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MAUI COLLEGE

# ChatGPT - Using an AI-Based Conversational Model in a Traditional Programming Course

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# Abstract

Traditional programming courses have relied on students learning coding syntax from examples and other textbook sources.

As students learn to write code, they become proficient in the syntax, logic, debugging, and documentation of their code.

ChatGPT is a revolutionary method that enables students to generate new code, fix bugs and errors, and learn and write programming languages and computational concepts.

# Agenda

1. Overview
  - a. Exams using ChatGPT
2. AI Tools
  - a. ChatGPT (v3.5 and v4.0)
  - b. GitHub Copilot
  - c. Visual Studio Code with GitHub Copilot
  - d. New features in ChatGPT v4.0
    - Code Interpreter in v4.0!
    - Plugins in v4.0
  - e. Claude 2
3. Reflections



# Introducing ChatGPT

We've trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer followup questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests.

[Try ChatGPT ↗](#)

[Read about ChatGPT Plus](#)

# Final Exam 2022

Questions were all in text format and provided clear and concise instructions for students to write or fix code.

ChatGPT answered all questions with correct/elegant answers!

# Final Exam 2022 - HTML Coding

Write the HTML code for a simple form that requires a mandatory text input fields for username mandatory, a mandatory password type input field, and an optional text input type of Last Name. Ensure you have a placeholder with hints for every field and require input for uid and pwd.

```
<form>
  <label for="username">Username:</label><br>
  <input type="text" id="username" name="username" placeholder = "Please enter
your username" required><br>

  <label for="pwd">Password:</label><br>
  <input type="password" id="pwd" name="pwd" placeholder = "Please enter a valid
password" required>

  <label for="lastname">LastName:</label><br>
  <input type="text" id="lastname" name="lastname" placeholder = "Please enter your
last name" >
</form>
```

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Simple Form</title>
</head>
<body>
  <form>
    <label for="username">Username:</label>
    <input type="text" id="username" name="username" placeholder="Enter your username" required>
    <br><br>

    <label for="password">Password:</label>
    <input type="password" id="password" name="password" placeholder="Enter your password"
required>
    <br><br>

    <label for="lastName">Last Name:</label>
    <input type="text" id="lastName" name="lastName" placeholder="Enter your last name (optional)">
    <br><br>

    <input type="submit" value="Submit">
  </form>
</body>
</html>
```



# Final Exam 2022 - Question on MongoDB and Mongoose Schema

## Question 1 – 4 points – Respond with answers in a Word Document

Consider the following code that creates a Mongoose Schema:

```
const postSchema = {  
  title: {  
    type: String,  
    required: [true, 'Title of Blog is required']  
  },  
  content: {  
    type: String,  
    required: [true, 'Content of Blog is required']  
  }  
};
```

Extend the schema with the following four elements:

1. **Description** of type String but always in lowercase, required field
2. **PostDate** of type Date, with default of today's date, not a required field
3. **Rating** of type Number, with a min rating of 1, not a required field
4. **isValid** is a Boolean, required field



# Final Exam 2022 - Official Answer to Question on MongoDB and Mongoose Schema

## Answer 1

```
const postSchema = {
  title: {
    type: String,
    required: [true, 'Title of Blog is required']
  },
  content: {
    type: String,
    required: [true, 'Content of Blog is required']
  },
  Description: {
    type: String,
    lowercase: [true],
    required: [true],
    default: [Date.now]
  },
  Rating: {
    type: Number,
    min: [1]
  },
  isValid: {
    type: Boolean,
    required: [true, "Need to enter True or False"]
  }
};
```

# Final Exam 2022 - MongoDB Answer from ChatGPT

