***Epidemiology and Infection***

**Prediction of Shigellosis outcomes in Israel using machine learning classifiers**

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**Supplementary Material**

**Supp. Figure 1 – Shigellosis morbidity rate (per 100,000) in Israel by sex – 2002-2015**

**Supp. Figure 2 – Hospitalization incidence by month (2002-2015)**

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**Supplementary text 1**

Neural networks parameters

**Shigellosis type**

The neural network’s type is "Pattern Recognition Neural Network". There are two layers. The hidden layer consists of 16 neurons.

The training function we used (trainscg) is Scaled conjugate gradient backpropagation and the loss function (performance function) is cross-entropy. The adaptation function we used (adaptwb) adapts the network with weight and bias learning rules.

**Hospitalization**

The neural network’s type is "Pattern Recognition Neural Network". There are two layers. The hidden layer consists of 19 neurons.

The training function we used (trainscg) is Scaled conjugate gradient backpropagation and the loss function (performance function) is cross-entropy. The adaptation function we used (adaptwb) adapts the network with weight and bias learning rules.

**Supplementary text 2 – Classification model for *Shigella* species – confusion matrices**

Confusion matrix for the LR model

|  |  |  |
| --- | --- | --- |
| Predicted  speciesActual species | *S. sonnei* | *S. flexneri* |
| *S. sonnei* | 11,358 | 252 |
| *S. flexneri* | 684 | 391 |

Average confusion matrix for the NN model

Due to the stochastic nature of the model, we ran the algorithm 100 times and calculated the average performances. The average results (number of predictions/100 iterations) are as following:

|  |  |  |
| --- | --- | --- |
| Predicted  speciesActual species | *S. sonnei* | *S. flexneri* |
| *S. sonnei* | 5,655 | 326 |
| *S. flexneri* | 133 | 228 |

Confusion matrix for the SVM Gaussian model

|  |  |  |
| --- | --- | --- |
| Predicted  speciesActual species | *S. sonnei* | *S. flexneri* |
| *S. sonnei* | 11,458 | 152 |
| *S. flexneri* | 784 | 291 |