

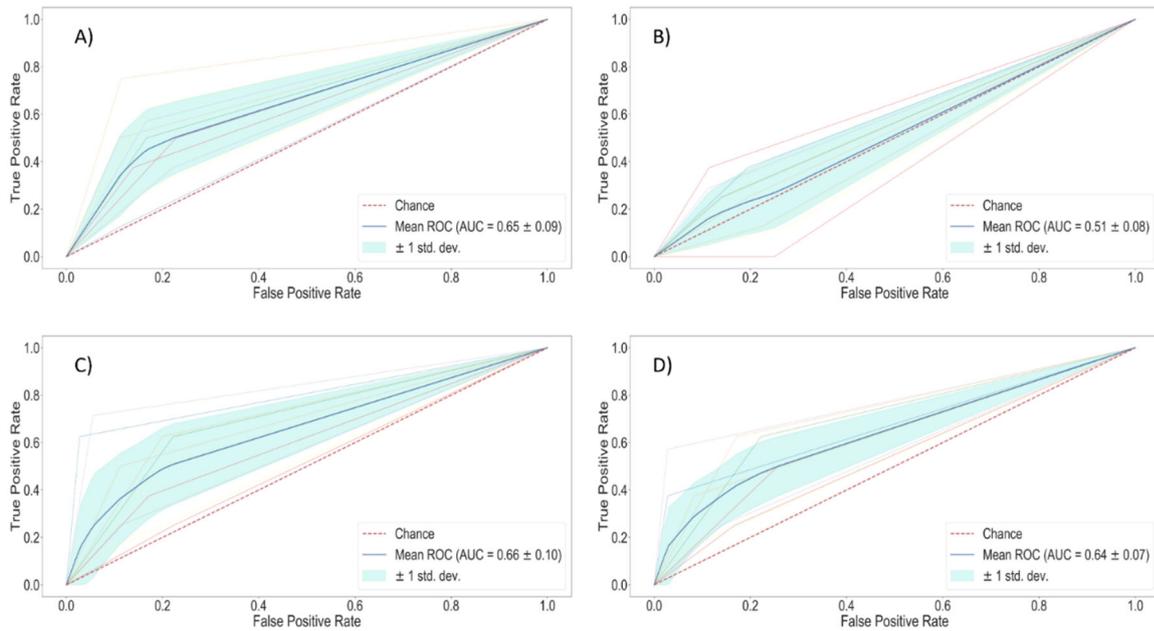
Supplementary materials :

**Details on default parameters in Sophia DDM for Radiomics.**

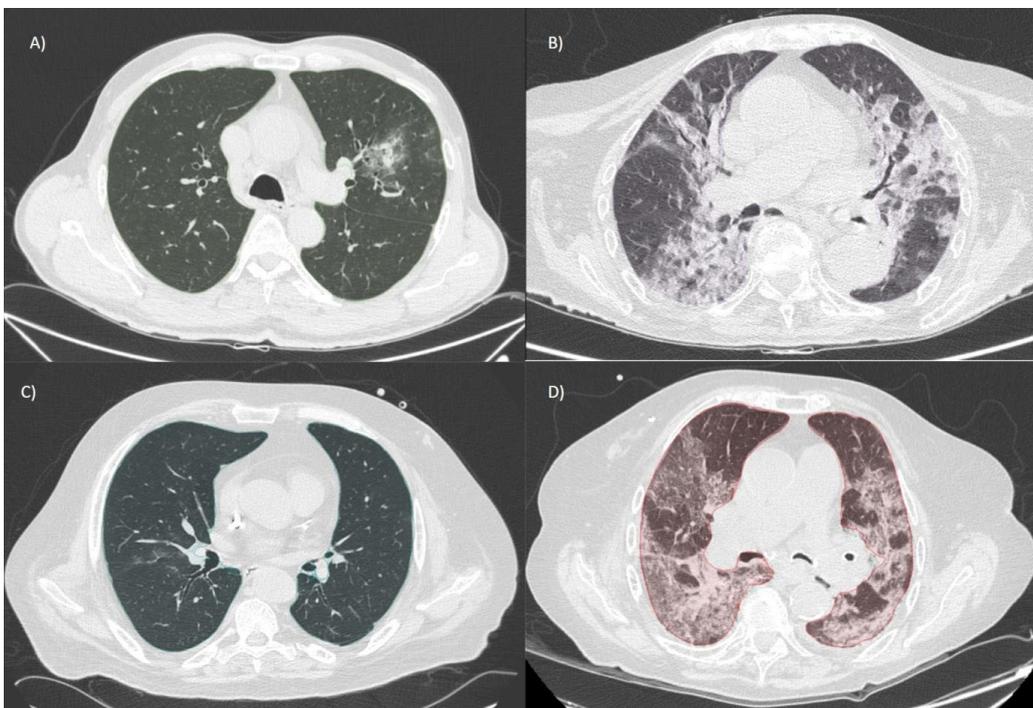
To perform the semi-automatic segmentation using chest CT images, the following parameters are applied by default in Sophia DDM for Radiomics: trilinear interpolation to 1 mm isotropic voxels, re-segmentation method (outlier cleaning): quantiles 0.001 and 0.999, discretization using the fixed bin number method into 32 grey levels, discretization range = VOI minimum value- VOI maximum value, no discretization for Intensity Volume Histogram features and matrix 3D aggregation.

