NEWS IN FOCUS

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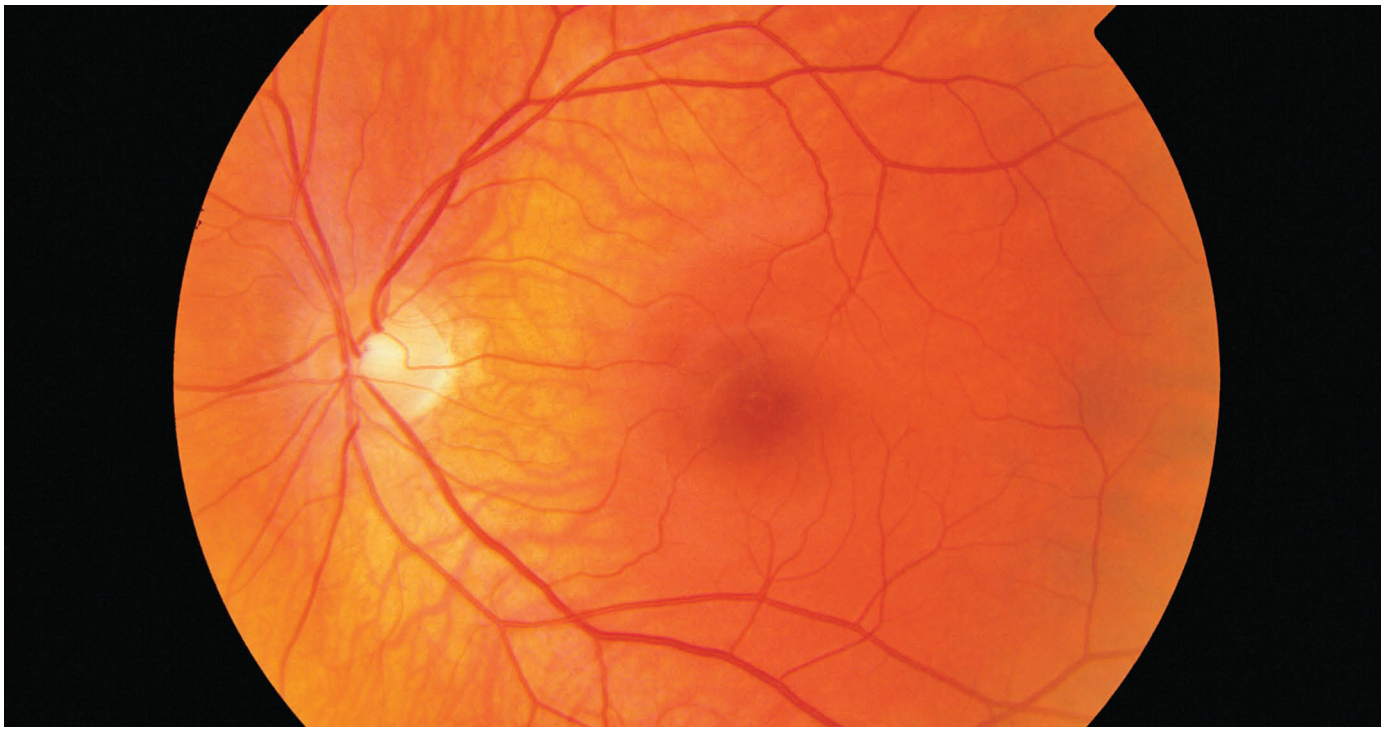

Retinal images could allow computers to predict a person's risk of an imminent heart attack.

BIOLOGY

Deep learning sharpens views of cells and genes

Neural networks are making biological images easier to process.

BY AMY MAXMEN

Eyes are said to be the window to the soul — but researchers at Google see them as indicators of a person's health. The technology giant is using deep learning to predict a person's blood pressure, age and smoking status by analysing a photograph of their retina. Google's computers glean clues from the arrangement of blood vessels — and a preliminary study suggests that the machines can use this information to predict whether someone is at risk of an impending heart attack.

The research relied on a convolutional neural network, a type of deep-learning algorithm that is transforming how biologists analyse images. Scientists are using the approach to find mutations in genomes and predict variations in the layout of single cells. Google's approach, described in a preprint in August (R. Poplin *et al.* Preprint at https://arxiv.org/abs/1708.09843; 2017), is part of a wave of new deep-learning applications that are making image processing easier and more versatile — and could even identify overlooked biological phenomena.

"It was unrealistic to apply machine learning to many areas of biology before," says Philip Nelson, a director of engineering at Google Research in Mountain View, California. "Now you can — but even more exciting, machines can now see things that humans might not have seen before."

Convolutional neural networks allow computers to process an image efficiently and holistically, without splitting it into parts. The approach took off in the tech sector around 2012, enabled by advances in computer power and storage; for example, Facebook uses this type of deep learning to identify faces in photographs. But scientists struggled to apply the networks to biology, in part because of cultural ▶