

# Chapter 1

## Applying Artificial Intelligence to Financial Investing

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### ABSTRACT

*Artificial intelligence techniques have long been applied to financial investing scenarios to determine market inefficiencies, criteria for credit scoring, and bankruptcy prediction, to name a few. While there are many subfields to artificial intelligence, this work seeks to identify the most commonly applied AI techniques to financial investing as appears in academic literature. AI techniques, such as knowledge-based, machine learning, and natural language processing, are integrated into systems that simultaneously address data identification, asset valuation, and risk management. Future trends will continue to integrate hybrid artificial intelligence techniques into financial investing, portfolio optimization, and risk management. The remainder of this chapter summarizes key contributions of applying AI to financial investing as appears in the academic literature.*

### INTRODUCTION

Artificial intelligence (AI) techniques have long been applied to financial investing scenarios to determine market inefficiencies, criteria for credit scoring, and bankruptcy prediction, to name a few. While there are many subfields to artificial intelligence this work seeks to identify the most commonly applied AI techniques to financial investing as appears in academic literature. Techniques identified in this work include fuzzy systems, swarm intelligence, case-based reasoning, hybrid systems, genetic algorithms, neural networks, and machine learning. AI techniques, such as knowledge-based, machine learning, and natural language processing, are integrated into systems that simultaneously address data identification, asset valuation, and risk management. Frequently, machine learning is applied to technical financial indicators in order to make predictions about the direction of stock prices. Financial investing requires data identification, asset valuation, and risk management. One such example of applying AI techniques

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to financial investing is the application of knowledge-based techniques for credit risk assessment and machine learning techniques for stock valuation. Future trends will continue to integrate hybrid artificial intelligence techniques into financial investing, portfolio optimization, and risk management. The remainder of this article summarizes key contributions of applying AI to financial investing as appears in the academic literature.

## **BACKGROUND**

### **What Is Artificial Intelligence?**

In the early days of computing, a typical task for a computer program was a numerical computation, such as computing the trajectory of a bullet. In modern days, a typical task for a computer program may involve supporting many people in important decisions backed by a massive database across a global network. As the tasks that computers typically perform have become more complex and more closely intertwined with the daily decisions of people, the behavior of the computer programs increasingly assumes characteristics that people associate with intelligence. When exactly a program earns the label of ‘artificial intelligence’ is unclear. The classic test for whether a program is intelligent is that a person would not be able to distinguish a response from an intelligent program from the response of a person. This famous Turing Test is dependent on factors not easily standardized, such as what person is making the assessment under what conditions.

A range of computer programming techniques that are currently, popularly considered artificial intelligence techniques includes (Rada, 2008):

- Knowledge-based techniques, such as in expert systems.
- Machine learning techniques, such as genetic algorithms and neural networks.
- Sensory or motor techniques, such as natural language processing and image processing.

These methods may apply to investing. For instance, expert systems have been used to predict whether a company will go bankrupt. Neural networks have been used to generate buy and sell decisions on stock exchange indices. Natural language processing programs have been used to analyze corporate news releases and to suggest a buy or sell signal for the corporate stock.

While artificial intelligence (AI) could apply to many areas of investing, much of what happens in computer-supported investing comes from non-AI areas. For instance, computational techniques not considered primarily AI techniques include numerical analyses, operations research, and probabilistic analyses. These non-AI techniques are routinely used in investing.

### **Investing and Data**

The process of investing has 3-stages of:

1. Data Identification,
2. Asset Valuation, and
3. Risk Management.

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