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Neural Networks on the Job

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Artificial neural networks are computational models, or systems, that are modelled after biological neural networks, like the human brain. They are computer programs that attempt to mimic the way biological brains work and think. What is unique about these systems is that they are able to "learn," and become better at a certain task, by performing that task over and over again, similar to how we learn by reviewing material or practicing a skill.

Developments in artificial intelligence—such as artificial neural networks and other forms of machine learning—are considered to be part of the Fourth Industrial Revolution, a series of technological breakthroughs that are changing the way that we interact with machines, and the way machines interact with us. Other examples of these developments are genome editing, biomechanics, and robotics.

You might have heard of technology like this being used by companies such as Google or Amazon. Indeed, at first glance, this may seem like the kind of technology reserved for huge tech companies. However, there are many researchers looking for ways to apply neural networks across many different fields.

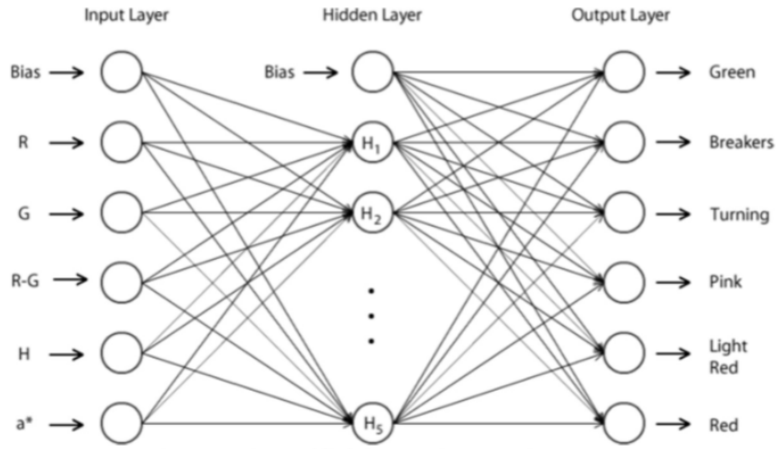
In this case, Harvey Opeña and John Paul Yusiong, researchers from the University of the Philippines Visayas Tacloban, have developed a method of sorting tomatoes by using an artificial neural network. They published their work in the Malaysian Journal of Computer Science.

An important step in storing and distributing tomatoes for sale is sorting them according to their ripeness. How ripe or unripe a tomato is will affect how it needs to be handled, and whether a customer will ultimately buy it, and so this is a crucial step.

In general this is done manually. The most common indicator of a tomato's ripeness is its skin color; so a worker will examine a tomato, compare it to a standard color chart, and use that to determine how ripe or unripe the tomato is. While this is an effective, time-tested method of sorting, it does come with its flaws. For example, it can be more time-consuming than automated alternatives. And while trained sorters are very accurate, human error and fatigue are always factors, as well as individual perception.

So, to have a quicker, automated method, with a high success rate, Opeña and Yusiong developed an image recognition program, powered by an artificial neural network. Their ANN was trained by having it examine images of tomatoes that were already categorized by ripeness. This network was then able to apply this learning to classifying new, uncategorized images of tomatoes.

The researchers employed a method of training their neural network called Artificial Bee Colony training. This method was based on the behavior of honeybees searching for food.



A diagram of the neural networks the researchers constructed for this study

This method was successful, with the neural network achieving a mean accuracy rate of almost 98% when attempting to categorize a random set of images.

These are extremely promising results, and the technology developed by this research can be further refined and adapted, and be used as the basis for creating a more sophisticated machine that can accurately and objectively categorize tomatoes by ripeness.

Work with artificial neural networks like Opeña and Yusiong's could also be indicative of how the developments of the Fourth Industrial Revolution could affect the Philippines. Local research into fields like this has the potential to make automation and machine assistance much more common and accessible. This could greatly benefit agriculture and food production, helping make food cheaper, healthier, or safer. This work also helps pave the way for other local research to apply machine learning to other fields, such as health and medicine.

Luis Wilfrido Atienza graduated from the Ateneo de Manila University, with a BS in Biology, and a minor in poetry. He currently works as a copywriter for a sustainability agency, and spends some of his free time writing about science.