About Hedia

Hedia ApS, founded in 2015, develops digital solutions that combine clinical knowledge and data driven models to provide daily decision support to people with diabetes. The app-based medical device, Hedia Diabetes Assistant 1.0 (HDA 1.0) is on the market in Denmark and U.K. Today, 20 people are employed at Hedia.

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Type 1 diabetes background

People with type 1 diabetes, an autoimmune disease in the pancreas, are dependent on insulin for controlling their blood glucose. A poorly managed blood glucose level increases the risk of long-term diabetes-related complications that affect life expectancy and quality of life for the individual with diabetes.

Achieving and maintaining a well-controlled blood glucose level will minimize the risk of short- and long-term complications, but managing diabetes is hard, and daily insulin dosing needs to be adjusted according to food intake (carbohydrates), physical activity, stress levels, etc.

The key to good diabetes management is to keep the blood glucose from getting too high or low, and this means knowing how the blood glucose levels are going to behave. Tools that offer insights on this will allow a person with type 1 diabetes to act proactively to changes in blood glucose.

Project 1: Blood Glucose Forecasting based on CGM data

For people with Type 1 diabetes, the art of forecasting one's blood glucose level (BGL) is highly valued. Being able to do this properly, can help them avoid hypoglycemia (very low blood glucose with potential lethal outcome). In this project, we encourage you to develop a deep learning based model that learns to forecast the BGL 30 (or 60) minutes.

The forecast should be based on Continuous Glucose Measurement (CGM) data. That is, BGL measurements collected at a high frequency. In this case, we consider a frequency of 5 minutes. The goal is to predict the BGL based on the latest *N* measurements of BGL, carbohydrate intake and .

We provide you with various datasets containing CGM time series carried out every 5 minutes over a longer period from different persons (simulated as well as real subjects). Along with the CGM time series, the person's carbohydrate intake and injected insulin is registered. Furthermore, we provide to you an end to end framework that preprocesses the data (based on a set of parameters, that you provide), trains the model (that you build and implement) and evaluates the results. Hence, you can focus on the fun part: Developing and implementing a model structure, tune the model hyper parameters and explore different training techniques.

Though an RNN might seem like a tempting model type for this data, we request you to avoid this, since training such a network on long time series can be very slow.

Instead, an idea could be to consider a 1D CNN to learn how the value of consecutive measurements impacts the BGL in the future.

Project 2: Recognising food in photos

Eating food is one of the major factors that causes a person's blood glucose level to increase. Good diabetes treatment requires estimating the nutritional content of food at the time of ingestion in order to dose the correct amount of insulin for the food and give it time to work. But accurately estimating the nutritional content in food is very difficult and has to be repeated for every meal. We want to make carbohydrate counting both easier and more precise for our users by letting our app identify the types and eventually the amounts of food present in a photo.

The goal of this project is to build a system for the food that appears in a photo for conveniently looking it up in Hedia’s food database and retrieve their nutritional contents for our users. We already have a dataset with images of food that are tagged with the food in each image for you to work with.