**Additional material**

**Mortality Prediction in Patients with** **Hyperglycaemic Crisis Using Explainable Machine Learning: A Prospective, Multicentre Study Based on Tertiary Hospitals**

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**Table S1: The hyperparameter optimization range and results of LR.**

|  |  |  |
| --- | --- | --- |
| Hyper-parameter | Tuning range | Tuning result |
| *c* | (0.001, 1000) | 55.96 |
| penalty | / | *l*2 |
| solver | / | liblinear |

LR, logical regression.

**Table S2:** **The hyperparameter optimization range and results of SVM.**

|  |  |  |
| --- | --- | --- |
| Hyper-parameter | Tuning range | Tuning result |
| *c* | (0.001, 1000) | 0.12 |
| gamma | (0.001, 0.1) | 0.03 |
| kernel | / | RBF |

SVM, support vector machine.

**Table S3: The hyperparameter optimization range and results of RF**

|  |  |  |
| --- | --- | --- |
| Hyper-parameter | Tuning range | Tuning result |
| n\_estimators | (50, 500) | 106 |
| max\_depth | (1, 10) | 7 |
| max\_features | (5, 15) | 6 |
| min\_samples\_split | (2, 10) | 8 |
| min\_samples\_leaf | (1, 5) | 3 |

RF, random forest.

**Table S4:** **The hyperparameter optimization range and results of LightGBM.**

|  |  |  |
| --- | --- | --- |
| Hyper-parameter | Tuning range | Tuning result |
| learning\_rate | (0.001, 1) | 0.09 |
| n\_estimators | (50, 500) | 461 |
| subsample | (0.8, 1,0) | 0.79 |
| colsample\_bytree | (0.8, 1,0) | 0.65 |
| reg\_alpha | (0.01, 100) | 7.63 |
| reg\_lamba | (0.01, 100) | 1.12 |
| max\_depth | (1, 10) | 5 |
| num\_leaves | (5, 15) | 16 |
| min\_child\_samples | (5, 30) | 4 |

LightGBM, light gradient boosting machine.



**Figure S1: Schematic diagram of DNN network structure**

**Table S5: The hyperparameter of the network structure of DNN.**

|  |  |
| --- | --- |
| Parameter | Value |
| Categorical/Dropout1 | 12 |
| Continuous/ Batch Normalization1 | 29 |
| Linear1/Dropout2/ Batch Normalization2 | 200 |
| Linear2/Dropout3/ Batch Normalization3 | 50 |
| Linear3 | 2 |
| Dropout1/ Dropout2/ Dropout3 | 0.5 |
| Activation function type | Relu |

DNN, deep neural network algorithm.

**Table S6:** **The hyperparameter optimization range and results of DNN.**

|  |  |  |
| --- | --- | --- |
| Hyper-parameter | Tuning range | Tuning result |
| learning\_rate | (0.001, 0.1) | 0.08 |
| momentum | (0.8, 1) | 0.92 |
| optimzier | / | SGD |

DNN, deep neural network algorithm.