
Comparative Analysis of Traditional AI Models and New Generation Advanced AI Models in Modern Applications and Tools Development

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Abstract

This paper presents a comprehensive analysis of the usage of traditional AI models and new generation advanced AI models in modern applications and tools development. The study explores the advantages and disadvantages of each model and provides insights into selecting the most suitable model based on specific application requirements. Furthermore, the paper investigates the feasibility and implications of using both traditional and advanced AI models simultaneously.

Keywords: Artificial Intelligence, Traditional AI Models, New Generation

INTRODUCTION

Why use AI models in development?

At now is era of innovation where every field and technology get evolve. Many fields reach at their max potential of evolution and innovation when it's time to being a upgrade with innovation of intelligence. And this is a part where different technology came in game of innovation is the artificial intelligence (AI). Artificial intelligence (AI) models are being used more and more to enhance human talents, automate tedious jobs, and extract insights from massive volumes of data. Through leveraging the capabilities of neural networks, machine learning algorithms, and natural language processing methods, programmers may design intelligent systems that are capable of continuous learning, adaptation, and evolution. With

integration of AI models, there are unmatched prospects to improve scalability, accuracy, and efficiency across a variety of industries, such as robotics, e-commerce, healthcare, and finance. AI-powered tech made change how we interact with technology in our daily life with active recommendations, predictive analytics, and personalised experiences.

TRADITIONAL AI MODELS

Overview of traditional AI models

Traditional AI models, which include rule-based systems, expert systems, and early machine learning algorithms, serve as the base of artificial intelligence research and development. Rule-based systems use logical thinking and a predefined set of rules to solve issues and make decisions.

Expert systems are copy of the problem-solving abilities of human specialists in specialised fields by utilising historical data and domain-specific knowledge. Statistical methods are used by early machine learning algorithms, like decision trees and linear regression, to identify trends in data and forecast future events. Although the foundation for AI applications has been established by these traditional AI models, they are frequently distinguished by their inflexible architecture, restricted flexibility, and reliance on manually created features.

NEW GENERATION ADVANCED AI MODELS

Introduction to new generation advanced AI models like LLM

Advanced AI models, which use deep learning, reinforcement learning, and generative modelling made change in artificial intelligence (AI) research, which is reflected in the birth of next generation advanced AI models. The Large Language Model (LLM), which is typified by architectures such as GPT (Generative Pre-trained Transformer), is one such innovative model. LLMs are spacial by their exceptional fluency, coherence, and contextual knowledge when processing and producing natural language text. In contrast to traditional AI models, LLMs use vast quantities of unlabeled data along with unsupervised learning strategies to learn and make generalisations across several domains.LLMs are highly effective at tasks like sentiment analysis, text summarization, question answering, and language translation because they make use of transformer structures and self-attention processes. LLMs can be used for certain downstream tasks, allowing minimal data and computing resources to be used for transfer learning and domain adaptation.

COMPARISON OF ADVANTAGES AND DISADVANTAGES WITH REAL-LIFE APPLICATIONS

a) Advantages of traditional AI models in real-life applications

- **Experience:** They have been extensively used and studied in various domains.
- **Specialization:** They often provide the best results in specific work fields due to their compatible design.
- **Familiarity:** Developers are used to working with these models, leading to easier implementation in certain contexts.

b) Advantages of new generation advanced AI models in real-life applications

- **Efficiency:** They require minimal time for fine-tuning and are relatively easier to train for specific outcomes.
- **Flexibility:** Capable of operating across different domains, they offer versatility in addressing a wide range of problems.
- **Integration:** They excel in handling combinations of problems from various fields within a single user iteration, increase overall efficiency and adaptability.

c) Disadvantages of traditional AI models in real-life applications

- **Time-consuming training:** Their training process is often lengthy and resource-intensive, delaying development timelines.
- **Complexity:** Developing and maintaining traditional models can be challenging, requiring significant expertise and effort.
- **Limited accuracy:** Due to their specialized nature, traditional models may struggle to achieve high accuracy in broader contexts or novel tasks.

d) Disadvantages of new generation advanced AI models in real-life applications

- **Overfitting:** Fine-tuning these models for specific outcomes may lead to overfitting if not carefully managed.
- **Interpretability:** complexity of advanced models can make it difficult to understand their decision-making processes.
- **Resource requirements:** Despite their efficiency, advanced models may still demand significant computational resources for training and deployment.

CHOOSING THE RIGHT MODEL

Factors to consider when selecting an AI model

- **Specificity of the task:** Determine whether the main task is specific and revolves around a single object model or if it requires handling diverse data and scenarios.
- **Efficiency:** Evaluate the efficiency of the model in terms of computational resources, training time, and inference speed.
- **Cost-effectiveness:** Consider the overall cost associated with training, deployment, and maintenance of the model, balancing it with the desired performance.
- **Use case specificity:** Assess whether the use case is specific and well-defined or if it involves handling a wide range of scenarios and data inputs.

Which model to use and why?

Based on the factors mentioned above, the decision to use a traditional AI model or a new generation advanced AI model depends on the specific requirements and characteristics of the project:

- **Traditional AI models:** Ideal for tasks that are well-defined, specific, and revolve around a single object model. They may offer cost-effective solutions and efficient outputs in scenarios where the use case is narrow and focused.
- **New generation advanced AI models:** Suitable for applications that require handling diverse data and scenarios, offering flexibility and adaptability. While they may consume higher initial costs and require more computational resources, they can provide more efficient outputs and better performance in complex and dynamic environments.

USING BOTH MODELS SIMULTANEOUSLY

Can both traditional and new generation AI models be used together?

- Yes, there are scenarios where leveraging both traditional and new generation AI models simultaneously can be beneficial, particularly when there is a need to work with various fields and personalized data, such as in home assistance applications.

How and when to use both models?

- To effectively utilize both types of models, developers need to tune and configure them to work together seamlessly. This involves developing personalized data flow designs and models that leverage the strengths of each approach while mitigating their weaknesses.

Additionally, memory allocation for specific areas may be necessary to optimize performance.

Advantages of using both models at the same time

- **Dynamic compatibility:** Integrating both traditional and new generation AI models provides dynamic compatibility, allowing for the generation of training datasets same as to specific user preferences and contexts.
- **Personalized user experience:** By combining the capabilities of both types of models, developers can create personalized user experiences that adapt to individual needs and preferences.
- **Enhanced performance:** Leveraging a combination of traditional and advanced AI models can lead to improved performance in handling complex tasks and diverse datasets.

Disadvantages of using both models at the same time

- **Complexity:** Integrating multiple AI models requires careful coordination and configuration, which can increase the complexity of development and maintenance.
- **Resource requirements:** Simultaneously using traditional and new generation AI models may demand additional computational resources, particularly in terms of memory and processing power.
- **Development overhead:** Developing personalized data flow designs and models for integrating both types of models adds to the development overhead, requiring expertise and effort to implement effectively.

CONCLUSION

The conclusion summarizes the key findings of the paper and offers insights into the future directions of AI model usage in modern applications and tools development. It underscores the importance of leveraging both traditional and advanced AI models judiciously to optimize performance and achieve desired outcomes.

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