Introducing a neural network into one of the top-rated mobile apps for women health.

Client: Flo
Industry: Health and Fitness, Mobile
Challenge: Prediction of irregular women cycles
Solution: Neural Network Introduction
Service provided: Data Science & Data Engineering
Technologies: Python

Client

Flo is a smart period tracker that accurately predicts women's menstrual cycles, ovulation and fertile days.

Challenge: improve predictions of irregular cycles for application users

Around 30% of women around the globe face the challenge of irregular periods, but the majority of mobile period trackers cannot make accurate predictions for these women.

When Flo decided to partner with InData Labs to implement the neural network there were more than 450 GB of useful information stored in their database. Every day, women manually log around 1.4 M new data points including cycle history, ovulation and pregnancy tests results, age, height, weight, lifestyle, statistics about sleep, activity, and nutrition. In addition, more data comes from wearable devices such as Fitbit & Apple Watch.

A formula created for an "average woman" cannot compete with neural networks when we deal with the volume, velocity, and variety of data.

Solution: creation and integration of a neural network for better predictions

Neural networks consist of millions of artificial neurons called units, which can be divided into 3 types: input units receive various forms of information from the outside world, output units represent neural network's response to the information it's learned, and hidden units connect input and output layers and form the most sophisticated part of the 'artificial brain'.

Flo's neural network has 442 input units that receive a variety of features engineered using the information women have supplied to the app. The combination of features is unique for every woman and each feature has a different impact on predictions. The hard job of feature prioritization and cycle length prediction is done by the neural network. It continuously learns by comparing its predictions to true results and fine-tunes interconnections between its input and output units over time. The output layer is represented by a single unit that transmits the predicted number of days in the cycle.

"We chose InData Labs for their professional and sophisticated approach, from analyzing the business and technical aspects of our objectives to developing and implementing data strategy."

- Marina Davidova, Managing Partner, OW Health

InData Labs

InData Labs team found the source of new features in the uniqueness of the application users. Women manually log their mood, physical inner activity, symptoms like headache, fatigue or acne, which sometimes form a stable pattern that repeats on certain days of a cycle. These unique repeatable patterns are so individual that no human can create enough rules to capture them all, but they may be so evident and stable for a particular woman that by analyzing them the neural network can make a better prediction. For that reason, the data science team working on the project developed a machine learning algorithm that can capture the unique menstrual cycle patterns for every woman.

Technically, this is realized through a two-step process:

- Unique patterns are recognized by individual-level machine learning models.
- The patterns are transformed into features for the neural network.

Thus, an output from one algorithm becomes an additional feature for the neural network.

The beauty of Flo's neural network is that it knows overall statistics and common rules that work for the 5+ million women using the app, but it still treats every woman as a unique person with her unique body characteristics and lifestyle.

Result: irregular cycle predictions improved by 54.2%

The current version of Flo's neural network can improve irregular cycle predictions by up to 54.2% depending on quality and quantity of data, with prediction error reduced from 5.6 to 2.6 days. Adding new features with time will produce even better results.

Flo Period Tracker - the first period tracking app to publicly announce using artificial intelligence for improving cycle predictions. Flo became the most downloaded app worldwide in its category within months after introducing neural networks to its prediction algorithm.

Interested in learning more?

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