SUPPLEMENTARY

Machine learning-based prediction of clinical outcomes   
after first-ever ischemic stroke

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Table S1. Hyperparameters of the machine learning models.

|  |  |  |
| --- | --- | --- |
| **Model** | **Hyperparameter** | **Values** |
| SVM-lin | k | all |
| C | 1, 10, 100, 1000 |
| SVM-rbf | k | all |
| Kernel | rbf |
| C | 1, 10, 100, 1000 |
| Gamma | 0.001, 0.0001 |
| GB | max\_depth | 8, 16, 32, 40, 50 |
| max\_features | sqrt, auto, log2 |
| n\_estimators | 25, 50, 75, 100 |
| min\_samples\_split | 0.1, 0.3 |
| min\_samples\_leaf | 0.3, 0.5 |

Abbreviations: SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier

Table S2. Results for all input variables and all models listed in BA±SD, AUC±SD, Sensitivity±SD, Specificity±SD and p-values according to the permutation test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Labels** | **Time** | **Model** | **BA±SD** | **AUC±SD** | **Sensitivity±SD** | **Specificity±SD** | **P-value** |
| mRS | PD | SVM-lin | 0.67±0.07 | 0.74±0.07 | 0.85±0.06 | 0.49±0.13 | 0 |
| SVM-rbf | 0.65±0.06 | 0.77±0.06 | 0.91±0.06 | 0.4±0.14 | 0 |
| GB | 0.69±0.07 | 0.77±0.06 | 0.8±0.06 | 0.57±0.13 | 0 |
| 1 year | SVM-lin | 0.58±0.08 | 0.66±0.09 | 0.85±0.07 | 0.3±0.15 | 1 |
| SVM-rbf | 0.53±0.06 | 0.68±0.09 | 0.95±0.04 | 0.11±0.11 | 1 |
| GB | 0.59±0.09 | 0.7±0.09 | 0.8±0.07 | 0.39±0.18 | 0,45 |
| BI | PD | SVM-lin | 0.65±0.08 | 0.73±0.11 | 0.91±0.03 | 0.39±0.17 | 0,03 |
| SVM-rbf | 0.6±0.07 | 0.73±0.1 | 0.97±0.03 | 0.23±0.15 | 0,18 |
| GB | 0.63±0.08 | 0.74±0.07 | 0.83±0.06 | 0.42±0.16 | 0,03 |
| 1 year | SVM-lin | 0.51±0.12 | 0.68±0.17 | 0.95±0.03 | 0.06±0.24 | 1 |
| SVM-rbf | 0.5±0.01 | 0.58±0.19 | 1.0±0.01 | 0.0±0.0 | 1 |
| GB | 0.55±0.16 | 0.64±0.25 | 0.98±0.03 | 0.12±0.33 | 1 |
| TICS-M | 1 year | SVM-lin | 0.61±0.08 | 0.69±0.08 | 0.8±0.07 | 0.41±0.16 | 0,225 |
| SVM-rbf | 0.57±0.07 | 0.68±0.09 | 0.9±0.08 | 0.23±0.15 | 0,96 |
| GB | 0.61±0.08 | 0.69±0.1 | 0.79±0.1 | 0.44±0.18 | 0,09 |
| 3 years | SVM-lin | 0.65±0.13 | 0.77±0.11 | 0.86±0.06 | 0.43±0.26 | 0,54 |
| SVM-rbf | 0.57±0.11 | 0.75±0.11 | 0.93±0.06 | 0.22±0.21 | 1 |
| GB | 0.62±0.14 | 0.74±0.14 | 0.9±0.06 | 0.34±0.29 | 0,75 |
| MMSE | PD | SVM-lin | 0.57±0.09 | 0.71±0.1 | 0.91±0.04 | 0.23±0.19 | 1 |
| SVM-rbf | 0.56±0.07 | 0.71±0.09 | 0.96±0.03 | 0.16±0.14 | 1 |
| GB | 0.56±0.08 | 0.66±0.1 | 0.85±0.04 | 0.27±0.18 | 1 |
| CES-D | 1 year | SVM-lin | 0.58±0.09 | 0.62±0.1 | 0.8±0.08 | 0.37±0.19 | 0,915 |
| SVM-rbf | 0.57±0.07 | 0.64±0.11 | 0.93±0.06 | 0.2±0.14 | 1 |
| GB | 0.59±0.09 | 0.66±0.1 | 0.78±0.07 | 0.4±0.18 | 0,195 |
| 3 years | SVM-lin | 0.55±0.08 | 0.56±0.1 | 0.78±0.1 | 0.31±0.17 | 1 |
| SVM-rbf | 0.5±0.06 | 0.53±0.11 | 0.93±0.06 | 0.08±0.1 | 1 |
| GB | 0.47±0.08 | 0.45±0.13 | 0.77±0.09 | 0.17±0.16 | 1 |
| Survival | 1 year | SVM-lin | 0.5±0.06 | 0.53±0.11 | 0.89±0.05 | 0.11±0.11 | 1 |
| SVM-rbf | 0.5±0.02 | 0.55±0.1 | 0.99±0.01 | 0.01±0.03 | 1 |
| GB | 0.5±0.07 | 0.48±0.12 | 0.81±0.05 | 0.18±0.13 | 1 |
| 3 years | SVM-lin | 0.53±0.04 | 0.55±0.05 | 0.5±0.08 | 0.56±0.07 | 1 |
| SVM-rbf | 0.51±0.05 | 0.5±0.07 | 0.35±0.15 | 0.68±0.14 | 1 |
| GB | 0.56±0.06 | 0.61±0.05 | 0.48±0.15 | 0.65±0.1 | 0,09 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; BA, Balance accuracy; AUC, Area under the curve; SD, Standard deviation

