
USING CHATGPT TO
BUILD A ML MODEL
ML
• How to use ChatGPT in a smart way
• What ChatGPT excels at
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How to best use ChatGPT

ChatGPT can create useful but also unusable code. For best results, you need to input clear and detailed prompts

GPT is very good at helping with coding tasks but less good at building a complete application from scratch

Always be critical about the results !never blindly trust the generated output! → understand the output completely

Interact with GPT as a conversation: ask questions based on the AI's response to get closer to the output you want

From beginner to advanced GPT user

The prompt (question) is the most important part of using ChatGPT

1. Be clear and specific

   ❌ **Bad:** *"Tell me about ML"*
   ✅ **Good:** *"Explain how transformers work in ML with a simple example."*

From beginner to advanced GPT user

The prompt (question) is the most important part of using ChatGPT

1. Be clear and specific
2. Give as much context as possible

❌ **Bad:** *"Write a script for a ML model"*
✅ **Good:** *"Write a python script using scikit-learn to train a linear regression model on a dataset with two numerical features"*

From beginner to advanced GPT user

The prompt (question) is the most important part of using ChatGPT

1. Be clear and specific
2. Give as much context as possible
3. Define the output format: what do you want back (code, list, explanation etc)

❌ **Bad:** *"What are the differences between FCNet and transformer"*
✅ **Good:** *"Summarize the differences between FCNet and transformer. Format it as a table"*

From beginner to advanced GPT user

The prompt (question) is the most important part of using ChatGPT

1. Be clear and specific
2. Give as much context as possible
3. Define the output format: what do you want back (code, list, explanation etc)
4. What is the output style: short/long, what level of explanation (student, expert)

❌ **Bad:** *"Explain what a Transformer is"*
✅ **Good:** *"Explain the ML Transformer model to a physics master student with no ML background. "*

I always start a chat by introducing myself: tell GPT about my research and level (4th year PhD, particle physics, working on KamLAND-Zen etc).

From beginner to advanced GPT user

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2. Give as much context as possible
3. Define the output format: what do you want back (code, list, explanation etc)
4. What is the output style: short/long, what level of explanation (student, expert)
5. Refine the output

✅ **Good:** *"The output is not how I want it. I will provide you with more information ...."*

From beginner to advanced GPT user

✅ Example prompt:

I am a 3th year physics graduate student in high energy particle physics, working for the KamLAND neutrino detector. I just started ML, following one lecture about deep neural networks. I have an existing deep learning model trained on waveform data, but I want to modify it to use neutron coordinates instead. My data consists of (x,y,z,t) neutron positions

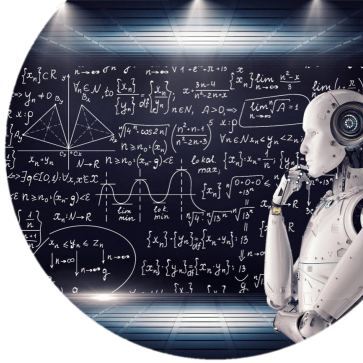
– input a couple of data lines –

I want you to give me guidance on the best way to preprocess and use this into my existing model. This is the existing model:

– script input – (or "I will input the existing model in the next step, wait with answering")

Please provide: 1. a step-by-step plan on formatting my data to replace the waveform input. 2. Recommendations on normalization and feature extraction. 3. Tips for testing the performance that are not yet in my current model. 4. The complete script using my data. Add print tests after each function. Explain the steps that you change compared to my input ML model. If you are missing any information to generate my task, ask me for more details.

Customize your ChatGPT



- How would you like ChatGPT to respond?

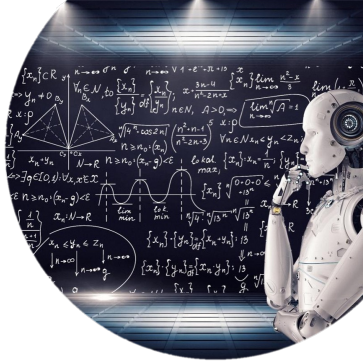
Always start a new chat with information on how you want GPT to answer

I want to the point answers, especially when I ask about programming-related things. Break down complex problems into smaller steps and explain each one using reasoning. If my question is unclear or missing context, ask for more details to confirm your understanding before answering. If information is beyond your knowledge cutoff date, respond with 'I don't know'.

- What should ChatGPT know about you?

For this chat, treat me as a completely new student on ML.

