Deep Sequence Modelling Algorithms on Type 1 Diabetes Management Data

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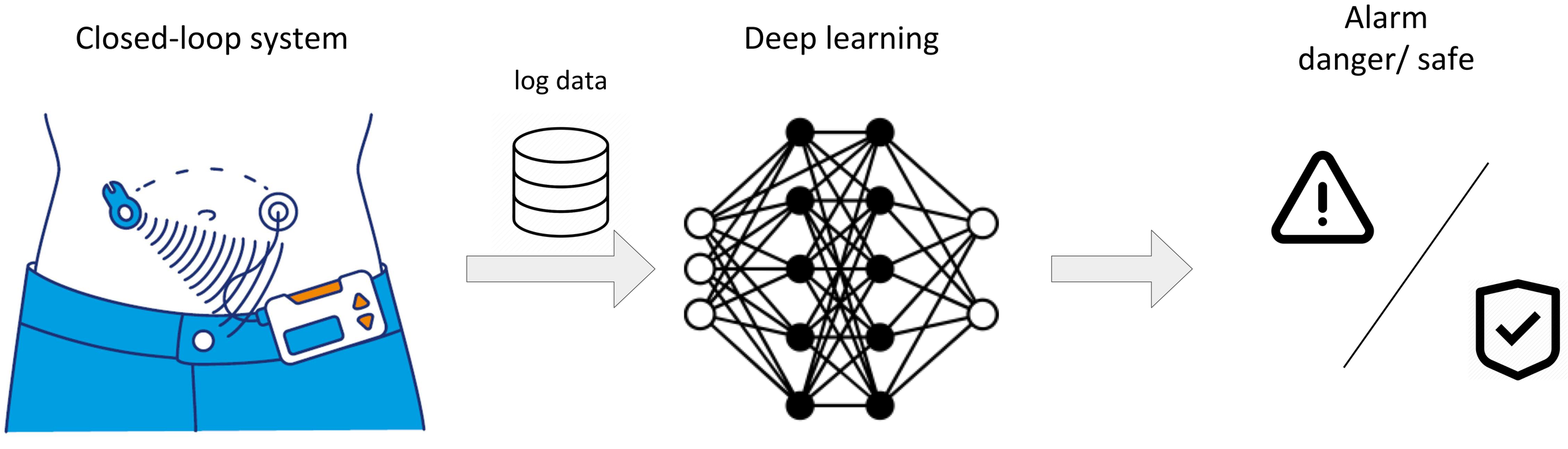
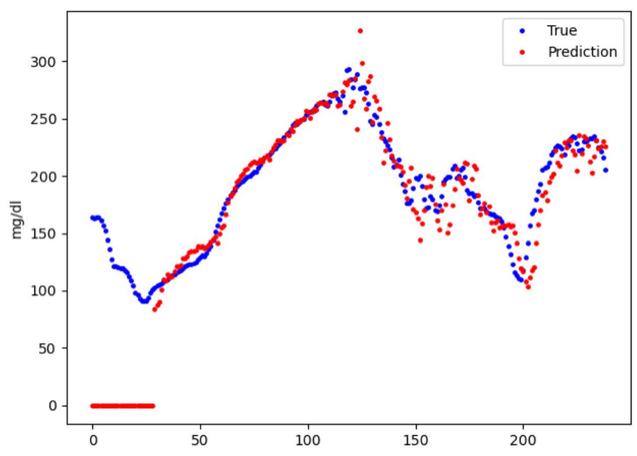
With the aim being to bring the latest development of deep learning to the applications of type 1 diabetes management, this study investigates personalised short-term glucose prediction, which is to be used as the alarming module in artificial pancreas. On the basis of existing studies on the same problem, the contribution of this study is 1) increased prediction performance by using longer inputs (e.g., past days), and 2) another step towards interpretability by showing which parts in the history contain the most important information for making the prediction.



Problem

Continuous glucose monitoring (CGM) data forecasting.



Input data (OhioT1DM dataset):

- CGM
- Basal / bolus insulin infusion
- Carbohydrate intake
- Heart rate

of the past days.

Output:

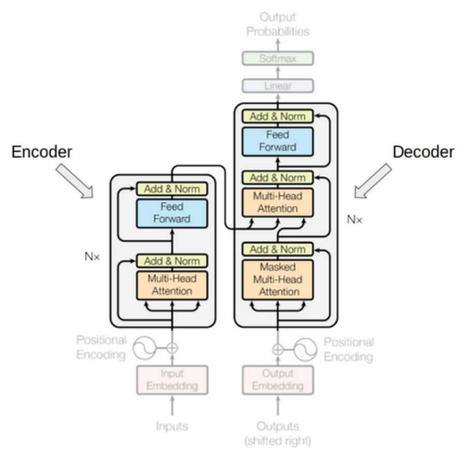
- Short-term CGM prediction (15 min / 30 min / 1h / 2h)
- Importance distribution of input data

Our motivation

Seasonality is important in time-series prediction. For example, the glucose level of the same time in the past days could help on predicting today's glucose.

Our method

Attention-based sequence modelling.



- Enables much longer sequence modelling, providing us the ability to analyse people's glucose data for a couple of days.

Existing methods

Short-term history → short-term prediction.

- Only past hours history is used to predict glucose. This does not capture long-term features of the person.

This study is currently still being experimented.