```
const mongoose = require('mongoose');
const { Schema } = mongoose;

const postSchema = new Schema({
  title: {
    type: String,
    required: [true, 'Title of Blog is required']
  },
  content: {
    type: String,
    required: [true, 'Content of Blog is required']
  },
  description: {
    type: String,
    required: [true, 'Description is required'],
    set: (value) => value.toLowerCase()
  },
  postDate: {
    type: Date,
    default: Date.now,
  },
  rating: {
    type: Number,
    min: [1, 'Rating must be at least 1']
  },
  isValid: {
    type: Boolean,
    required: [true, 'isValid field is required']
  }
});
```

# ChatGPT (Generative Pre-Trained Transformer)

v3.5 - Free

v4.0 - \$20/mo

## ChatGPT v3.5

Free!

Started using in March  
2023

Students learned how to  
write clear and concise  
prompts and converse

Understand code  
snippets and examples  
from class

Used to generate sample  
code

Students used ChatGPT  
for homework and final  
exam

## ChatGPT v4.0 - Plus

New - **Code Interpreter  
and Plugins** for coding  
etc.

Useful for an Instructor

Paid service for \$20/month

More powerful engine for  
generating code and  
explanations

Assists instruction by  
providing an online coding  
“assistant”

Helpful for generating  
sample code for students  
based on existing  
documentation



# Your AI pair programmer

GitHub Copilot uses the OpenAI Codex to suggest code and entire functions in real-time, right from your editor.

## GitHub Copilot enables developers to

- **Get AI-based coding suggestions:** Get code suggestions that match a project's context and style conventions, and cycle through different options to decide what to accept, reject, or edit.
- **Use your preferred environment:** Integrate GitHub Copilot with popular editors, including Neovim, JetBrains IDEs, Visual Studio, and Visual Studio Code as an unobtrusive extension.
- **Code confidently in unfamiliar territory:** Code in new languages or try something new, and let GitHub Copilot suggest syntax and code in dozens of languages—so you can spend more time learning by doing.

# What can you do with GitHub Copilot?

## Convert comments to code

GitHub Copilot uses a special version of GPT-3 that has been trained on a large body of public source code. It is as good at writing natural language as it is at writing code, so in fact it can complete your comments for you. In the example below, we first let it complete our explanation, and then, line by line, we tab through the code that does what we just said in English.

```
//create javascript code for volume of a sphere  
//create a function that calculates the volume of a sphere  
//volume =  $\frac{4}{3} * \pi * r^3$ 
```

## Create unit tests

An important use case of GitHub Copilot is to take some of the drudgery out of writing unit tests. Below, we already have an implementation of a function that computes the common prefix of two lists, and we want to test that. To do so, we import the unit test package, and then we start writing a test function to let Copilot generate the asserts which we accept just by hitting the Tab key.



EXTENSIONS

Search Extensions in Marketplace

INSTALLED

C/C++

C/C++ IntelliSense, debug...

Microsoft

GitHub Copilot

Your AI pair programmer

GitHub

Jupyter

Jupyter notebook support,...

Microsoft

Jupyter Cell Tags

Jupyter Cell Tags support

RECOMMENDED

Debugger f...

Debug your web applicatio...

Firefox DevTools

Microsoft E...

Use the Microsoft Edge To...

Microsoft

ESLint

Integrates ESLint JavaScri...

Microsoft

JS test.js

Extension: GitHub Copilot

GitHub Copilot

v1.95.233

GitHub

github.com

7,341,863

★★★★★

Your AI pair programmer

Disable

Uninstall

Switch to Pre-Release Version

This extension is enabled globally.

DETAILS

FEATURE CONTRIBUTIONS

CHANGELOG

RUNTIME STATUS

Followers

26k

Follow

@github

Views

13M

Try Copilot

Free trial

Categories

Programming Languages

Machine Learning

Education

Snippets

Extension Resources

Marketplace

GitHub

Your AI pair programmer

Get Code Suggestions in real-time, right in your IDE