Table S3. Results for the demographic input subdomain and all models listed in BA±SD, AUC±SD, Sensitivity±SD, Specificity±SD and p-values according to the permutation test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Labels** | **Time** | **Model** | **BA±SD** | **AUC±SD** | **Sensitivity±SD** | **Specificity±SD** | **P-value** |
| mRS | PD | SVM-lin | 0.56±0.05 | 0.57±0.07 | 0.64±0.08 | 0.48±0.1 | 0,675 |
| SVM-rbf | 0.54±0.05 | 0.57±0.07 | 0.6±0.09 | 0.49±0.1 | 0,33 |
| GB | 0.51±0.06 | 0.54±0.07 | 0.65±0.09 | 0.36±0.1 | 1 |
| 1 year | SVM-lin | 0.67±0.08 | 0.73±0.1 | 0.7±0.08 | 0.65±0.17 | 0 |
| SVM-rbf | 0.68±0.09 | 0.73±0.1 | 0.7±0.08 | 0.65±0.19 | 0 |
| GB | 0.61±0.08 | 0.66±0.09 | 0.72±0.09 | 0.5±0.19 | 0,03 |
| BI | PD | SVM-lin | 0.51±0.07 | 0.49±0.1 | 0.65±0.06 | 0.36±0.13 | 1 |
| SVM-rbf | 0.5±0.08 | 0.48±0.09 | 0.61±0.15 | 0.4±0.19 | 1 |
| GB | 0.47±0.07 | 0.45±0.09 | 0.68±0.08 | 0.27±0.11 | 1 |
| 1 year | SVM-lin | 0.66±0.23 | 0.86±0.15 | 0.92±0.07 | 0.39±0.49 | 1 |
| SVM-rbf | 0.63±0.22 | 0.83±0.19 | 0.91±0.09 | 0.36±0.48 | 1 |
| GB | 0.63±0.22 | 0.78±0.21 | 0.92±0.08 | 0.34±0.48 | 1 |
| TICS-M | 1 year | SVM-lin | 0.67±0.09 | 0.73±0.09 | 0.69±0.06 | 0.65±0.15 | 0 |
| SVM-rbf | 0.65±0.09 | 0.72±0.09 | 0.66±0.06 | 0.65±0.17 | 0 |
| GB | 0.63±0.08 | 0.69±0.11 | 0.71±0.08 | 0.56±0.17 | 0 |
| 3 years | SVM-lin | 0.69±0.14 | 0.77±0.13 | 0.76±0.08 | 0.63±0.27 | 0,015 |
| SVM-rbf | 0.7±0.13 | 0.76±0.13 | 0.73±0.08 | 0.66±0.25 | 0,015 |
| GB | 0.68±0.12 | 0.74±0.13 | 0.8±0.08 | 0.56±0.23 | 0 |
| MMSE | PD | SVM-lin | 0.65±0.1 | 0.7±0.1 | 0.7±0.06 | 0.6±0.2 | 0,03 |
| SVM-rbf | 0.67±0.09 | 0.71±0.11 | 0.68±0.07 | 0.66±0.2 | 0 |
| GB | 0.62±0.09 | 0.67±0.1 | 0.75±0.06 | 0.5±0.19 | 0,105 |
| CES-D | 1 year | SVM-lin | 0.63±0.08 | 0.68±0.1 | 0.71±0.08 | 0.56±0.15 | 0,03 |
| SVM-rbf | 0.62±0.07 | 0.7±0.09 | 0.66±0.12 | 0.58±0.15 | 0 |
| GB | 0.63±0.09 | 0.7±0.1 | 0.73±0.08 | 0.53±0.17 | 0,015 |
| 3 years | SVM-lin | 0.6±0.1 | 0.6±0.11 | 0.7±0.1 | 0.5±0.19 | 0,555 |
| SVM-rbf | 0.59±0.1 | 0.62±0.12 | 0.66±0.11 | 0.52±0.19 | 0,195 |
| GB | 0.58±0.1 | 0.62±0.11 | 0.71±0.11 | 0.45±0.18 | 0,81 |
| Survival | 1 year | SVM-lin | 0.5±0.09 | 0.49±0.11 | 0.63±0.06 | 0.37±0.19 | 1 |
| SVM-rbf | 0.48±0.09 | 0.47±0.1 | 0.62±0.09 | 0.34±0.19 | 1 |
| GB | 0.53±0.1 | 0.53±0.11 | 0.67±0.08 | 0.39±0.18 | 1 |
| 3 years | SVM-lin | 0.53±0.06 | 0.55±0.07 | 0.37±0.07 | 0.7±0.1 | 1 |
| SVM-rbf | 0.5±0.04 | 0.48±0.08 | 0.32±0.22 | 0.69±0.22 | 1 |
| GB | 0.52±0.06 | 0.56±0.07 | 0.37±0.11 | 0.68±0.12 | 1 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; BA, Balance accuracy; AUC, Area under the curve; SD, Standard deviation

