



中國人民大學  
RENMIN UNIVERSITY OF CHINA



高瓴人工智能学院  
Gaoling School of Artificial Intelligence

# Towards LLM & Social Science Research

Large Language Model

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# Outline

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- Use large language models (LLMs) in your computer

- Run LLMs (e.g., Tinyllama 1.1B) locally on your machine
- Run a multi-modal LLM (llava) locally on your machine
- Customize LLM behaviors (e.g., temperature)
- Automatically run many instructions

- Discuss about research topics on LLM + Social Science

Implementation

Idea



# Preparation

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- **Step 1:** Find your group members

We have randomly assigned the group members, each group has around 3 members

- **Step 2:** Decide which computer you use

Must be Windows (Windows 10 or later) or Mac (macOS 11 Big Sur or later)

Must have at least 20G empty space, preferably have R installed (GPU is NOT required)

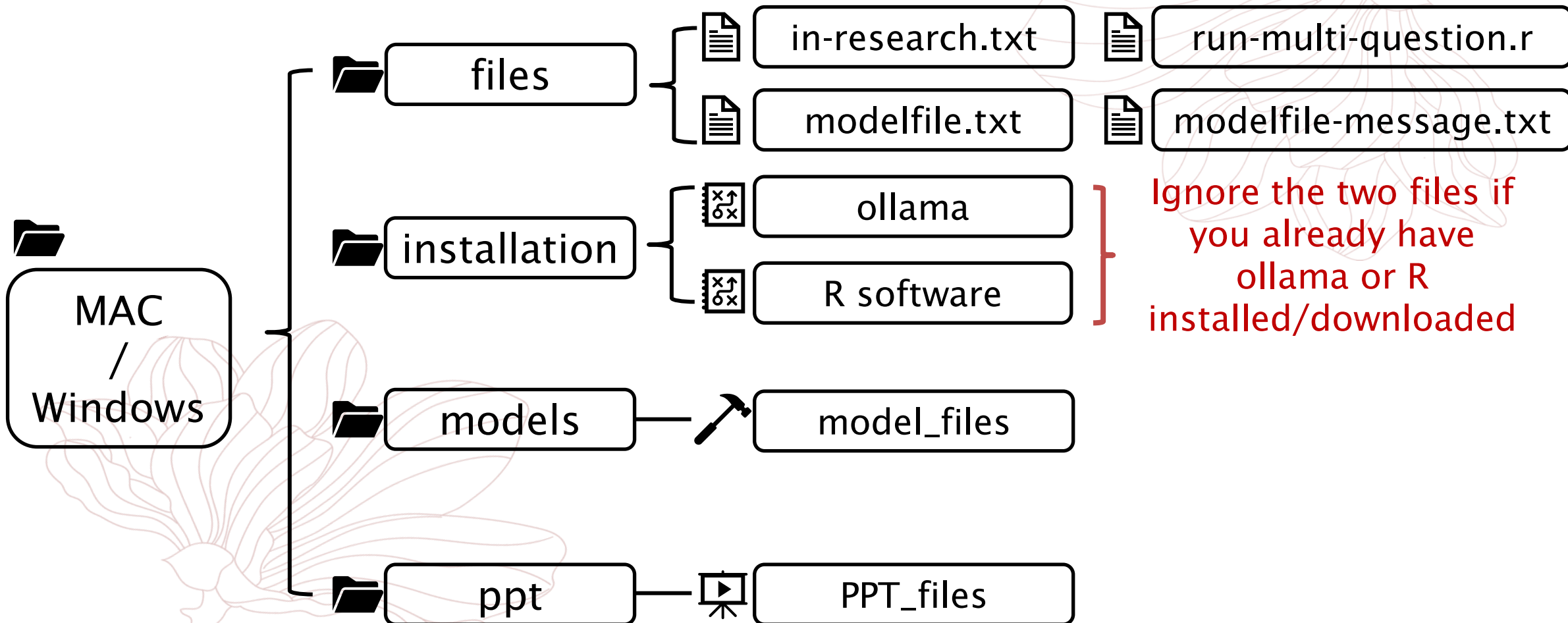
- **Step 3:** Copy the files in our USB drive to the chosen computer

