**Deep Science**

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Artificial Intelligence, Machine Learning, Representation Learning, Deep Learning – these are the most buzzing words in the industry right now. So, what are these? It all started with a simple question: "Can machines think?" Inventors have long dreamed of creating machines that can think. This desire of creation dates back to at least the time of ancient Greece.

When programmable computers were ﬁrst discovered, people wondered whether such machines might become intelligent – over a hundred years before one was built. Today, artificial intelligence (AI) is a growing ﬁeld with many practical applications and current research problems. We look to intelligent software for the automation of routine labor, recognizing speech or images, making diagnoses in medicine and supporting fundamental scientiﬁc research.

In the early days of artiﬁcial intelligence, the ﬁeld rapidly undertook and solved problems that are intellectually diﬃcult for human beings but relatively straightforward for computers—problems that can be described by a list of formal, mathematical rules like your general computer programs, but these worked upon repeated data and can be applied to many problems.

The actual challenge in the field of artiﬁcial intelligence proved to be solving the tasks that are easy for people to perform but hard for people to describe formally — problems that we solve intuitively, that feel automated, like recognizing spoken words, predicting stock prices, faces in images, or something predicting most of the things on the planet.

The diﬃculties faced by systems relying on hard-coded knowledge suggest that AI systems need the ability to acquire their own knowledge, by extracting patterns from raw data. This capability is known as machine learning. A simple machine learning algorithm called Naive Bayes can separate legitimate e-mail from spam e-mail.

The introduction of machine learning allowed computers to tackle problems involving knowledge of the real world and make decisions that appear subjective. For example, when the regression problem is used to recommend delivery, the Artificial Intelligent (AI) system does not analyze the patient directly. Instead, the doctor tells the system several pieces of related and relevant information, such as the presence or absence of a uterine scar. Each piece of information included in the representation of the patient is known as a feature. The regression (one technique of ML) learns how each of these features of the patient correlates with various outcomes. However, it cannot influence the way that the features are deﬁned in any way. If logistic regression were given an MRI scan of the patient, rather than the doctor’s formalized report, it would not be able to make useful predictions. Individual pixels in an MRI scan have negligible correlation with any complications that might occur during delivery.