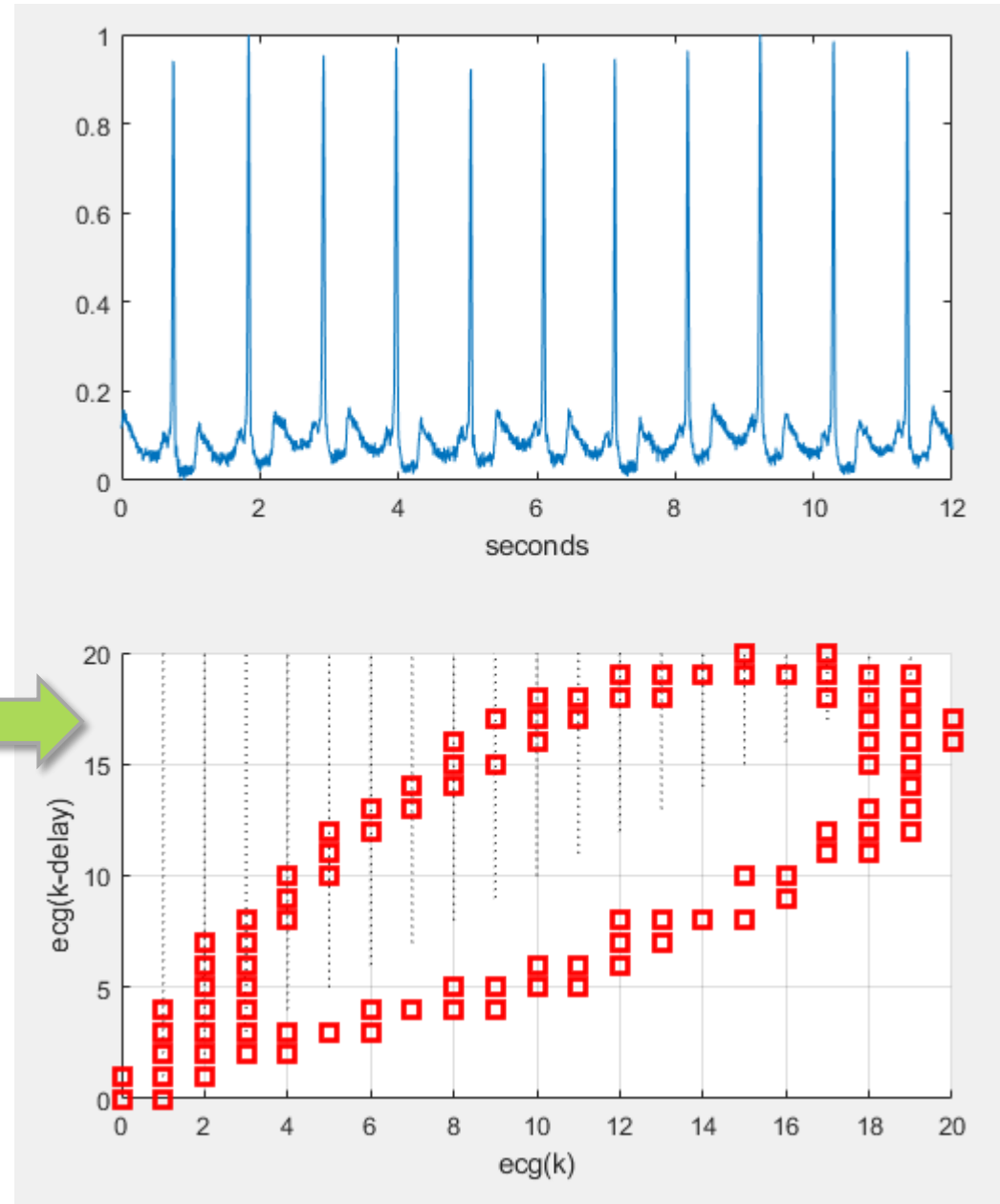IF
    breathing difficulty >= moderate
AND
    Temperature > 37.8
