

The Use of Artificial Intelligence (AI) in Software Engineering

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Abstract

Artificial intelligence (AI) has the potential to revolutionize software engineering by automating many of the tasks that are currently done manually. This paper discusses the use of AI in software engineering, including its applications, benefits, challenges, and future trends.

Keywords: *Artificial intelligence (AI), Software engineering, Automated software testing, Improved software documentation, Detecting and fixing bugs, Generating code, Managing software projects, Productivity, Quality, Costs, Agility, Bias, Explainability, Security*

INTRODUCTION

Software engineering is a discipline that deals with the application of engineering principles to the development of software. It is a complex and challenging field, and there is always room for improvement. Artificial intelligence (AI) has the potential to revolutionize software engineering by automating many of the tasks that are currently done manually.

The increasing complexity of software systems

Software systems are becoming increasingly complex. This is due to a number of factors, including the increasing size and complexity of software applications, the need for software to be more responsive to changing requirements, and the need for software to be more secure. The increasing complexity of software systems makes it more difficult to develop and maintain software manually. This is because it is difficult for humans to keep track of all the different aspects of a complex software system.

AI IN SOFTWARE ENGINEERING

There are many ways that AI can be used in software engineering. Some of the most common applications include:

- **Automating software testing:** AI can be used to automate the process of testing software. This can free up software engineers to focus on more creative and strategic tasks. For example, AI can be used to generate test cases automatically, or to analyze test results to identify potential bugs.
- **Improving software documentation:** AI can be used to generate software documentation automatically. This can help to ensure that documentation is accurate and up-to-date. For example, AI can be used to extract information from code and create documentation, or to generate diagrams and visualizations of software systems.
- **Detecting and fixing bugs:** AI can be used to detect and fix bugs in software. This can help to improve the quality of software and reduce the number of defects. For example, AI can be used to analyze code for potential bugs, or to generate patches to fix bugs.
- **Generating code:** AI can be used to generate code automatically. This can help to speed up the development process and reduce the amount of manual coding required. For example, AI can be used to generate code from natural language descriptions, or to complete code that is partially written.
- **Managing software projects:** AI can be used to manage software projects. This can help to ensure that projects are completed on time and within budget. For example, AI can be used to track the progress of projects, identify potential risks, and allocate resources efficiently.

Table 1: Examples of AI applications in software engineering

Application	Description
Automated software testing	AI can be used to automate the process of testing software. This can free up software engineers to focus on more creative and strategic tasks.
Improved software	AI can be used to generate software documentation automatically. This can help to ensure that documentation is accurate and up-to-

documentation	date.
Detecting and fixing bugs	AI can be used to detect and fix bugs in software. This can help to improve the quality of software and reduce the number of defects.
Generating code	AI can be used to generate code automatically. This can help to speed up the development process and reduce the amount of manual coding required.
Managing software projects	AI can be used to manage software projects. This can help to ensure that projects are completed on time and within budget.

BENEFITS OF AI IN SOFTWARE ENGINEERING

There are many benefits to using AI in software engineering. Some of the most important benefits include:

- **Increased productivity:** AI can automate many of the tasks that are currently done manually, freeing up software engineers to focus on more creative and strategic tasks.
- **Improved quality:** AI can help to detect and fix bugs in software, which can improve the quality of software and reduce the number of defects.
- **Reduced costs:** AI can help to reduce the cost of software development by automating tasks and improving the quality of software.
- **Increased agility:** AI can help software teams to be more agile and responsive to change.
- **Improved decision-making:** AI can help software teams to make better decisions by providing insights into data and trends.

CHALLENGES OF AI IN SOFTWARE ENGINEERING

There are also some challenges to using AI in software engineering. Some of the most important challenges include:

- **Data availability:** AI algorithms require large amounts of data to train. This can be a challenge in some cases, where data is not readily available or is difficult to collect.

- **Bias:** AI algorithms can be biased, which can lead to inaccurate or unfair results. This is a challenge that is being actively addressed by researchers.
- **Explainability:** It can be difficult to explain how AI algorithms make decisions. This can make it difficult to trust and use AI algorithms.
- **Security:** AI algorithms can be vulnerable to security attacks. This is a challenge that is being addressed by researchers and developers.

CONCLUSION

AI has the potential to revolutionize software engineering. However, there are still some challenges that need to be addressed before AI can be widely adopted in the software industry. As these challenges are overcome, AI is likely to play an increasingly important role in software engineering.

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