Copy either the “windows” folder or the “mac” folder based on your system

Ignore the “installation” folder if you have already installed ollama and R

Install ollama (installation\ollama) & R (installation\R softmax) if you haven't done it

# Files To Be Copied (In Our USB Drive)





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An easy to use tool – **ollama**, which allows us to run open-source large language models (LLMs) **locally** on our machine

### **Advantages** of running models locally

- Can run without access to networks, do not require API calls & save money
- Privacy preservation: can protect sensitive data
- More flexibly configure the open-soucre LLMs

### **Disadvantages** of running models locally

- Cannot run the largest LLMs or LLMs that have not been open-sourced (e.g., GPT4o)



An easy to use tool – **ollama**, which allows us to run open-source large language models (LLMs) locally on our machine

Download: <https://ollama.com>

Ollama is available on Windows, Mac,  
and Linux platforms

## Download Ollama



macOS



Linux



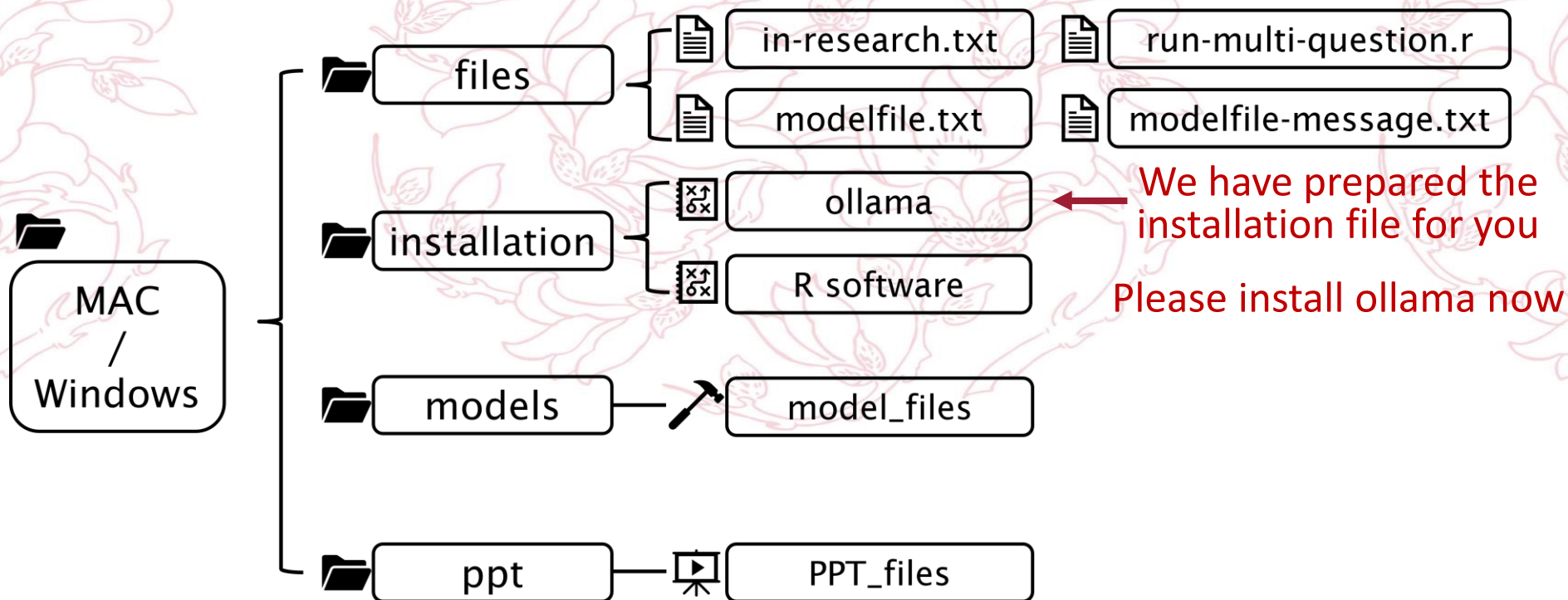
Windows

Download for macOS

Requires macOS 11 Big Sur or later



An easy to use tool – **ollama**, which allows us to run open-source large language models (LLMs) locally on our machine







