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USING AI CODE IN C# PROGRAMMING

Nguyen Ha Giang

Ho Chi Minh City University of Economics and Finance

giangnh@uef.edu.vn

Abstract:

Recently, the appearance of ChatGPT, a generating AI application tool, has been widely used and has attracted a lot of attention from the technology world. The application of ChatGPT has spread across different industries because the ability to answer the results is considered useful and the completion level of the results is very high. Based on ChatGPT's answer, users can adjust, add and expand to get the content they want without having to spend a lot of time and effort. Within the framework of the article, we will cover the aspect of leveraging the ChatGPT tool for programmers, software developers, or software engineers. The illustrative examples use C# language and other programming languages, ChatGPT also handles the same results. Making good use of this support tool will help build computer programs faster, saving programmers' effort. Especially for new programmers, you can take advantage of ChatGPT to better support your work.

Keywords*: ChatGPT, computer programming, C# programmer, AI Code.*

1. Introduction

In recent years, the explosion of applications using artificial intelligence platforms has brought about very positive effects. Previously, AI applications focused on specialized and specialized activities, serving groups and organizations, but today, AI has made strong development steps and crept into all human activities, can be likened to an extended arm, an extra brain for a person.

One of the AI applications that is known and widely used by the public in recent times is ChatGPT, an intelligent chatbot that can answer questions in many different fields and the results are evaluated by users. High. ChatGPT can generate content on demand and human descriptions of a certain field.

Within the framework of the article, ChatGPT applications will be presented to support programming work, accompanied by illustrative examples for each application. The selected programming language is C# (ChatGPT can answer all popular programming languages today). In addition, the article also gives some comments on the advantages and limitations of using this tool to support programming.

2. AI, Generative AI, ChatGPT and applications

Artificial Intelligence (AI) is an area of computer science and technology that deals with the development of computer solutions and algorithms to help computers learn and make decisions on their own human. The main goal of artificial intelligence is to create intelligent computer systems capable of solving complex problems and making decisions based on information provided or gathered.

To achieve this goal, AI researchers must build mathematical models and algorithms to solve problems such as image recognition, natural language processing, data analysis, forecasting, decision support, and many other applications. This includes finding the most suitable approach to process input data, building machine learning models, and training these models through machine learning algorithms and techniques, deep learning, and more.

Artificial intelligence is widely applied in many fields, from applications such as facial recognition, autonomous vehicles, and financial investment advice to the fields of health, statistics, military, communication, education, and many other industries.

Generative AI is an area of artificial intelligence that focuses on creating new content, not limited by original training data. Using generative models such as Generative Adversarial Networks (GANs) or Variational Autoencoders (VAEs), generative AI can generate images, music, text, and other content, based on input data.

In GANs, two neural network models interact, one called the generator model and the other called the discriminator model. The generative model tries to generate new samples from the training data, while the discriminant model tries to distinguish between the samples generated by the generative model and the real ones from the training data. The two models will interact with each other through the training process to create new samples of better quality.

In VAEs, an encoder model is used to convert the input data into a latent space, and then a decoder model is used to convert points in this latent space into new output data. Once trained, the model learns to generate new data based on the basic characteristics of the training data.

With its ability to create new and diverse content, generative AI has been used in a wide variety of applications, including photo and video production in the media and entertainment industries, creating newspaper content, and creating new content. and even new product designs. However, the use of generative AI also poses some challenges, including issues of ethics and the quality of the generated content.

2.1. What is ChatGPT?

ChatGPT is a group of AI applications in the direction of generating AI. Specifically, ChatGPT is a large automated language model trained by OpenAI, based on the Transformer Network's GPT (Generative Pre-trained Transformer) architecture, and has dimensions up to millions of parameters. This model has the ability to read and understand the content of the input text, then give an answer or generate new text based on the context and available information.

ChatGPT is trained on a large amount of data from various sources on the Internet, including English and other languages. With the ability to automatically learn from data and improve quality over time, ChatGPT can answer questions, solve problems, and provide the information requested by users naturally and smartly.

ChatGPT has many practical applications, including support for chatbots, online conversations, customer support, education and research support, and many more.

Features of ChatGPT

Answer questions: ChatGPT can answer users' questions on a variety of topics, including history, science, entertainment, culture, business, and more.

Create new content: ChatGPT can generate text snippets, from product descriptions to longer articles, or even essays, letters, and more.

User interaction: ChatGPT can interact with users and answer their questions, discuss with them different topics, or give advice on something.

Language translation: ChatGPT can translate documents into many different languages, helping users to read and understand information from other languages.

Synthesize information: ChatGPT can aggregate information from different sources and help users save time searching for information.

Make predictions: ChatGPT can make predictions about future events or trends based on available data.

2.2. Applications

Education: ChatGPT can assist teachers/lecturers and students/students in teaching and learning. For example, ChatGPT can answer students' questions or guide teachers in lesson planning.