```

1 def common_prefix(a, b):
2     """Return the common prefix of two lists."""
3     if len(a) < len(b):
4         return common_prefix(b, a)
5     for i in range(len(a)):
6         if a[i] != b[i]:
7             return a[:i]
8     return a
9
10
11 def test_common_
12

```






15



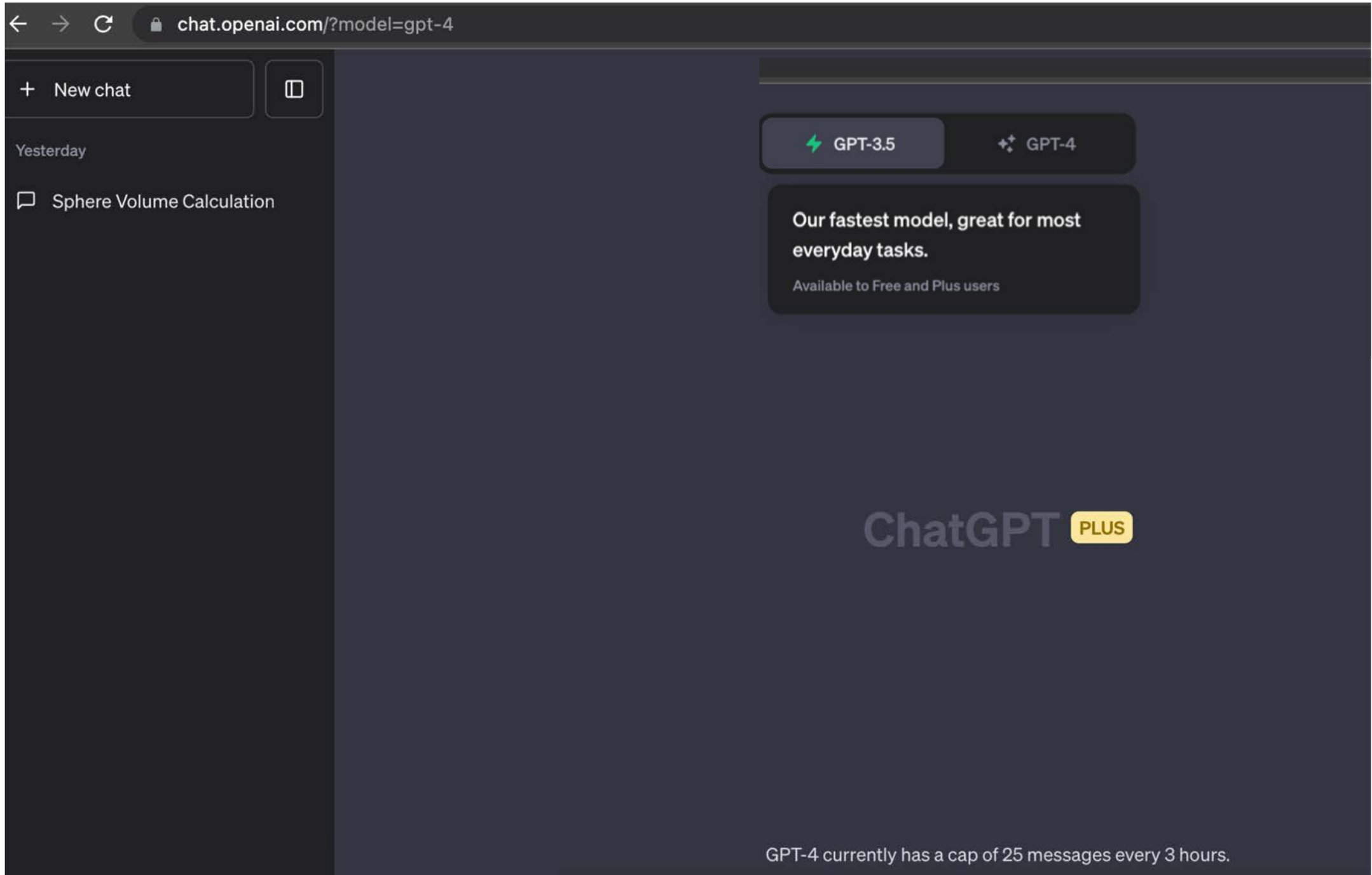
JS test.js



Users > debasisbhattacharya > JS test.js > ...




```
1 //create javascript code for volume of a sphere
2 //create a function that calculates the volume of a sphere
3 //volume = 4/3 * pi * r^3
4 //r = radius of sphere
5 //pi = 3.14
6
7 function volumeOfSphere(r) {
8     const pi = 3.14;
9     const volume = (4 / 3) * pi * Math.pow(r, 3);
10    return volume;
11 }
12
13 //usage
14 console.log(volumeOfSphere(5)); // radius = 5 units
15
16
```



## Using Model - Default in V3.5 (free)



Sure! Below is the JavaScript code for a function that calculates the volume of a sphere given its radius: 

javascript

 Copy code