	Avg(Days)	Std	min	25%	50%	75%	max
Total	13.5	12	0	6	10	16	99
Dead	16.75	13.6	1	8	13	20	57
Alive	12.8	11.54	0	6	9	15	99
1 <sup>st</sup> Wave	17.9	16.22	2	8	11	22	99
2 <sup>nd</sup> Wave	11.28	8.34	0	6	9	14	51

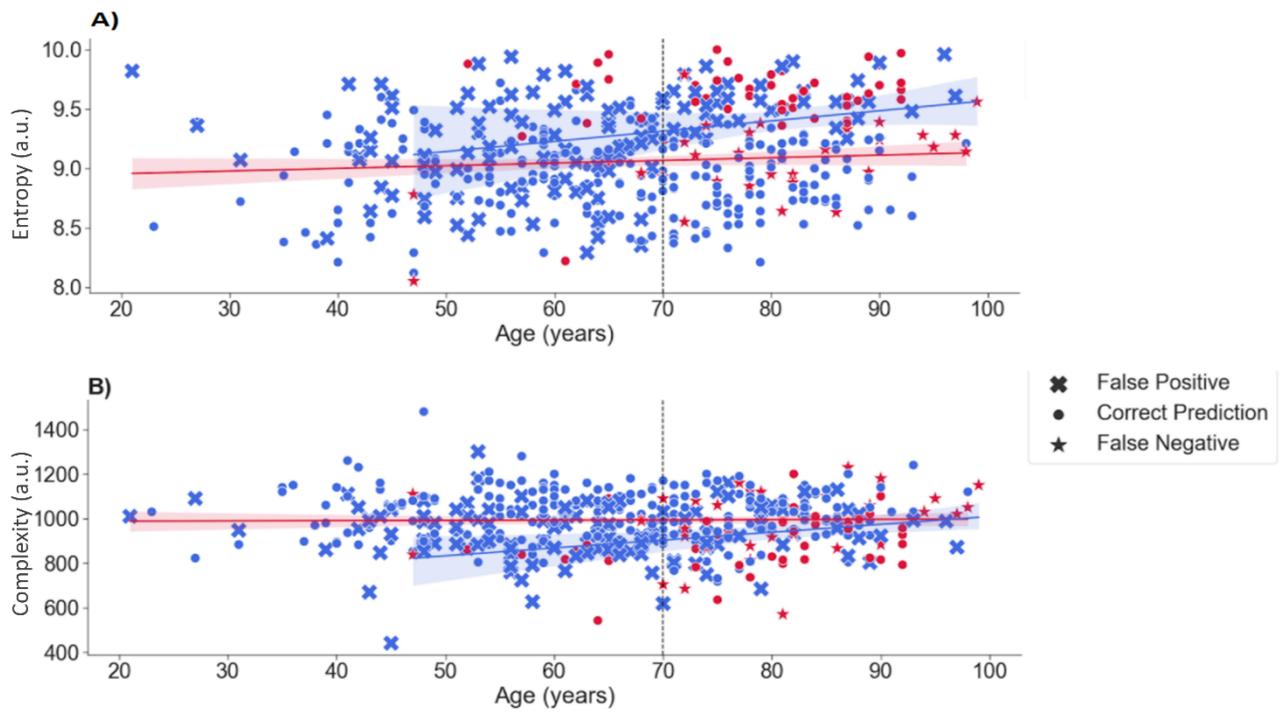
**Table S1:** Days of hospitalization for different sub-populations in the study. Total refers to the entire population, Dead/Alive and 1<sup>st</sup>/2<sup>nd</sup> wave refer to sub-populations in the investigated cohort. In particular, 1<sup>st</sup> and 2<sup>nd</sup> waves identify Sars-CoV-2 patients admitted before and after 20<sup>th</sup> of July 2020, respectively.