Health: ChatGPT can assist medical professionals in diagnosing diseases or providing medical information to users. For example, ChatGPT can answer questions related to disease symptoms, provide nutritional advice or guide users to perform exercises.

Business: ChatGPT can assist businesses in consulting products, services or managing customer care. For example, ChatGPT can answer questions about products, pricing, or warranties, or help customers with questions.

Communication: ChatGPT can assist journalists or media in writing articles, finding information, or providing information to readers. For example, ChatGPT can generate descriptions of an event or give advice to readers.

Scientific research: ChatGPT can assist researchers in finding information, analyzing data, or generating reports. For example, ChatGPT can search for scientific articles related to a specific topic or generate descriptive snippets of data.

History, society, current affairs: can aggregate information in ChatGPT database, and information on the Internet. In addition, the system can answer questions about general knowledge, providing simple explanations of complex in-depth concepts.

Other areas of synthesis: Giving advice on certain topics; Summarizing long paragraphs; Translating text into different languages.; Helps with language learning by providing definitions and examples of words and phrases; Creates personalized content, such as emails and social media posts; Creates music and art based on user input and preferences.

It can be said that ChatGPT's knowledge base is quite extensive, trained from big data, from many different sources, and updated regularly. So the ability to meet user requirements is quite good.

3. ChatGPT application in programming

Through part 2, ChatGPT has the ability to support many different fields, from general to specialized in certain narrow areas. In part 3, we will focus on presenting applications of ChatGPT to support computer programming. For each of the following application sections, only some typical and basic examples are given. From these examples, programmers can completely apply to similar and more complex situations. Just as ChatGPT's capabilities are not limited to computer programming languages, programmers can ask for any arbitrary computer language.

3.1 Generating source code

ChatGPT can understand and interpret the needs of programmers using its natural language processing skills and provide corresponding code snippets. When it comes to repetitive tasks or boilerplate code, this can save programmers a lot of time.

An example chatGPT generates source code at the request of the programmer as shown in Figure 1.

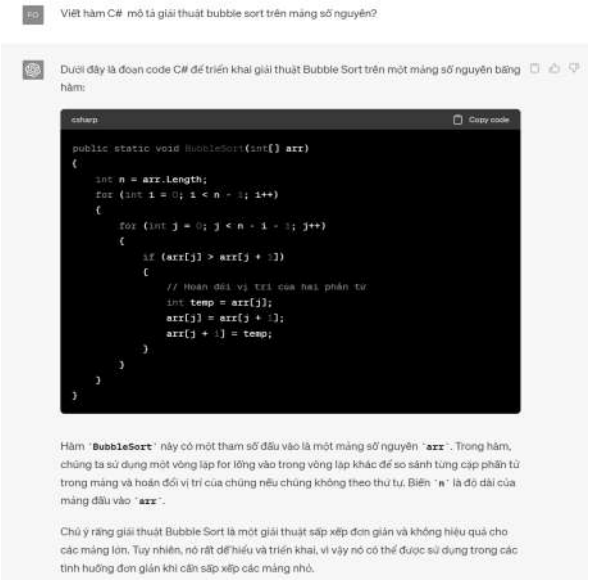

Figure 1. *Generating code on demand.*

In the example, users can ask questions in Vietnamese language and the answering system is also in Vietnamese, including the source code of the sample function and a very detailed and easy to understand function explanation.

3.2 Find bugs or refactor the source code

In addition to generating source code according to the user's discretion, the system can help find errors or restructure the program code to be more compact.

In the example in Figure 2, the user enters a question and a program segment, and ChatGPT will answer and edit the source code.

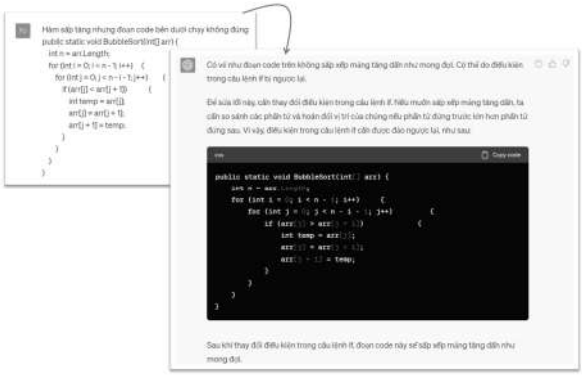

Figure 2. *Fixing the bugs*

In the above source code, there is a mistake by the programmer, so the program execution is only about to decrease, not increase as expected. ChatGPT detects this error and explains it in detail and then recommends more accurate source code.

An example is followed in Figure 3, giving ChatGPT a correct but not optimal program and the system has given the optimized source code very neatly and explained very clearly.