## MAC

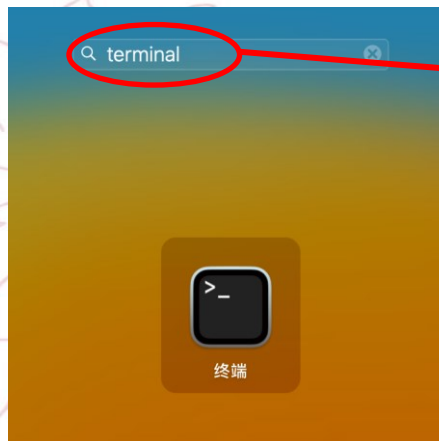
Run Tinyllama 1.1B

Windows - command line (cmd)

Mac - Terminal

Enter command:

```
ollama run tinyllama
```



mac  
command  
line

## Windows



windows command line

```
siriusren — ollama run tinyllama — 80x24
[(base) siriusren@bogon ~ % ollama run tinyllama
pulling manifest
pulling 2af3b81862c6... 100% ██████████ 637 MB
pulling af0ddbdaaa26... 100% ██████████ 70 B
pulling c8472cd9daed... 100% ██████████ 31 B
pulling fa956ab37b8c... 100% ██████████ 98 B
pulling 6331358be52a... 100% ██████████ 483 B
verifying sha256 digest
writing manifest
removing any unused layers
success
>>> █end a message (/? for help)
```

You can now have a conversation with tinyllama!



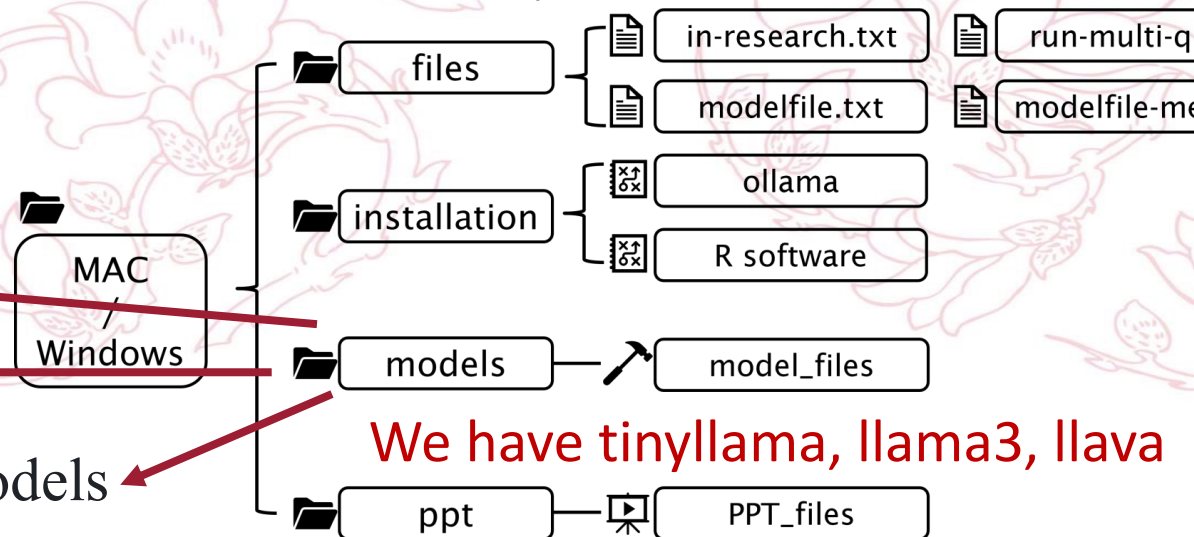
## Copying already downloaded models:

If you already have the models downloaded and would like to copy the models to machine B, you can simply copy the “~\.ollama\” or “~\.ollama\models\” directory.