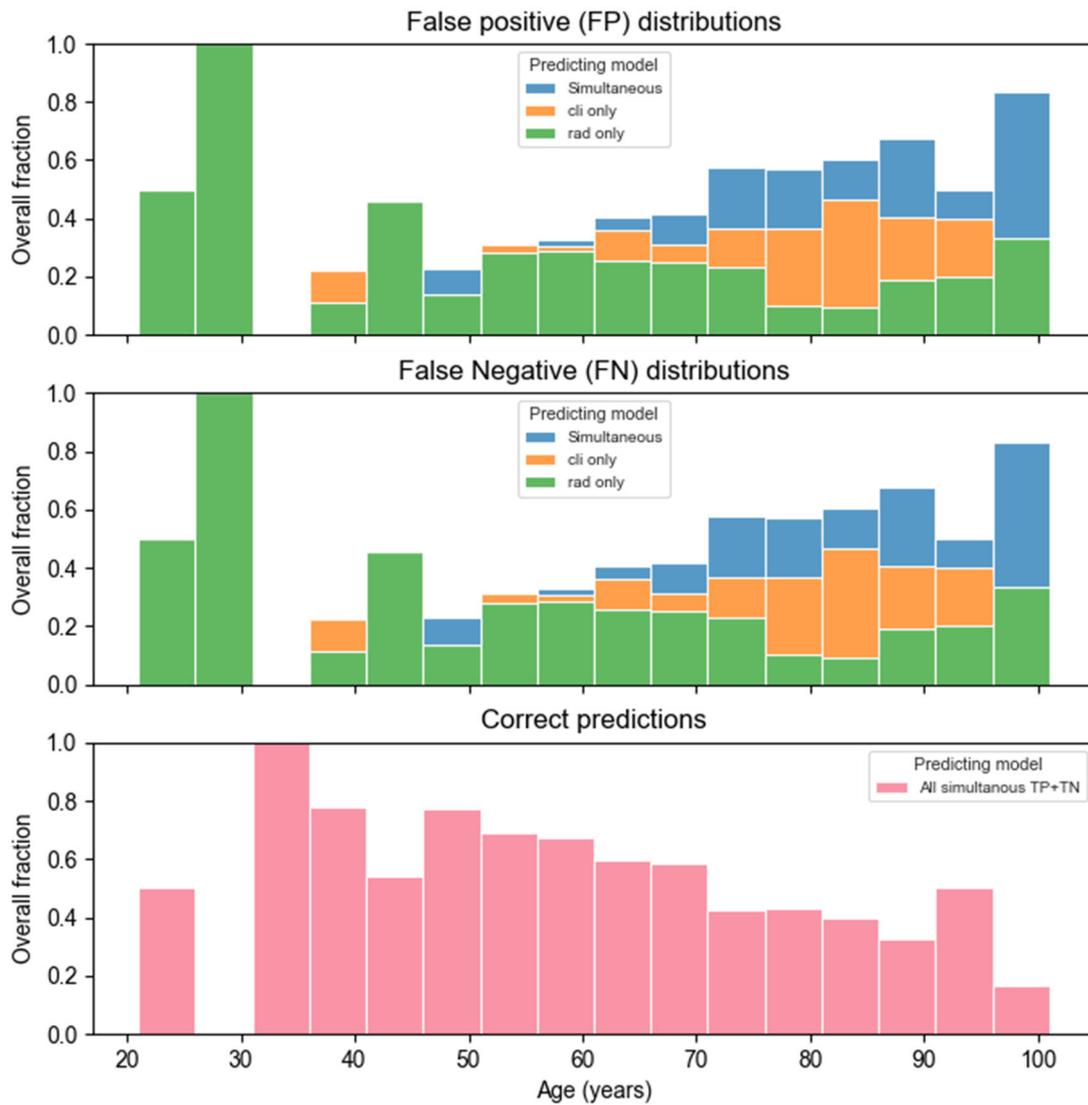
**Figure S1:** Performance of RFC on different input features either A) Clinical, B) Radiological, C) Radiomic or D) All available features



**Figure S2:** CT axial images from different patients. In first column (A, C) the patients are both younger than 70 years, while in the second (B, D) are both older. Similarly, patients on the same row (A, B and C, D) were alive and dead until the end of follow-up, respectively. Entropy was 8.29,9.96,8.22,9.97 and 10 while Complexity was 440,1240, 811.4,1230 for A,B,C,D respectively.



**Figure S3:** Behaviour of relevant radiomic features A) Entropy and B) Complexity in function of Age. The patients are also represented as Misclassification group using the marker in the plot, and by outcome by color as Dead (Red) and Alive (Blue).



**Figure S4.** Histogram of different misclassifications individually made by the clinical model (Orange), the radiomic model (Green) or both simultaneously (Blue) according to the FcNN. The pink colored histogram represents the distribution of the simultaneously correct predictions for both the clinical and the radiomic models. False Positives are cases in which the model predicts the patient mortality and the patient survive; false negatives are cases in which the model predicts that the patient survive, but the patient dies. In all cases, all the bins are normalized with the size of the population in the corresponding age range