Table S4. Results for the clinical input subdomain and all models listed in BA±SD, AUC±SD, Sensitivity±SD, Specificity±SD and p-values according to the permutation test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Labels** | **Time** | **Model** | **BA±SD** | **AUC±SD** | **Sensitivity±SD** | **Specificity±SD** | **P-value** |
| mRS | PD | SVM-lin | 0.54±0.05 | 0.56±0.07 | 0.87±0.07 | 0.21±0.08 | 1 |
| SVM-rbf | 0.53±0.05 | 0.57±0.07 | 0.91±0.07 | 0.15±0.08 | 1 |
| GB | 0.49±0.07 | 0.49±0.08 | 0.64±0.09 | 0.34±0.13 | 1 |
| 1 year | SVM-lin | 0.55±0.08 | 0.68±0.09 | 0.83±0.08 | 0.27±0.16 | 1 |
| SVM-rbf | 0.55±0.08 | 0.67±0.09 | 0.81±0.08 | 0.29±0.17 | 1 |
| GB | 0.54±0.11 | 0.58±0.12 | 0.67±0.09 | 0.4±0.24 | 1 |
| BI | PD | SVM-lin | 0.5±0.05 | 0.51±0.1 | 0.89±0.04 | 0.11±0.09 | 1 |
| SVM-rbf | 0.5±0.05 | 0.48±0.1 | 0.92±0.07 | 0.07±0.07 | 1 |
| GB | 0.48±0.09 | 0.47±0.1 | 0.64±0.09 | 0.32±0.18 | 1 |
| 1 year | SVM-lin | 0.49±0.1 | 0.51±0.25 | 0.95±0.05 | 0.04±0.2 | 1 |
| SVM-rbf | 0.52±0.13 | 0.47±0.26 | 0.96±0.05 | 0.08±0.27 | 1 |
| GB | 0.42±0.08 | 0.41±0.27 | 0.84±0.16 | 0.0±0.0 | 1 |
| TICS-M | 1 year | SVM-lin | 0.58±0.07 | 0.66±0.09 | 0.85±0.08 | 0.32±0.15 | 0,495 |
| SVM-rbf | 0.56±0.08 | 0.64±0.1 | 0.84±0.08 | 0.28±0.15 | 0,885 |
| GB | 0.6±0.08 | 0.66±0.1 | 0.72±0.09 | 0.48±0.16 | 0 |
| 3 years | SVM-lin | 0.65±0.13 | 0.8±0.1 | 0.87±0.07 | 0.42±0.25 | 0,27 |
| SVM-rbf | 0.63±0.13 | 0.79±0.11 | 0.89±0.07 | 0.37±0.25 | 0,465 |
| GB | 0.61±0.16 | 0.64±0.17 | 0.71±0.11 | 0.5±0.3 | 0,57 |
| MMSE | PD | SVM-lin | 0.57±0.07 | 0.65±0.1 | 0.9±0.06 | 0.23±0.15 | 1 |
| SVM-rbf | 0.59±0.08 | 0.67±0.09 | 0.93±0.06 | 0.25±0.15 | 0,195 |
| GB | 0.56±0.08 | 0.58±0.09 | 0.69±0.08 | 0.43±0.18 | 1 |
| CES-D | 1 year | SVM-lin | 0.53±0.07 | 0.58±0.1 | 0.85±0.08 | 0.22±0.12 | 1 |
| SVM-rbf | 0.53±0.06 | 0.59±0.09 | 0.89±0.08 | 0.17±0.12 | 1 |
| GB | 0.48±0.08 | 0.53±0.09 | 0.63±0.1 | 0.34±0.15 | 1 |
| 3 years | SVM-lin | 0.47±0.07 | 0.47±0.1 | 0.84±0.11 | 0.09±0.11 | 1 |
| SVM-rbf | 0.49±0.04 | 0.47±0.11 | 0.92±0.11 | 0.06±0.11 | 1 |
| GB | 0.53±0.1 | 0.51±0.13 | 0.67±0.12 | 0.39±0.2 | 1 |
| Survival | 1 year | SVM-lin | 0.51±0.05 | 0.58±0.1 | 0.91±0.05 | 0.11±0.11 | 1 |
| SVM-rbf | 0.51±0.05 | 0.58±0.11 | 0.95±0.05 | 0.08±0.1 | 1 |
| GB | 0.45±0.07 | 0.42±0.09 | 0.65±0.11 | 0.25±0.14 | 1 |
| 3 years | SVM-lin | 0.51±0.05 | 0.52±0.07 | 0.42±0.08 | 0.6±0.09 | 1 |
| SVM-rbf | 0.5±0.05 | 0.46±0.05 | 0.23±0.16 | 0.76±0.18 | 1 |
| GB | 0.51±0.04 | 0.52±0.05 | 0.26±0.13 | 0.76±0.13 | 1 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; BA, Balance accuracy; AUC, Area under the curve; SD, Standard deviation