THEN
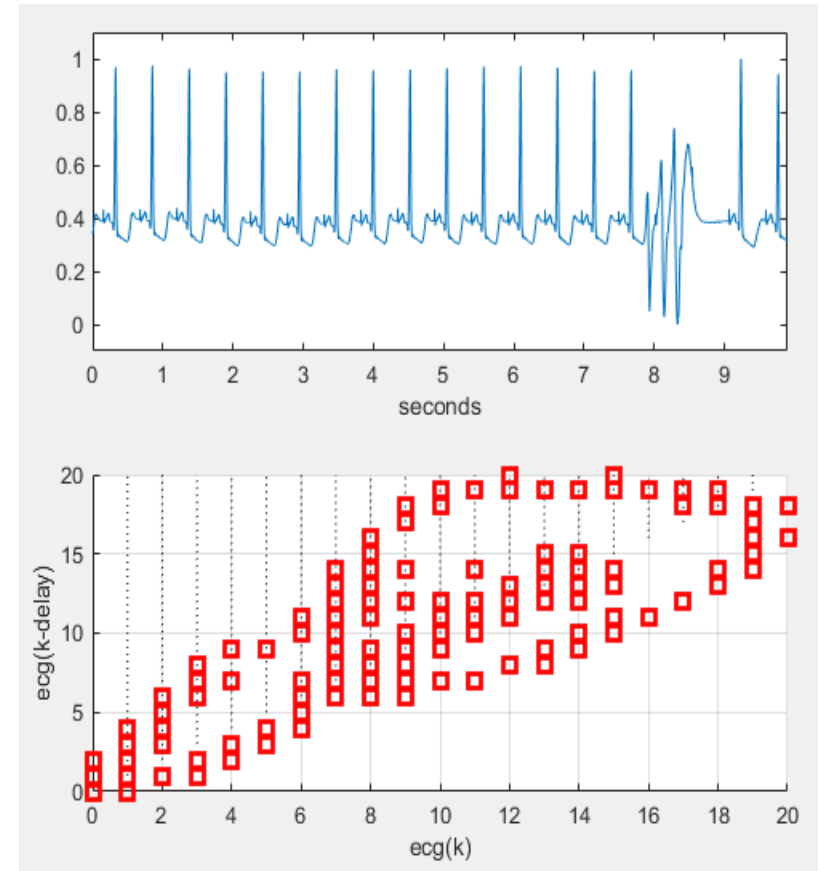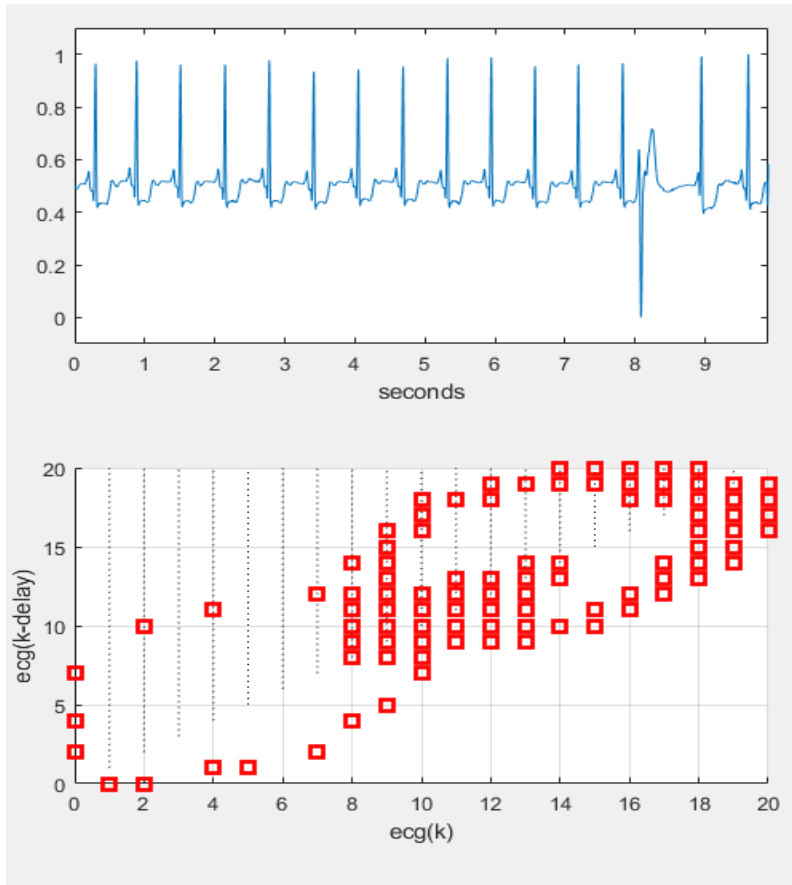   Stay at hospital