```
function sphereVolume(radius) {  
  // Check if the input is a number and it is not negative  
  if (typeof radius !== 'number' || radius < 0) {  
    throw new Error('Radius must be a non-negative number.');  }  
  
  const pi = Math.PI;  
  const volume = (4 / 3) * pi * Math.pow(radius, 3);  
  return volume;  
}  
  
// Example usage:  
const radius = 5;  
const volume = sphereVolume(radius);  
console.log('Volume of the sphere:', volume);
```

This code defines a function called `sphereVolume` that takes the `radius` of the sphere as input and returns the volume calculated using the formula you provided. It also includes a check to ensure that the input radius is a non-negative number, and it throws an error if it's not. The function then calculates the volume and returns it. Finally, there's an example usage to demonstrate how to call the function.

 Regenerate response

←

→

↻

chat.openai.com/?model=gpt-4

+

New chat

Yesterday

Sphere Volume Calculation

⚡

GPT-3.5

🧠

GPT-4

Our most capable model, great for tasks that require creativity and advanced reasoning.

Available exclusively to Plus users

⚙️

Default

🧠

Code Interpreter

Beta

✓

🔌

Plugins

Beta

ChatGPT

PLUS

GPT-4 currently has a cap of 25 messages every 3 hours.



---

## Code interpreter Alpha

An experimental ChatGPT model that can use Python, handle uploads and downloads

We provide our models with a working Python interpreter in a sandboxed, firewalled execution environment, along with some ephemeral disk space. Code run by our interpreter plugin is evaluated in a persistent session that is alive for the duration of a chat conversation (with an upper-bound timeout) and subsequent calls can build on top of each other. We support uploading files to the current conversation workspace and downloading the results of your work.



# ChatGPT plugins

We've implemented initial support for plugins in ChatGPT. Plugins are tools designed specifically for language models with safety as a core principle, and help ChatGPT access up-to-date information, run computations, or use third-party services.

## Plugin store

Popular

New

All

Installed

programming



AskYourCode

Install



Ask your code without having to copy-paste it. Works with most popular programming languages.



Code Runner

Install



Run and Save your code while creating visualizations (charts and graphs) supports upto 70 programming...



Code Runner

Install



Compile and save your code while creating visualizations (charts and graphs) supports upto 70 programmin...



CoderPad

Install



Run code in more than 30 different programming languages, and let us worry about setting up the environment!

ANTHROPIC

Product

Announcements

# Claude 2

Jul 11, 2023 • 4 min read

Talk to Claude

In addition, our latest model has greatly improved coding skills. Claude 2 scored a **71.2%** up from 56.0% on the Codex HumanEval, a Python coding test. On GSM8k, a large set of grade-school math problems, Claude 2 scored **88.0%** up from 85.2%. We have an exciting roadmap of capability improvements planned for Claude 2 and will be slowly and iteratively deploying them in the coming months.

## Sphere volume formula in JavaScript ▾

Here is a JavaScript function to calculate the volume of a sphere:

```
js Copy code  
  
function calculateSphereVolume(radius) {  
  const PI = 3.141592653589793;  
  
  return (4/3) * PI * Math.pow(radius, 3);  
}
```

To use it:

```
js Copy code  
  
const radius = 5;  
const volume = calculateSphereVolume(radius);  
  
console.log(volume); // 523.5987755982989
```

The key aspects are:

- Use the constant PI for the value of pi
- The volume formula is  $\frac{4}{3} * \pi * \text{radius}^3$
- Use Math.pow() to calculate the radius cubed
- Return the result of the volume calculation
- To find the volume, call the function passing in the radius of the sphere

# Reflections - AI Tools as Programming Assistants

1. Extends the current toolsets and learning aids
  - a. Intelligent IDEs, Stack Overflow, Online Docs, Google Search, GitHub etc.
2. Introductory Programming Courses
  - a. HTML, CSS, Javascript, Python
  - b. Students understand basic syntax
  - c. Students learn to write comments/prompts -> generate code
  - d. Students learn to test code
3. Intermediate Programming and Database Courses
  - a. MERN Stack - MongoDB, Express, React, NodeJS
  - b. Databases - MySQL, MongoDB, Mongoose
  - c. Installation process, Code Generation, Test Scripts, GitHub Repo
  - d. Group Projects where students work together
4. Integrate ChatGPT and other AI models like Claude 2 into the curriculum





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# Questions? Comments?!

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