Table S5. Results for the serological input subdomain and all models listed in BA±SD, AUC±SD, Sensitivity±SD, Specificity±SD and p-values according to the permutation test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Labels** | **Time** | **Model** | **BA±SD** | **AUC±SD** | **Sensitivity±SD** | **Specificity±SD** | **P-value** |
| mRS | PD | SVM-lin | 0.58±0.06 | 0.61±0.07 | 0.7±0.08 | 0.45±0.12 | 0,27 |
| SVM-rbf | 0.57±0.06 | 0.63±0.07 | 0.77±0.09 | 0.37±0.14 | 0,015 |
| GB | 0.63±0.07 | 0.68±0.08 | 0.69±0.08 | 0.56±0.13 | 0 |
| 1 year | SVM-lin | 0.64±0.09 | 0.66±0.11 | 0.71±0.06 | 0.58±0.19 | 0,06 |
| SVM-rbf | 0.63±0.1 | 0.64±0.12 | 0.69±0.07 | 0.58±0.19 | 0 |
| GB | 0.6±0.09 | 0.69±0.09 | 0.74±0.07 | 0.45±0.18 | 0,195 |
| BI | PD | SVM-lin | 0.57±0.07 | 0.61±0.1 | 0.71±0.06 | 0.43±0.14 | 1 |
| SVM-rbf | 0.57±0.08 | 0.6±0.1 | 0.72±0.08 | 0.42±0.16 | 1 |
| GB | 0.57±0.08 | 0.62±0.09 | 0.73±0.06 | 0.41±0.17 | 0,48 |
| 1 year | SVM-lin | 0.54±0.19 | 0.66±0.19 | 0.87±0.12 | 0.2±0.4 | 1 |
| SVM-rbf | 0.61±0.2 | 0.63±0.25 | 0.84±0.15 | 0.38±0.49 | 1 |
| GB | 0.51±0.16 | 0.45±0.28 | 0.9±0.1 | 0.12±0.33 | 1 |
| TICS-M | 1 year | SVM-lin | 0.61±0.08 | 0.69±0.08 | 0.73±0.08 | 0.49±0.14 | 0,09 |
| SVM-rbf | 0.61±0.09 | 0.67±0.09 | 0.73±0.08 | 0.49±0.15 | 0,12 |
| GB | 0.6±0.08 | 0.65±0.09 | 0.74±0.09 | 0.46±0.16 | 0,135 |
| 3 years | SVM-lin | 0.62±0.12 | 0.61±0.15 | 0.72±0.08 | 0.51±0.24 | 0,915 |
| SVM-rbf | 0.62±0.13 | 0.65±0.15 | 0.73±0.12 | 0.52±0.25 | 0,165 |
| GB | 0.55±0.1 | 0.57±0.13 | 0.79±0.09 | 0.3±0.21 | 1 |
| MMSE | PD | SVM-lin | 0.59±0.09 | 0.67±0.07 | 0.7±0.06 | 0.49±0.18 | 0,705 |
| SVM-rbf | 0.58±0.09 | 0.65±0.07 | 0.66±0.06 | 0.51±0.19 | 0,36 |
| GB | 0.55±0.11 | 0.6±0.11 | 0.76±0.07 | 0.35±0.23 | 1 |
| CES-D | 1 year | SVM-lin | 0.6±0.07 | 0.6±0.09 | 0.7±0.08 | 0.49±0.15 | 0,21 |
| SVM-rbf | 0.58±0.08 | 0.59±0.09 | 0.71±0.1 | 0.45±0.16 | 0,195 |
| GB | 0.58±0.1 | 0.62±0.1 | 0.7±0.08 | 0.46±0.17 | 0,645 |
| 3 years | SVM-lin | 0.55±0.11 | 0.56±0.11 | 0.67±0.11 | 0.43±0.23 | 1 |
| SVM-rbf | 0.54±0.1 | 0.56±0.11 | 0.65±0.13 | 0.44±0.23 | 1 |
| GB | 0.51±0.11 | 0.54±0.11 | 0.72±0.1 | 0.29±0.2 | 1 |
| Survival | 1 year | SVM-lin | 0.48±0.07 | 0.46±0.1 | 0.66±0.07 | 0.29±0.14 | 1 |
| SVM-rbf | 0.49±0.08 | 0.48±0.11 | 0.67±0.09 | 0.3±0.16 | 1 |
| GB | 0.54±0.1 | 0.59±0.1 | 0.76±0.07 | 0.32±0.18 | 1 |
| 3 years | SVM-lin | 0.56±0.05 | 0.6±0.06 | 0.46±0.09 | 0.66±0.07 | 0,75 |
| SVM-rbf | 0.53±0.04 | 0.61±0.06 | 0.31±0.14 | 0.76±0.11 | 0,75 |
| GB | 0.57±0.06 | 0.61±0.05 | 0.54±0.15 | 0.61±0.12 | 0,09 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; BA, Balance accuracy; AUC, Area under the curve; SD, Standard deviation