## Where are models stored?

- macOS: ~/.ollama/models
- Linux: /usr/share/ollama/.ollama/models
- Windows: C:\Users\%username%\.ollama\models

replace



We have tinyllama, llama3, llava





```
siriusren — ollama run tinyllama — 80x24

[(base) siriusren@SiriusRens-MacBook-Pro ~ % ollama run tinyllama ]
[>>> Why is the sky blue? ]
There is no simple answer to why the sky blue. However, there are several
factors that influence how blue the sky appears:
1. Color palette - The colors used in a painting or photograph can have an
impact on how blue the sky looks. For example, warm colors (like orange
and yellow) tend to make the sky look bluer than cool colors (like blue
and purple).
2. Light conditions - Sunlight reflecting off the surface of the Earth
creates light that falls on our atmosphere, which causes it to be colored
blue by absorption of blue light. This is called "atmospheric blue."
3. Geology - The Earth's crust can contain minerals such as potassium,
sodium and magnesium that absorb blue light and cause the sky to appear
blue.
4. Temperature - Clouds can also contribute to the color of the sky by
reflecting sunlight or absorbing it as infrared radiation. Warm clouds are
usually blue-toned.
5. Humidity - The amount of moisture in the air can affect how blue the
sky appears. Dry air tends to make the sky look gray, while humid air can
make the sky appear more blue due to scattering of light by water droplets
in the atmosphere.

>>> █end a message (/? for help)
```



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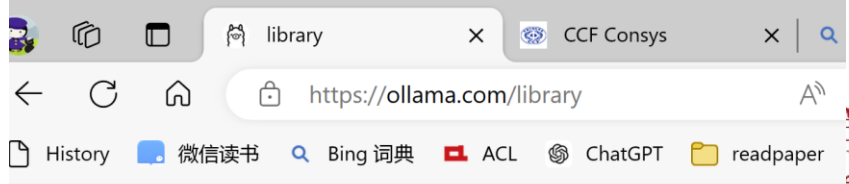
Run other models

<https://ollama.com/library>

Example:

```
siriusren — ollama run tinyllama — 80x24
[(base) siriusren@bogon ~ % ollama run tinyllama]
pulling manifest
pulling 2af3b81862c6... 100% ██████████ 637 MB
pulling af0ddbdaaa26... 100% ██████████ 70 B
pulling c8472cd9daed... 100% ██████████ 31 B
pulling fa956ab37b8c... 100% ██████████ 98 B
pulling 6331358be52a... 100% ██████████ 483 B
verifying sha256 digest
writing manifest
removing any unused layers
success
>>> end a message (/? for help)
```

replace



学院  
elligence

## gemma2

Google Gemma 2 is now available in 2 sizes, 9B and 27B.

9B 27B

↓ 17.5K Pulls 33 Tags Updated 3 hours ago

## llama3

Meta Llama 3: The most capable openly available LLM to date

8B 70B

↓ 4.1M Pulls 68 Tags Updated 5 weeks ago

## qwen2

Qwen2 is a new series of large language models from Alibaba group

0.5B 1.5B 7B 72B

↓ 202K Pulls 97 Tags Updated 2 weeks ago

## deepseek-coder-v2

An open-source Mixture-of-Experts code language model



# Comparing different large language models

## tinyllama

```
C:\Users\Xitin>ollama run tinyllama
>>> I have three apples and my mother gives me one more. How many apples do I have now?
According to your statement, you have three apples. The sentence "How many apple(s) do I have now?" has a count noun (3 apple(s)), so the answer is 3.

>>> If my brother takes 2 apples from me, how many apples do I have now?
According to your statement, you take two apple(s) from your brother. The sentence "How many apple(s) do I have now?" has a count noun (2 apple(s)), so the answer is 2
```

## llama3

```
C:\Users\Xitin>ollama run llama3
>>> I have three apples and my mother gives me one more.
How many apples do I have now?
A simple math problem!

You start with 3 apples.
Your mother gives you 1 more apple.

So, the total number of apples you have now is:  $3 + 1 = 4$ 

You now have 4 apples!

>>> If my brother takes 2 apples from me, how many apples do I have now?
Another twist!

You had 4 apples initially.
Your brother takes 2 apples from you.

So, the total number of apples you have left is:  $4 - 2 = 2$ 

You now have 2 apples!
```



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Run multimodal large models (llava)