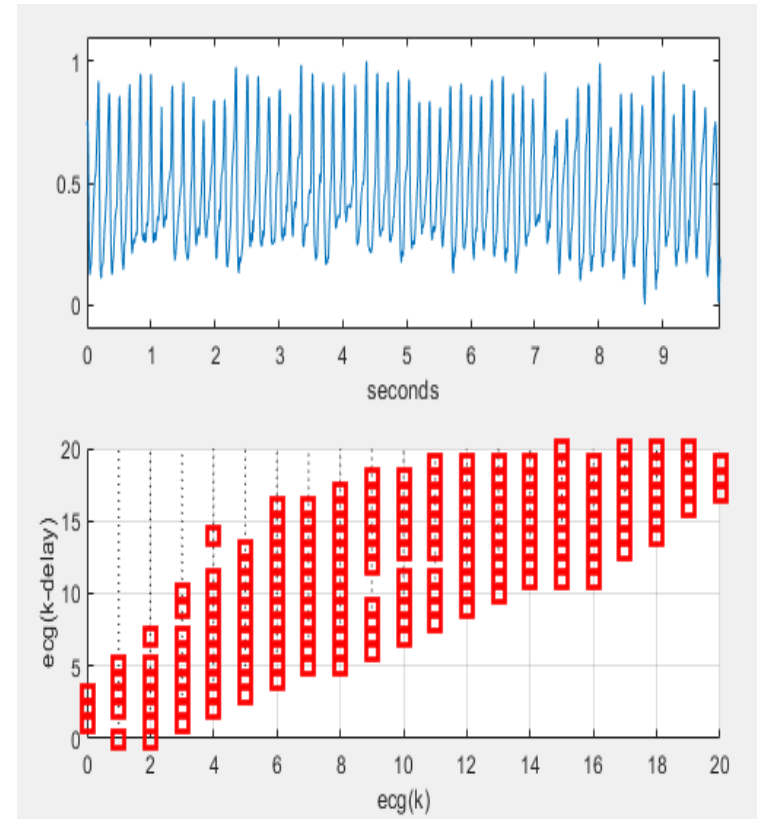## 2| COVID_IMG.csv
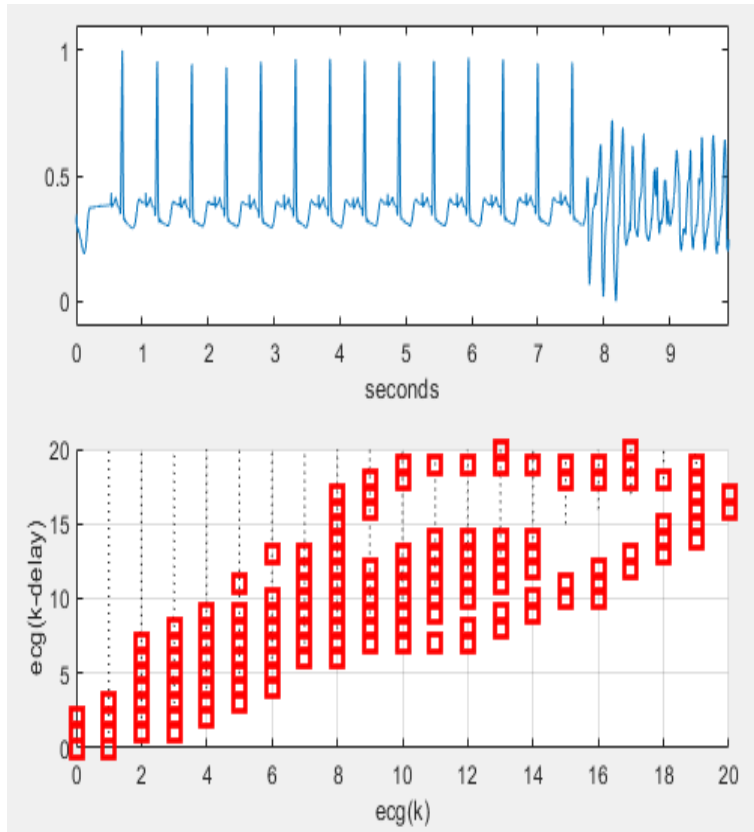
- ECG - Phase space plot