Table S6. Results for the MRI input subdomain and all models listed in BA±SD, AUC±SD, Sensitivity±SD, Specificity±SD and p-values according to the permutation test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Labels** | **Time** | **Model** | **BA±SD** | **AUC±SD** | **Sensitivity±SD** | **Specificity±SD** | **P-value** |
| mRS | PD | SVM-lin | 0.54±0.06 | 0.6±0.08 | 0.89±0.06 | 0.2±0.09 | 1 |
| SVM-rbf | 0.5±0.03 | 0.58±0.08 | 0.92±0.07 | 0.09±0.07 | 1 |
| GB | 0.52±0.06 | 0.56±0.07 | 0.7±0.07 | 0.33±0.09 | 1 |
| 1 year | SVM-lin | 0.52±0.05 | 0.55±0.12 | 0.95±0.04 | 0.08±0.09 | 1 |
| SVM-rbf | 0.5±0.03 | 0.52±0.1 | 0.98±0.04 | 0.02±0.05 | 1 |
| GB | 0.51±0.08 | 0.56±0.09 | 0.73±0.09 | 0.3±0.14 | 1 |
| BI | PD | SVM-lin | 0.54±0.05 | 0.57±0.12 | 0.95±0.03 | 0.12±0.09 | 1 |
| SVM-rbf | 0.53±0.04 | 0.61±0.11 | 0.97±0.03 | 0.1±0.09 | 1 |
| GB | 0.54±0.07 | 0.58±0.1 | 0.72±0.08 | 0.36±0.14 | 1 |
| 1 year | SVM-lin | 0.5±0.0 | 0.35±0.24 | 1.0±0.01 | 0.0±0.0 | 1 |
| SVM-rbf | 0.5±0.01 | 0.35±0.26 | 1.0±0.01 | 0.0±0.0 | 1 |
| GB | 0.49±0.14 | 0.44±0.22 | 0.88±0.12 | 0.1±0.3 | 1 |
| TICS-M | 1 year | SVM-lin | 0.53±0.06 | 0.55±0.1 | 0.9±0.08 | 0.15±0.1 | 1 |
| SVM-rbf | 0.52±0.06 | 0.55±0.12 | 0.94±0.07 | 0.11±0.11 | 1 |
| GB | 0.51±0.08 | 0.55±0.1 | 0.7±0.11 | 0.33±0.15 | 1 |
| 3 years | SVM-lin | 0.49±0.03 | 0.46±0.11 | 0.97±0.04 | 0.01±0.05 | 1 |
| SVM-rbf | 0.49±0.02 | 0.4±0.14 | 0.98±0.04 | 0.0±0.04 | 1 |
| GB | 0.53±0.11 | 0.57±0.14 | 0.81±0.1 | 0.25±0.23 | 1 |
| MMSE | PD | SVM-lin | 0.55±0.06 | 0.68±0.09 | 0.96±0.03 | 0.14±0.13 | 1 |
| SVM-rbf | 0.53±0.06 | 0.68±0.09 | 0.96±0.04 | 0.09±0.14 | 1 |
| GB | 0.56±0.1 | 0.62±0.11 | 0.75±0.09 | 0.36±0.25 | 1 |
| CES-D | 1 year | SVM-lin | 0.55±0.07 | 0.53±0.12 | 0.92±0.05 | 0.18±0.14 | 1 |
| SVM-rbf | 0.56±0.07 | 0.53±0.12 | 0.94±0.05 | 0.19±0.14 | 0,78 |
| GB | 0.56±0.1 | 0.56±0.12 | 0.74±0.08 | 0.38±0.2 | 0,825 |
| 3 years | SVM-lin | 0.48±0.04 | 0.49±0.11 | 0.93±0.06 | 0.03±0.08 | 1 |
| SVM-rbf | 0.48±0.03 | 0.5±0.14 | 0.95±0.06 | 0.01±0.03 | 1 |
| GB | 0.47±0.1 | 0.47±0.14 | 0.7±0.12 | 0.24±0.19 | 1 |
| Survival | 1 year | SVM-lin | 0.49±0.01 | 0.5±0.11 | 0.98±0.02 | 0.0±0.02 | 1 |
| SVM-rbf | 0.5±0.01 | 0.35±0.09 | 0.99±0.01 | 0.0±0.0 | 1 |
| GB | 0.48±0.08 | 0.4±0.11 | 0.81±0.07 | 0.13±0.14 | 1 |
| 3 years | SVM-lin | 0.5±0.05 | 0.51±0.06 | 0.33±0.09 | 0.67±0.11 | 1 |
| SVM-rbf | 0.49±0.03 | 0.48±0.05 | 0.14±0.13 | 0.85±0.15 | 1 |
| GB | 0.5±0.05 | 0.51±0.06 | 0.23±0.2 | 0.77±0.2 | 1 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; BA, Balance accuracy; AUC, Area under the curve; SD, Standard deviation

