

Ventilation Prediction for ICU Patients with LSTM-based Deep Relative Risk Model

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Abstract: After admitted by the intensive care unit (ICU), a patient may experience mechanical ventilation (MV) if he/she suffers from acute respiratory failure. Vital signs and lab tests associated with the patient are typically recorded in a series over time.

We propose an LSTM-based deep relative risk model to quantify patients' time to occurrence of MV. The internal time-varying covariates motivate us to learn the ratio function via an LSTM net. The number of LSTM cells equals to the width of the sampling window; that is, the i -th cell of the LSTM net takes the patient's covariates of the time interval i as an input. A subsequent linear layer is used to summarize the hidden layers as the final partial likelihood contribution of each individual. Such an architecture solves the survival analysis problem with internal time-dependent covariates in a nonparametric way. Our experiments based on the MIMIC-III database demonstrate it is a very promising approach to predicting the occurrence of MV.