

PP14: Will AI Tech Steal My Job?

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What is ‘my job’?

- Statistical Programmer for SDTM and ADaM datasets, and TLFs.
- Functional lead responsible for client communication, creating specifications and quality plans.

What ‘AI Tech’ is available? ^[1]

- In-app code suggestions using code comments as prompts
 - GitHub Copilot
 - Amazon Code Whisperer
- Chatbots
 - **ChatGPT** – using OpenAI’s GPT-3.5
 - BingChat – using OpenAI’s GPT-4
- And many more!

Will AI Teach Steal My Job?

Probably not – but it can definitely make my job easier

My Code:

```
proc freq data=adsl;  
  tables group*saffl / out=saffltable;  
run;  
  
proc freq data=adsl;  
  tables group / out=groupcounts;  
run;  
  
data outtable;  
  merge saffltable (drop=percent  
    rename=(count=number))  
    groupcounts (drop=percent  
    rename=(count=denom));  
  by group;  
  percent=number/denom*100;  
  count=number;  
  drop number denom;  
run;
```

ChatGPT Code:

```
/* Step 1: Use PROC FREQ to calculate the percentages */  
proc freq data=ADSL noprint;  
  tables GROUP*SAFFL / out=TempTable;  
run;  
  
/* Step 2: Compute percentages using PROC SQL */  
proc sql;  
  create table OUTTABLE as  
  select a.GROUP, a.SAFFL, a.COUNT,  
         a.COUNT / b.N * 100 as Percentage  
  from TempTable as a  
  left join (select GROUP, count(*) as N  
            from ADSL group by GROUP) as b  
    on a.GROUP = b.GROUP;  
quit;  
  
/* Step 3: Display the output table */  
proc print data=OUTTABLE;  
run;
```

How good is ChatGPT at performing SAS programming tasks that are relevant to my role?

Example	Prompt	Evaluation
A very simple table	Write some SAS code to create a table named OUTTABLE that shows the percentage of records in dataset ADSL that have each unique value in variable in SAFFL, separated by GROUP and with the number of records in each GROUP as the denominator	Issues: • On first attempt, the AI generated code that ran with an error: <code>ERROR: Ambiguous reference, column GROUP is in more than one table.</code> Successes: • Remembered to comment its code, unlike me! • Was able to correct the error in its code
Creating a Baseline Flag	Using the SAS programming language, create a variable ABLFL. This should equal 'Y' on the latest record where the date part of character variable VSDTC <= numeric variable TRTSDT within each PARAMCD. If the date part of VSDTC is equal to TRTSDT, then set to 'Y' on the record with the earliest time part of VSDTC.	Issues: • It didn't understand the concept of the VSDTC variable having a date part and a time part • It didn't understand that it needed to identify records that were <=TRTSDT before selecting the latest record overall per PARAMCD • It created a variable called min_time to hold the 'earliest time' information, but didn't derive it anywhere • I really struggled to write a prompt that was both thorough and concise Successes: • Correctly identified that only one record should be flagged per parameter • Correctly wrote a PROC SQL step
Splitting a character variable into 200-character chunks	Using SAS, write a macro that will take an input character variable of unknown length and split it into character variables of length 200. The first 200 characters of text should be stored in the first output variable and each additional 200 characters of text should be stored in the subsequent variables. When splitting the text string between output variables, the text should be split between words to improve readability. The output variables should be named INPUT1, INPUT2, etc., where INPUT is the name of the input variable.	Issues: • Initial run contained 3 warnings: <code>WARNING: Argument 2 to macro function %SUBSTR is out of range.</code> • Code looks plausible at a surface level but nearly every line has some mis-step in logic. • Was not able to correct itself when asked Successes: • Had generally the correct idea, might be a good starting point for a programmer to write the code themselves

Will AI Tech Steal My Poster?

Scan the QR Codes to see ChatGPT’s answers to the below questions!

How do I write a good programming prompt?

- The basics of a good prompt:
 - Instructions or a question
 - Input data
 - Examples
- Give a high-level overview of what you want the AI to do, and then provide details
- **Too much detail can overwhelm it and produce convoluted results** – keep it concise
- Experimentation/practice will be necessary



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What issues are there with using AI to write code?

- **AI code is not reproducible** – entering these exact prompts multiple times will generate completely different code as the process is stochastic (random).
- **Domain expertise and precise input instructions are still necessary** to produce complex, or even relatively simple, programming tasks.
- Vast amount of input data would be required to produce any kind of study specific content, ChatGPT is not capable of handling this level of complexity.
- Intellectual property concerns – by default, **ChatGPT collects any data you enter into the chat for use in development.** ^[2] Ensure that this is disabled in your user settings before entering any proprietary information.
- Code will likely contain some errors, even while looking convincing.
- Languages with less content available for use in the model may produce less robust suggestions. For this reason, ChatGPT will not perform as well in SAS as it would in Java or Python.



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How can AI support with programming tasks?

- It can encourage you to think of new options – it may come up with different programming solutions you would not have thought of.
- Ask AI to review your code – based on my tests I found this produced more accurate help than code generation. However, ensure you take care when uploading proprietary information or code.
- Chain of thought prompting - encourage the model to be correct by asking it to show reasoning or cite sources. It can still ‘make stuff up’ but it is easier to verify given results. ^[3]



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1. Generative AI Coding: Top 10+ Use cases & 4 Tools in 2023 <https://research.aimultiple.com/generative-ai-coding/>
2. Samsung bans employees from using AI tools like ChatGPT and Google Bard after an accidental data leak <https://www.businessinsider.com/samsung-chatgpt-bard-data-leak-bans-employee-use-report-2023-5?r=US&IR=T>
3. Chain-of-Thought Prompting Elicits Reasoning in Large Language Models <https://arxiv.org/pdf/2201.11903.pdf>