Table S7. Comparison of all models using all input variables with Integrated Discrimination Improvement (IDI) and Likelihood Ratio (LR) with p-values.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Outcome** | **Time point** | **Model 1** | **Model 2** | **IDI** | **LR** | **P-value** |
| mRS | PD | SVC-lin | SVC-rbf | -0,13 | -0,4 | 1 |
| SVC-lin | GB | -0,13 | -0,36 | 1 |
| SVC-rbf | GB | 0 | 0,04 | 1 |
| 1 year | SVC-lin | SVC-rbf | -0,06 | -0,64 | 1 |
| SVC-lin | GB | -0,13 | -0,58 | 1 |
| SVC-rbf | GB | -0,07 | 0,06 | 1 |
| BI | PD | SVC-lin | SVC-rbf | 0 | -0,4 | 1 |
| SVC-lin | GB | -0,04 | -0,24 | 1 |
| SVC-rbf | GB | -0,04 | 0,16 | 1 |
| 1 year | SVC-lin | SVC-rbf | 0,24 | -0,18 | 1 |
| SVC-lin | GB | 0,11 | -0,2 | 1 |
| SVC-rbf | GB | -0,17 | -0,02 | 1 |
| MMSE | PD | SVC-lin | SVC-rbf | 0 | -0,66 | 1 |
| SVC-lin | GB | 0,15 | -0,46 | 1 |
| SVC-rbf | GB | 0,15 | 0,2 | 1 |
| TICS-M | 1 year | SVC-lin | SVC-rbf | 0,03 | -1,36 | 1 |
| SVC-lin | GB | 0 | -1,32 | 1 |
| SVC-rbf | GB | -0,03 | 0,04 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0,08 | -0,56 | 1 |
| SVC-lin | GB | 0,12 | -0,58 | 1 |
| SVC-rbf | GB | 0,04 | -0,02 | 1 |
| CES-D | 1 year | SVC-lin | SVC-rbf | -0,06 | -0,7 | 1 |
| SVC-lin | GB | -0,12 | -0,64 | 1 |
| SVC-rbf | GB | -0,06 | 0,06 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0,06 | -2,36 | 1 |
| SVC-lin | GB | 0,2 | -2,22 | 1 |
| SVC-rbf | GB | 0,15 | 0,14 | 1 |
| Survival | 1 year | SVC-lin | SVC-rbf | -0,04 | -0,54 | 1 |
| SVC-lin | GB | 0,1 | -0,24 | 1 |
| SVC-rbf | GB | 0,13 | 0,3 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0,1 | -0,38 | 1 |
| SVC-lin | GB | -0,15 | -0,42 | 1 |
| SVC-rbf | GB | -0,28 | -0,04 | 1 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; IDI, Integrated discrimination improvement; LR, Likelihood Ratio

Table S8. Comparison of all models using the demographic input subdomain with Integrated Discrimination Improvement (IDI) and Likelihood Ratio (LR) with p-values.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Outcome** | **Time point** | **Model 1** | **Model 2** | **IDI** | **LR** | **P-value** |
| mRS | PD | SVC-lin | SVC-rbf | 0 | -0,02 | 1 |
| SVC-lin | GB | 0,07 | 0 | 1 |
| SVC-rbf | GB | 0,07 | 0,02 | 1 |
| 1 year | SVC-lin | SVC-rbf | 0 | -0,02 | 1 |
| SVC-lin | GB | 0,21 | 0,06 | 1 |
| SVC-rbf | GB | 0,21 | 0,08 | 1 |
| BI | PD | SVC-lin | SVC-rbf | 0,02 | -0,02 | 1 |
| SVC-lin | GB | 0,07 | -0,02 | 1 |
| SVC-rbf | GB | 0,05 | 0 | 1 |
| 1 year | SVC-lin | SVC-rbf | 0,18 | 0 | 1 |
| SVC-lin | GB | 0,36 | 0 | 1 |
| SVC-rbf | GB | 0,23 | 0 | 1 |
| MMSE | PD | SVC-lin | SVC-rbf | -0,03 | 0 | 1 |
| SVC-lin | GB | 0,09 | -0,04 | 1 |
| SVC-rbf | GB | 0,12 | -0,04 | 1 |
| TICS-M | 1 year | SVC-lin | SVC-rbf | 0,04 | 0 | 1 |
| SVC-lin | GB | 0,13 | 0,04 | 1 |
| SVC-rbf | GB | 0,1 | 0,04 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0,04 | -0,02 | 1 |
| SVC-lin | GB | 0,12 | -0,06 | 1 |
| SVC-rbf | GB | 0,08 | -0,04 | 1 |
| CES-D | 1 year | SVC-lin | SVC-rbf | -0,07 | 0 | 1 |
| SVC-lin | GB | -0,07 | -0,02 | 1 |
| SVC-rbf | GB | 0 | -0,02 | 1 |
| 3 years | SVC-lin | SVC-rbf | -0,05 | -0,06 | 1 |
| SVC-lin | GB | -0,05 | -0,1 | 1 |
| SVC-rbf | GB | 0 | -0,04 | 1 |
| Survival | 1 year | SVC-lin | SVC-rbf | 0,04 | -0,02 | 1 |
| SVC-lin | GB | -0,09 | -0,04 | 1 |
| SVC-rbf | GB | -0,13 | -0,02 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0,13 | 0 | 1 |
| SVC-lin | GB | -0,02 | -0,02 | 1 |
| SVC-rbf | GB | -0,18 | -0,02 | 1 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; IDI, Integrated discrimination improvement; LR, Likelihood Ratio

