Deep neural network trained to detect early signs of diabetes

February 9 2018, by Nancy Owano

Your watch's heartrate data can alert you to signs of diabetes thanks to a diabetes detection algorithm. A study shows heart rate sensors like the Apple Watch, Android Wear, Garmin, or Fitbits can detect early signs of diabetes.

A study that is the result of a collaboration between the University of California San Francisco and startup called Cardiogram says so. Cardiogram co-founders Johnson Hseih and Brandon Ballinger founded Cardiogram in 2016. Cardiogram is available for both iOS and Android.

Study participants were Apple Watch and Android Wear device owners.

The researchers validated the accuracy of DeepHeart, a deep neural network, in distinguishing between people with and without diabetes. They achieved 85% accuracy on a large data set including 200 million heart rate and step count measurements.

Why this study is important: "This is the first large-scale study that shows a regular heart rate sensor can be used in conjunction with an AI-based algorithm to identify early signs of diabetes," said Paul Lilly in *Hot Hardware*.

How does it work?

Hot Hardware said that the deep neural network, DeepHeart, can distinguish between people with and without diabetes.

The company described DeepHeart as a deep neural network that accurately predicts cardiovascular risk, but requires less labeled data

than conventional deep learning techniques.

What does diabetes have to do with the heart?

Johnson Hseih: "Your heart is connected with your pancreas via the autonomic nervous system. As people develop the early stages of diabetes, their pattern of heart rate variability shifts. In 2015, the Framingham Heart Study showed that high resting heart rate and low heart rate variability predicts who will develop diabetes over a 12-year period."

In turn, an opportunity was recognized by the Cardiogram team. Megan Molteni, *Wired*: "In 2005, heart rate sensors were something only elite athletes and very sick people used. Today, one in five Americans own one. Which is why there's now a deep learning company trying to make something out of the connection between heart rates and diabetes."

Medical measurements via wearables are bringing us steps closer to self-knowledge about what is going on with our health. Could it be though that DeepHeart may at times be picking up a diabetes signal or picking up something else?

A cardiologist quoted in *Wired* spoke about the black box of algorithms and the black box of biology. Molteni said, nonetheless, that the app cannot function as a standalone diagnostic. It is more like some friendly advice.

Engadget's Chris Velazco also placed their work in perspective, though it is easy to assume reasonable people would need no reminders that any wearable health measurement would need to be followed up by a visit to a health practitioner.

"To be clear, though, DeepHeart wasn't designed to diagnose diabetes.

As sophisticated as the algorithm is, the link between the diabetes and its effects on your heart rate is a subtle one, and making crystal clear determinations using consumer-grade heart sensors isn't possible yet. Instead, Ballinger says the goal is to help screen for diabetes in people who otherwise had no idea they were at risk for it."

More information: cardiogr.am/