- Matrix (21,21)
- Binary values {0,1}

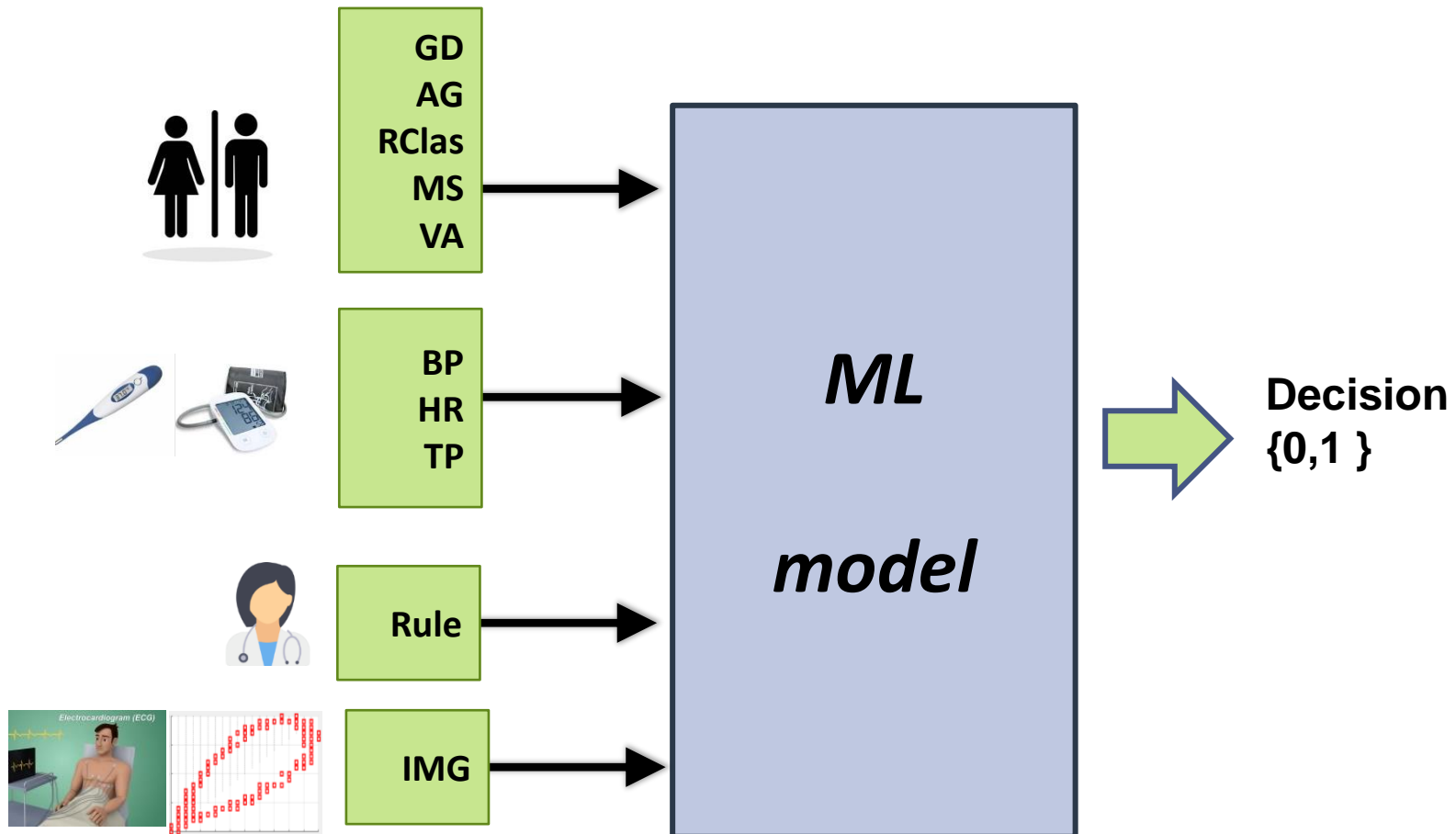- These plot/image can reveal patterns in the ECG data, such as periodicity or anomalies

Image

Image

Machine learning model

- Historical, measurements, clinical knowledge (guidelines), Images

◢ Main goals

- Design a machine learning model to address this issue:

  - **Decide whether the individual should remain hospitalized for additional examinations or be discharged to return home.**

- Questions to consider:

  - 1| Which techniques can/should be applied?

    - Clustering?
    - Decision Trees?
    - Neural Networks?
    - Deep Learning (e.g., CNNs)?
    - Fuzzy Systems?
    - Other you consider relevant

  - 2| Are the the classifier(s) acceptable?

  - 3| Should all available information (inputs/variables) be used?

  - 4| Other you consider relevant !

Components for evaluation

- **1| Report**
  - The report is the <u>most important </u>component for the final evaluation
  - Short (maximum 5/6 pages)
  - Explain the important decisions and conclusions !!
  - Results should be discussed in detail
  - Do not explain what was taught during the course.
    - e.g., Steps to build K-means or any basic implementation details).
    - E.g. Do not include the theoretical advantages or disadvantages of a method unless directly relevant to the conclusions.

- **2| Code**
  - All code should be provided

- **3| Defense**
  - Mandatory (data to be defined)

- **4| Deadline for submission**
  - ?? January 2025