

# Appendix

## A. ML classification models and feature selection.

### The variables used to build up the model

- *physical examination on admission*: temperature, HR BPM, SBP, DBP, RR /min. SpO<sub>2</sub>, SpO<sub>2</sub> on RA vs. O<sub>2</sub> Therapy, GCS, SOFA score
- *symptoms on admission*: cough, sputum, sore throat, chest pain, SOB, fever, headache, confusion, having any gastrointestinal symptoms (e.g., nausea, vomiting, diarrhea), myalgia, malaise, loss of smell or taste.
- *laboratory findings on admission*: count of WBC, platelet, and lymphocyte; the concentration of hemoglobin, total bilirubin, D-Dimer, creatinine, sodium, C-reactive protein, troponin, ferritin, fibrinogen; the activity of ALT, AST, CK, LDH; APTT.

### Feature selection

To check if there are unique patterns within the data that can unambiguously identify if the patient is going to be transferred to the intensive care unit, we utilized ML algorithms.

To assess the importance of the features fed to the ML models as predictors of admitted to ICU patients, we employed four ensemble tree-based estimators such as AdaBoost, Gradient Boosting, Random Forest, and Extra Trees. These models were trained on the whole dataset and used to rank the features in ascending order concerning their predictive potential. Figure 1 and Table 1 display the averaged values of impurity-based attribute ranks, where the average for each feature is calculated as the mean of rank values for the four ML methods mentioned above.

Table 1: Ranking scores of the variables selected for predicting the disease severity

Score	Feature	Score	Feature	Score	Feature	Score	Feature
0.19429	SOFA score	0.02520	Temperature	0.01164	Total bilirubin	0.00466	Sore Throat
0.10168	Clinical severity	0.01748	SOB	0.01135	SBP	0.00445	Troponin
0.08745	O2 therapy	0.01712	ALT	0.00983	Fever	0.00367	Confusion
0.08061	RR/min	0.01623	APTT	0.00969	GCS	0.00309	GI symptoms
0.04127	LDH	0.01595	Hemoglobin	0.00896	Ethnicity	0.00287	Cough
0.03829	Lymphocytes	0.01545	SpO <sub>2</sub> on RA vs O <sub>2</sub> Therapy	0.00732	HR BPM	0.00188	Malaise
0.03223	SpO <sub>2</sub>	0.01505	Na	0.00637	Myalgia	0.00186	Chest pain
0.03212	D-Dimer	0.01383	AST	0.00633	Sputum	0.00141	Smell/taste loss
0.03125	CRP	0.01382	CK	0.00524	DBP	0.00000	Creatinine
0.03067	Platelet	0.01360	WBC	0.00513	Headache	0.00000	Ferritin
						0.00000	Fibrinogen

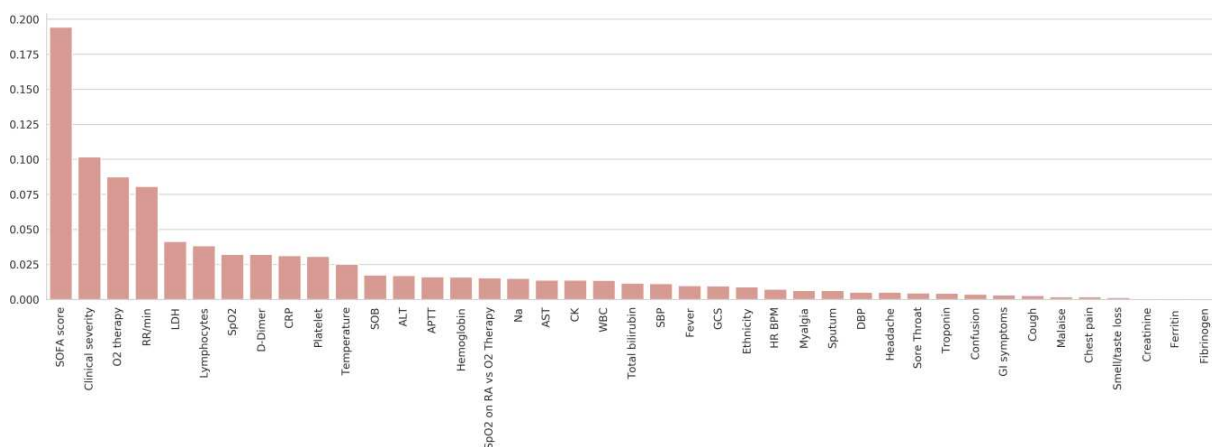


Figure 1: Feature selection for predicting whether a patient is going to be transferred to ICU