Customize your ChatGPT



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💰 Paid version: there is the option "customize ChatGPT", Explore GPTs, input your own files to make the chat an 'expert' in what you want

ChatGPT-4o

Last tips & tricks

- Create a standard format for your questions
- Save the text to customize your chatgpt so you can re-use it everytime
- You can let GPT ask you questions to clarify your problem

  → I will ask you to change a FCNet ML model to a transformer. This will include a new data format, extra ways of visualising the output and understanding the new model. Ask me at least 3 questions about my dataset, goal, and anything else you need to complete the task to the best of your ability.

Last tips & tricks

- Create a standard format for your questions
- Save the text to customize your chatgpt so you can re-use it everytime
- You can let GPT ask you questions to clarify your problem
- Make sure you understand everything you use from ChatGPT since it can contain many mistakes

  → I like to feed the model I got from GPT into GPT again and ask if there are any optimizations or errors: often the script can be significantly optimized (in the first output GPT is mostly concentrating on just giving a valid script)

It will save you a lot of time to look at a video giving some extra tips and tricks on ChatGPT once (only 30min): for example this link

Other tools

- Copilot in visual studio code
- Gemini in google collab

} Good for small tasks but doesn't give much explanation

- Claude.ai

My favourite when it come to asking for a full script → output format is clear and it's good at creating detailed programming scripts

Claude

If you are unsure of which tool to use, try them all and compare! You can also input the results from one tool (for example Claude.ai) into another tool (ChatGPT) and let it check if there is anything missing

Example Usage

ChatGPT input example

You can see the chat through [this link]

I am a 3th year physics graduate student in high energy particle physics, working for the KamLAND neutrino detector. I just started ML, following one lecture about deep neural networks. I have an existing deep learning model trained on waveform data, but I want to modify it to use neutron coordinates instead. My data is a pandas frame and consists of rows with neutron information, where LL_ID indicates one event. I want to input the vertex, split into x, y and z, and dT dTNtoLL) per neutron. So one event consists of n neutrons. The number of neutrons is different per event, so I want to input maximum 10 neutrons per event and fill the empty spots with zeros. My pandas frames look for example like:

LL_ID LLisotope dRLL vertex_n dRn dRnMu dRtoN dR2DtoN height_toN dRnear Num_n dTNtoLL Nenergy

0 1 (114, 51, 0) 146.527924 (-14.452692463073625, 118.9811778493495, -137.... 182.572869 59.940156 59.659642 38.638787 45.45676 17.461772 11 250.0 2.194528

0 1 (114, 51, 0) 146.527924 (25.34894462348021, 53.80562077267208, -127.76... 140.928544 78.000687 17.461772 11.166652 13.424581 17.461772 11 250.0 2.410631

I want you to give me guidance on the best way to preprocess and use this into my existing model. **I will input the existing model in the next step, please wait with answering.**

Please provide: 1. a step-by-step plan on formatting my data to replace the waveform input. 2. Recommendations on normalization and feature extraction. 3. Tips for testing the performance that are not yet in my current model. 4. The complete script using my data, please follow the same structure as the existing model I give as input. {or only return blocks of code that have to be changed}

Explain the steps that you change compared to my input ML model. If you are missing any information to generate my task, ask me for more details.

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1. I want the input shape as you suggested 2. Pad with zeros 3. Across entire dataset 4. The model should predict if it is background or signal -> 0 or 1 5. I would like suggestions

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I will explain a bit more what physics results I am looking at. I am looking at muon spallation events: returning events where long-lived (xenon) spallation isotopes have been created, and I return the information of neutrons those events. I want to match the neutrons and ll-isotopes to distinguish accidentals (uniformly distributed events, I also simulated these), and signal (longlived spallation isotopes). I want to change the FCNet code from before, into a Pytorch transformer since my events will be variable length: I will be returning per event (which is an accidental or signal one) the x, y, z and dT of all neutrons along the muon path where the number of neutrons can vary. Can you give me a script where a transformer is implemented correctly. Please explain all new steps in detail so I understand what every new step in the script is doing, since I don't have any knowledge on transformers.

Your answers are too shorts, please explain in detail why any new steps are taken. For example, what is the padding mask? Why do you take dim_feedforward 128, etc? In addition, I don't want to use any np.stack since I am not used to that function. I am also wondering why you are not using pad_sequence?

Can you create tests for every step so I can test the code in a jupyter notebook and see step for step what happens