Chapter 7
Role of Artificial Intelligence in Detecting Herding

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ABSTRACT

This research investigates the role of Artificial Intelligence (AI) in detecting herding behavior in financial markets. Herding, a phenomenon where investors follow the majority, can lead to market inefficiencies and increased volatility. By leveraging AI techniques, including machine learning and deep learning, this study aims to improve the detection and understanding of herding patterns. The research explores how AI models can analyze large datasets, recognize non-linear relationships, and identify subtle patterns indicative of herding. It gives the picture of Factors Affecting Herd-Behavior, Impact of Herd-Behavior, Sources for data analysis for detecting Herding with AI, Navigating Herding with AI, Challenges and threats in Detecting Herding with AI. The findings suggest that AI provides more accurate and timely detection of herding behavior compared to traditional methods, offering significant implications for market stability and investor strategies.

1. INTRODUCTION

Artificial Intelligence (AI) has rapidly transformed various industries by enhancing efficiency, enabling automation, and providing advanced analytics capabilities. Among its numerous applications, AI's role in the financial sector has been particularly revolutionary. One of the critical phenomena in financial markets that AI

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is increasingly being employed to detect and analyze is herding behavior. Herding occurs when investors follow the majority in their trading decisions, leading to significant impacts on asset prices and market stability. Understanding and detecting herding behavior is crucial for market participants, regulators, and policymakers to mitigate systemic risks and enhance market efficiency.

Artificial Intelligence (AI) refers to the simulation of human intelligence processes by machines, particularly computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using the rules to reach approximate or definite conclusions), and self-correction. AI has various applications, including natural language processing (NLP), speech recognition, machine vision, and expert systems.

AI technologies are categorized into two types: narrow AI, designed to perform a narrow task (e.g., facial recognition or internet searches), and general AI, which can perform any intellectual task that a human can do. Advances in machine learning, a subset of AI that involves the use of algorithms to parse data, learn from it, and make informed decisions, have significantly propelled AI development. The integration of AI in various sectors has revolutionized industries by enhancing efficiency, accuracy, and decision-making capabilities.

The concept of herding in financial markets is rooted in the behavioral finance theory, which suggests that investors are not always rational and are often influenced by psychological factors and social dynamics. herding behavior, in which investors imitate the actions of the majority, making decisions based on the behavior of others rather than their independent analysis. Herding can lead to asset bubbles, increased volatility, and even financial crises, as seen in historical events such as the dot-com bubble and the 2008 financial crisis. Traditional methods of detecting herding have relied on statistical and econometric models that analyze trading volumes, price movements, and correlation structures. However, these methods often fall short in capturing the complex and dynamic nature of herding behavior, especially in real-time.

AI offers a promising alternative due to its ability to process vast amounts of data, recognize patterns, and adapt to changing market conditions. Machine learning algorithms, a subset of AI, can be trained to identify subtle and complex patterns indicative of herding behavior that might be missed by traditional methods. These algorithms can analyze diverse data sources, including market data, news articles, social media feeds, and even sentiment analysis, to provide a comprehensive view of market dynamics. By leveraging AI, financial institutions can enhance their ability to predict and respond to herding behavior, thereby improving their risk management strategies and decision-making processes.

The application of AI in detecting herding behavior encompasses several techniques and approaches. Supervised learning methods, such as decision trees, support vector machines, and neural networks, can be employed to classify and predict herding