Table S9. Comparison of all models using the clinical input subdomain with Integrated Discrimination Improvement (IDI) and Likelihood Ratio (LR) with p-values.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Outcome** | **Time point** | **Model 1** | **Model 2** | **IDI** | **LR** | **P-value** |
| mRS | PD | SVC-lin | SVC-rbf | -0,02 | -0,02 | 1 |
| SVC-lin | GB | 0,14 | 0,08 | 1 |
| SVC-rbf | GB | 0,16 | 0,1 | 1 |
| 1 year | SVC-lin | SVC-rbf | 0,03 | 0 | 1 |
| SVC-lin | GB | 0,24 | 0,18 | 1 |
| SVC-rbf | GB | 0,21 | 0,18 | 1 |
| BI | PD | SVC-lin | SVC-rbf | 0,06 | -0,04 | 1 |
| SVC-lin | GB | 0,08 | 0,22 | 1 |
| SVC-rbf | GB | 0,02 | 0,26 | 1 |
| 1 year | SVC-lin | SVC-rbf | 0,08 | -0,02 | 1 |
| SVC-lin | GB | 0,17 | 0,16 | 1 |
| SVC-rbf | GB | 0,1 | 0,18 | 1 |
| MMSE | PD | SVC-lin | SVC-rbf | -0,06 | -0,04 | 1 |
| SVC-lin | GB | 0,17 | 0,36 | 1 |
| SVC-rbf | GB | 0,21 | 0,4 | 1 |
| TICS-M | 1 year | SVC-lin | SVC-rbf | 0,06 | 0 | 1 |
| SVC-lin | GB | 0 | 0,04 | 1 |
| SVC-rbf | GB | -0,06 | 0,04 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0,05 | -0,04 | 1 |
| SVC-lin | GB | 0,44 | 0,34 | 1 |
| SVC-rbf | GB | 0,42 | 0,38 | 1 |
| CES-D | 1 year | SVC-lin | SVC-rbf | -0,02 | -0,04 | 1 |
| SVC-lin | GB | 0,12 | 0,1 | 1 |
| SVC-rbf | GB | 0,15 | 0,14 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0 | -0,16 | 1 |
| SVC-lin | GB | -0,08 | 0 | 1 |
| SVC-rbf | GB | -0,08 | 0,16 | 1 |
| Survival | 1 year | SVC-lin | SVC-rbf | 0 | -0,04 | 1 |
| SVC-lin | GB | 0,28 | 0,38 | 1 |
| SVC-rbf | GB | 0,28 | 0,42 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0,11 | -0,06 | 1 |
| SVC-lin | GB | 0 | -0,06 | 1 |
| SVC-rbf | GB | -0,12 | 0 | 1 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; IDI, Integrated discrimination improvement; LR, Likelihood Ratio