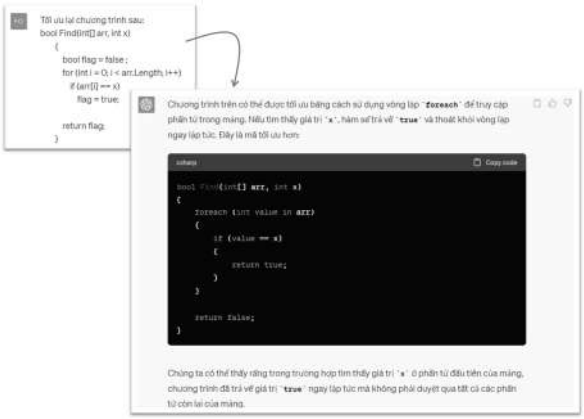

Figure 3. *Optimizing the source code.*

3.3 Writing the documentation

ChatGPT has the ability to read and understand source code and perform documentation writing for that source code. This is a very useful feature that saves a lot of time for programmers.

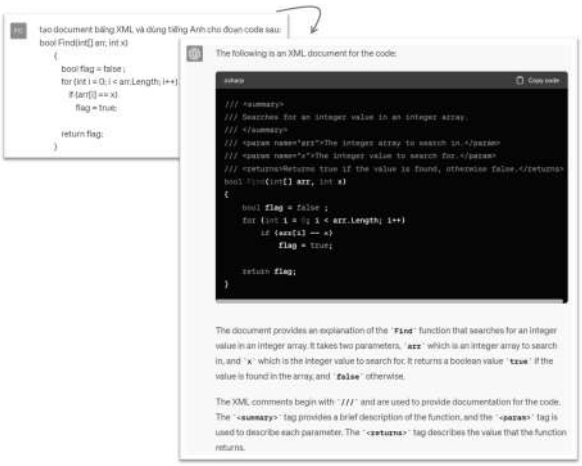

Figure 4. *Generating documentations*

For Visual Studio C#'s XML Documentation tool, only the framework can be generated, and the interpretation content must be filled in by the programmer. ChatGPT can parse and understand the source code and generate XML Documentation that describes the exact function and meaning of each component of the function in the above program.

3.4 Writing the test cases

In the illustrative example (Figure 5), the user will ask the system to write a test case to find the error of the program segment. And the system specified the error and gave the test case of the error case.

Figure 5. *Test cases.*

It can be said that generating test cases for the program is a very necessary job in the program testing phase. This is also quite a time-consuming and labor-intensive job, so using ChatGPT can improve the efficiency of the testing phase of software development.

3.5 Creating sample data

When running a program test, the programmer needs some sample data to run and test the functions. ChatGPT can be used to generate data patterns based on the provided source code.

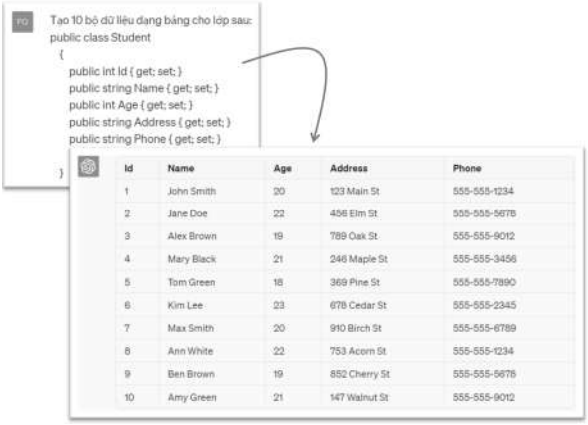

Figure 6. *Sample data.*

Depending on the needs of using test data, the programmer can describe more details so that ChatGPT can create the test data set exactly as the programmer wants.

4. Some comments about using ChatGPT in programming

Some of the advantages of using ChatGPT in programming support are as follows:

1. Quickly support repetitive jobs, thereby saving programmers' time and effort.

2. With the ability to analyze and understand the program segment, ChatGPT can help improve the quality of the program through code improvement, debugging, and other suggestions for optimization.

3. Combining search and information synthesis intelligently, so it will help a lot in programming. Instead of using a regular search engine, you can use ChatGPT for more optimal results.

4. The ability to support all current programming languages is the strength of ChatGPT.

However, besides the advantages, the quality of the answer also depends on many factors, such as the complexity of the question, the way the question is asked, and the additional or guiding information. so that ChatGPT can quickly approach answering in the desired direction of the user. In addition, when receiving results from ChatGPT, programmers also need to add or adjust the content to be more complete, or more accurate to the requirements of the programmer.

5. Conclusion

In the article, we have presented the basic parts of the ChatGPT application, an artificial intelligence generator, that have been widely applied in recent times. This focus on introducing ChatGPT applications for programmers, these applications will help improve work efficiency and save programmers' time and effort. In the framework of the article, we have only presented the basic applications, and the tests are not many. In the future, we will continue to study deeply the applications of ChatGPT for different stages in the software development process.

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HO CHI MINH CITY UNIVERSITY OF ECONOMICS AND FINANCE
141 - 145 Dien Bien Phu, Ward 15, Binh Thanh District, HCM City
Website: uef.edu.vn - Hotline: (028) 5422 6666 * (028) 5422 5555