Opportunities and Challenges of Large Language Models in Industry Applications

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Abstract
In recent years, large language models(LLMs) have gained gained significant attention not only in academic, but also in industry. With the rising demand of the LLMs and the incredible potential interest of the AI-powered applications, it occurs massive opportunities also challenges. These LLMs, including GPT-4, Gemini, Qwen, and other advanced models, have demonstrated there abilities to automate tasks such as writing, coding, analysis and more. They are also transforming fields like healthcare, education, marketing by enabling prominent personalization and efficiency. However, there still exists several challenges performing as obstacles to the development of LLMs, including data privacy, ethics, cost and more. In this survey, we will explore and discuss about both opportunities and chanllenges of LLMs in industrial applications, providing insights into current research and future directions for addressing these obstacles.

Keywords
Keyword1 — Keyword2 — Keyword3

Contents

Introduction

The field of natural language processing (NLP) has changed a lot with the rise of large language models (LLMs). Coming from years of research in computational linguistics and deep learning, LLMs are based on early work like the use of neural networks for language modeling in the late 1990s and the transformer-based architectures introduced by Vaswani et al. [1]. These steps led to the creation of models like GPT [2], BERT [3], and, more recently, GPT-4, Gemini, and Qwen, which now surpass humans in many language tasks.

In the beginning, LLMs were praised in academic settings for advancing research in linguistics and machine learning. Their uses were mostly experimental, focusing on benchmarks and competitions like GLUE and SuperGLUE. But as models grew larger and AI-powered tools became more common, their use spread beyond academia. Now, industries like healthcare and marketing use LLMs to transform their work. These models help automate tasks like creating content, programming, and making decisions.

After the coming of GPT-3, the whole industry make sense that the era of LLMs are coming. From 2020 to now, industry release their LLMs like mushrooms after rain, few of them make a significant success including Claude, Gemini, Ernie,

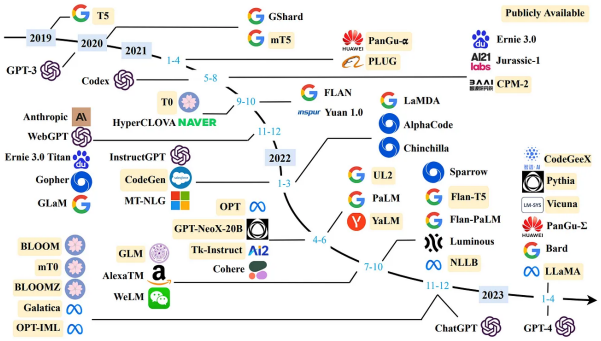

Figure 1. Chronological development of large language models (LLMs) from 2019 to 2023.

LLaMA. While others are still trying their best to make their LLMs outstanding. We can briefly grasp the development context by Figure1

Even with their promise, using LLMs in industries comes with challenges. Problems like data privacy, ethical concerns, and the high cost of running these models often slow their wider use [4]. These issues not only limit their usefulness but also show gaps in research and implementation.

This survey aims to connect advances in research with real-world applications of LLMs. By collecting input from professionals and researchers, the study looks to find ways to use LLMs better in industries while addressing the problems that hold them back. The results aim to add to the discussion about AI's role in society and offer useful ideas for researchers, policymakers, and business leaders.

1. Overview of Core-tech in LLMs

1.1 Machanism

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1.2 Architectures

1.3 Potential Issues

2. Industry Application Scenarios

2.1 Content Creation

2.1.1 Automatical Writing

Case Name

2.1.2 Need-to-be-done

Case Name

2.2 Chatbot

2.2.1 Customer Support

Case Name

2.2.2 Q&A Systems

Case Name

2.3 Healcare

2.3.1 Diagnostic Assistance

Case Name

2.3.2 Medical Record Generation

Case Name

2.3.3 Health Analysis & Advice

Case Name

2.4 Education

2.4.1 Personalized Learning

Case Name

2.4.2 Language Learning

Case Name

2.4.3 Skills Training

Case Name

2.5 Finace & Legal

2.5.1 Sales and Marketing

Case Name

2.5.2 Financial Analysis

Case Name

2.5.3 Risk Assessment

Case Name

2.5.4 Legal Assistance

Case Name

3. Opportunities

4. Challenges

5. Conclusion

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Acknowledgments

So long and thanks for all the fish [5, 6].

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