# AI and machine learning for financial institutions:
# Breaking down the terminology

AI, machine learning, deep learning — while related, are different concepts. As financial institutions begin to dive deeper into the world of advanced analytics and the technology around it, it's important to know the terms and their business benefits.

## Artificial intelligence

A machine's ability to perform cognitive functions we associate with humans — e.g., interacting with an environment, perceiving, learning and solving problems. This includes machine learning, robotics (e.g., robotic process automation and self-driving cars) and natural language processing (e.g., chatbots).

In financial services, artificial intelligence can be used to optimize credit decisions, reduce fraud and create better customer experiences.

## Machine learning

A broad term that covers the analytical techniques used to extract meaning from data to create a predictive model and the manner in which the model is trained. Machine learning algorithms can process data inputs to detect patterns and learn how to make the best predictions and recommendations based on this information.

In financial services, machine learning can be used to uncover patterns and interactions in data for better modeling, credit decisions and fraud prevention.

## Deep learning

A category of machine learning that involves complex architectures based on layers composed of units called neurons, each performing simple calculations. These layers are called neural networks.

In financial services, deep learning models have proved to be much more efficient and accurate at facial and voice recognition, which can authenticate customers and provide better customer experiences.

## Supervised learning

A subset of machine learning where the training data are labeled with the actual outcomes so that the algorithm can detect the relationship of the inputs to those outcomes.

In financial services, supervised learning algorithms have a variety of uses, from predicting likelihood of loan repayment to detecting customer churn.

## Semi-supervised learning

Combines the best of both worlds with supervised and unsupervised machine learning methods and requires a mix of labeled and unlabeled data.

In financial services, semi-supervised learning creates models when only some of the data are labeled. This is often the case when spotting unusual or criminal activity, such as fraud.

## Unsupervised learning

Does not require labeled output variable in the training data set.

In financial services, unsupervised learning models can be used to better segment or group customers by common characteristics — e.g., annual income or card loyalty program, or to detect unusual behavior.

## Reinforcement learning

Allows the machine learning algorithm to create decisions and learns through trial and error.

In financial services, some high-frequency trading algorithms are based on reinforcement learning.
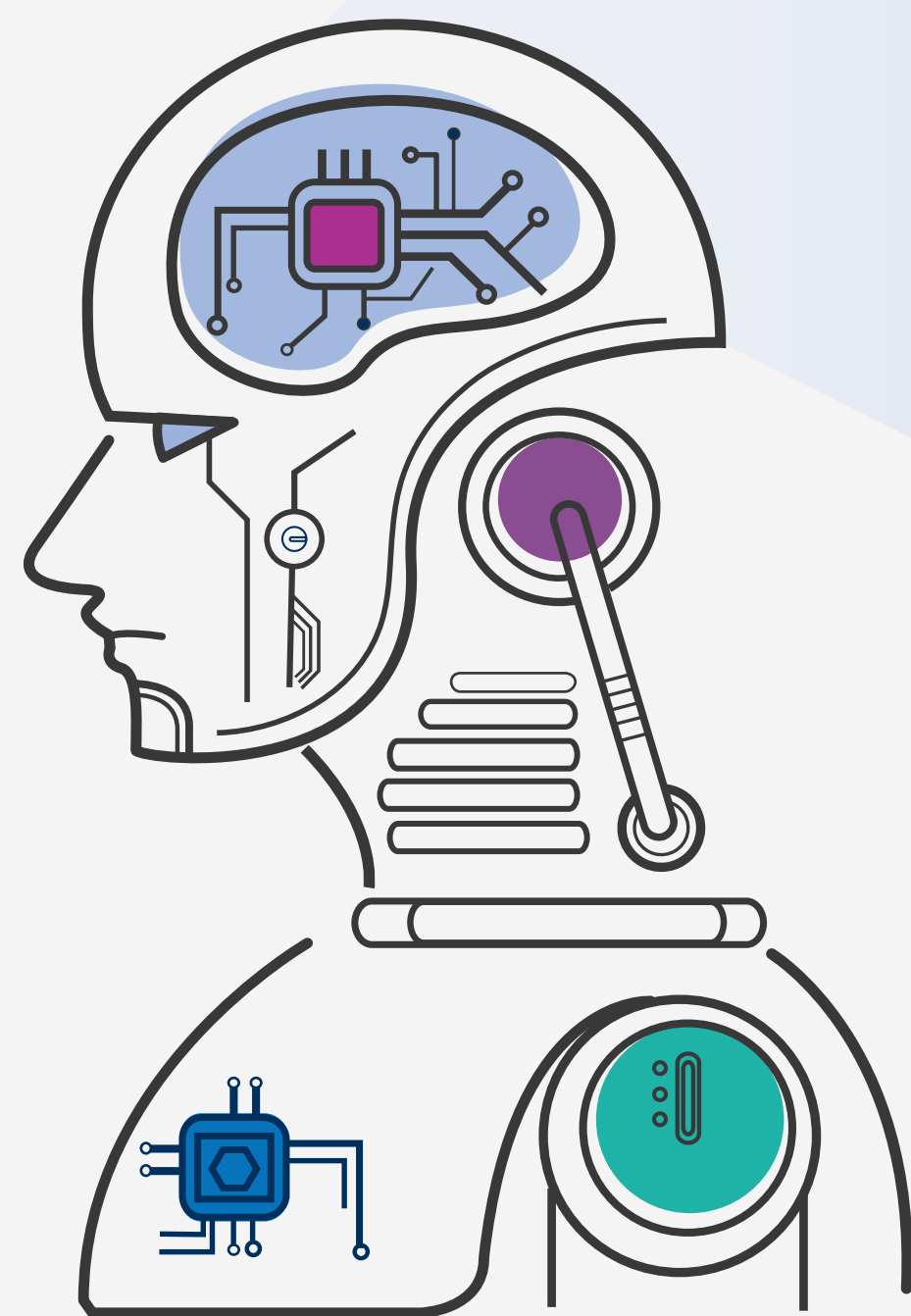
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