Table S10. Comparison of all models using the serological input subdomain with Integrated Discrimination Improvement (IDI) and Likelihood Ratio (LR) with p-values.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Outcome** | **Time point** | **Model 1** | **Model 2** | **IDI** | **LR** | **P-value** |
| mRS | PD | SVC-lin | SVC-rbf | -0,05 | -0,1 | 1 |
| SVC-lin | GB | -0,22 | -0,16 | 1 |
| SVC-rbf | GB | -0,16 | -0,06 | 1 |
| 1 year | SVC-lin | SVC-rbf | 0,06 | -0,04 | 1 |
| SVC-lin | GB | -0,1 | -0,2 | 1 |
| SVC-rbf | GB | -0,16 | -0,16 | 1 |
| BI | PD | SVC-lin | SVC-rbf | 0,03 | -0,06 | 1 |
| SVC-lin | GB | -0,03 | -0,14 | 1 |
| SVC-rbf | GB | -0,05 | -0,08 | 1 |
| 1 year | SVC-lin | SVC-rbf | 0,08 | 0,02 | 1 |
| SVC-lin | GB | 0,38 | -0,14 | 1 |
| SVC-rbf | GB | 0,33 | -0,16 | 1 |
| MMSE | PD | SVC-lin | SVC-rbf | 0,06 | -0,02 | 1 |
| SVC-lin | GB | 0,18 | -0,2 | 1 |
| SVC-rbf | GB | 0,13 | -0,18 | 1 |
| TICS-M | 1 year | SVC-lin | SVC-rbf | 0,06 | -0,08 | 1 |
| SVC-lin | GB | 0,11 | -0,12 | 1 |
| SVC-rbf | GB | 0,06 | -0,04 | 1 |
| 3 years | SVC-lin | SVC-rbf | -0,11 | -0,4 | 1 |
| SVC-lin | GB | 0,09 | -0,5 | 1 |
| SVC-rbf | GB | 0,19 | -0,1 | 1 |
| CES-D | 1 year | SVC-lin | SVC-rbf | 0,02 | -0,06 | 1 |
| SVC-lin | GB | -0,05 | -0,1 | 1 |
| SVC-rbf | GB | -0,08 | -0,04 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0 | -0,16 | 1 |
| SVC-lin | GB | 0,04 | -0,16 | 1 |
| SVC-rbf | GB | 0,04 | 0 | 1 |
| Survival | 1 year | SVC-lin | SVC-rbf | -0,04 | -0,1 | 1 |
| SVC-lin | GB | -0,32 | -0,26 | 1 |
| SVC-rbf | GB | -0,27 | -0,16 | 1 |
| 3 years | SVC-lin | SVC-rbf | -0,03 | -0,02 | 1 |
| SVC-lin | GB | -0,03 | -0,04 | 1 |
| SVC-rbf | GB | 0 | -0,02 | 1 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; IDI, Integrated discrimination improvement; LR, Likelihood Ratio

Table S11. Comparison of all models using the MRI input subdomain with Integrated Discrimination Improvement (IDI) and Likelihood Ratio (LR) with p-values.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Outcome** | **Time point** | **Model 1** | **Model 2** | **IDI** | **LR** | **P-value** |
| mRS | PD | SVC-lin | SVC-rbf | 0,05 | 0 | 1 |
| SVC-lin | GB | 0,09 | 0,08 | 1 |
| SVC-rbf | GB | 0,05 | 0,08 | 1 |
| 1 year | SVC-lin | SVC-rbf | 0,06 | -0,12 | 1 |
| SVC-lin | GB | -0,02 | 0,14 | 1 |
| SVC-rbf | GB | -0,09 | 0,26 | 1 |
| BI | PD | SVC-lin | SVC-rbf | -0,1 | -0,1 | 1 |
| SVC-lin | GB | -0,02 | 0,3 | 1 |
| SVC-rbf | GB | 0,07 | 0,4 | 1 |
| 1 year | SVC-lin | SVC-rbf | 0 | -0,08 | 1 |
| SVC-lin | GB | -0,16 | 0,3 | 1 |
| SVC-rbf | GB | -0,16 | 0,38 | 1 |
| MMSE | PD | SVC-lin | SVC-rbf | 0 | -0,08 | 1 |
| SVC-lin | GB | 0,16 | 0,32 | 1 |
| SVC-rbf | GB | 0,16 | 0,4 | 1 |
| TICS-M | 1 year | SVC-lin | SVC-rbf | 0 | -0,1 | 1 |
| SVC-lin | GB | 0 | 0,02 | 1 |
| SVC-rbf | GB | 0 | 0,12 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0,1 | -0,14 | 1 |
| SVC-lin | GB | -0,26 | 0,1 | 1 |
| SVC-rbf | GB | -0,4 | 0,24 | 1 |
| CES-D | 1 year | SVC-lin | SVC-rbf | 0 | -0,16 | 1 |
| SVC-lin | GB | -0,07 | 0,02 | 1 |
| SVC-rbf | GB | -0,07 | 0,18 | 1 |
| 3 years | SVC-lin | SVC-rbf | -0,02 | -0,14 | 1 |
| SVC-lin | GB | 0,04 | 0,1 | 1 |
| SVC-rbf | GB | 0,06 | 0,24 | 1 |
| Survival | 1 year | SVC-lin | SVC-rbf | 0,23 | -0,08 | 1 |
| SVC-lin | GB | 0,17 | 0,34 | 1 |
| SVC-rbf | GB | -0,08 | 0,42 | 1 |
| 3 years | SVC-lin | SVC-rbf | 0,06 | -0,06 | 1 |
| SVC-lin | GB | 0 | -0,04 | 1 |
| SVC-rbf | GB | -0,06 | 0,02 | 1 |

Abbreviations: mRS, Modified Rankin Scale; BI, Barthel Index; MMSE, Mini-Mental State Examination; TICS-M, Modified Telephone Interview for Cognitive Status; CES-D, Epidemiologic Studies Depression Scale; SVM-lin, Support Vector Machine with linear kernel; SVM-rbf, Support Vector Machine with radial basis function kernel; GB, Gradient Boosting Classifier; PD, Patient discharge; IDI, Integrated discrimination improvement; LR, Likelihood Ratio