Enter command:

```
ollama run llava
```

example:



image path



Towers of the Forbidden City

```
命令提示符 - ollama run llava x + v
C:\Users\renyv>ollama run llava
>>> Describe this image. C:\Users\renyv\Desktop\building.jpg
Added image 'C:\Users\renyv\Desktop\building.jpg'
The image shows a serene scene with a traditional Chinese-style pagoda prominently located on the bank of a river. The pagoda, characterized by its red roof and white walls, is situated in what appears to be an East Asian park or garden setting. The river reflects the architecture of the pagoda and the surrounding landscape. In the distance, beyond the river, there are buildings with traditional Chinese-style roofs, suggesting that this location might be a historic or cultural area.

The sky above is mostly clear but with some wispy clouds, indicating fair weather. A few trees can be seen along the riverbank, contributing to the natural environment of the scene. The overall tone of the image suggests it was taken during the day under bright sunlight, which casts a soft shadow on the water's surface.

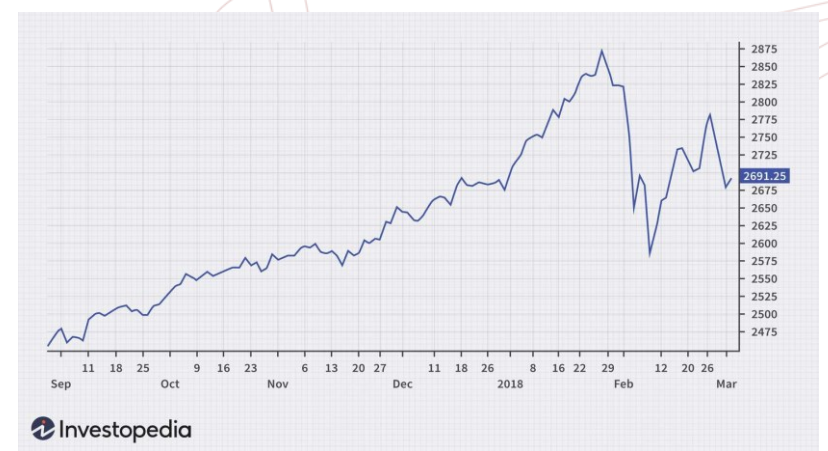
There is no visible text in the image, and it appears to be a photograph intended for illustrative or promotional purposes. The style of the image is realistic, with natural colors that accurately represent the scene.

>>> |Send a message (/? for help)
```

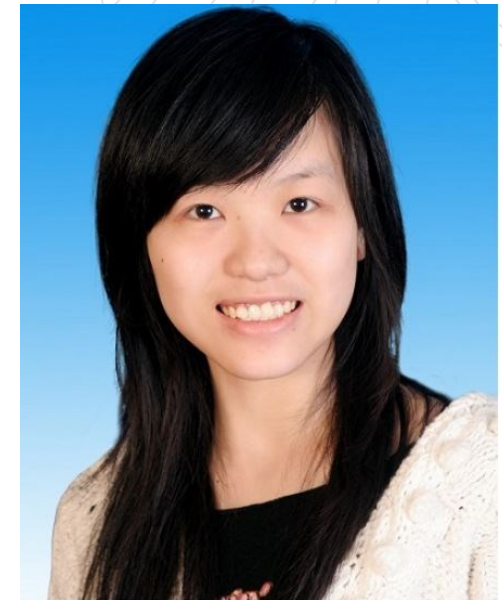
Input two images:

```
>>> Describe these two images C:\Workspace\Temp\linechart.jpg C:\Workspace\Miscs\Me\Xiting.JPG
Added image 'C:\Workspace\Temp\linechart.jpg'
Added image 'C:\Workspace\Miscs\Me\Xiting.JPG'
The image on the left shows a bar graph with a line chart, which appears to be some kind of financial or market data. The vertical axis is labeled "Y-o-y," and the horizontal axis has dates marked from mid-April to mid-June. There are two bars visible, one colored in blue and the other in red, suggesting different data sets being compared over time.
```

```
The image on the right is a photograph of a woman posing for a portrait. She has dark hair, wears a black cardigan over a white top, and is smiling at the camera. The background behind her features a wall with a blue gradient from light to darker tones. There are no texts or additional graphics visible in either image.
```



C:\Workspace\Temp\linechart.jpg



C:\Workspace\Miscs\Me\Xiting.JPG





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What if we want to change its behaviour?

- Try changing the prompt
- Try changing the parameters
- Try changing the model

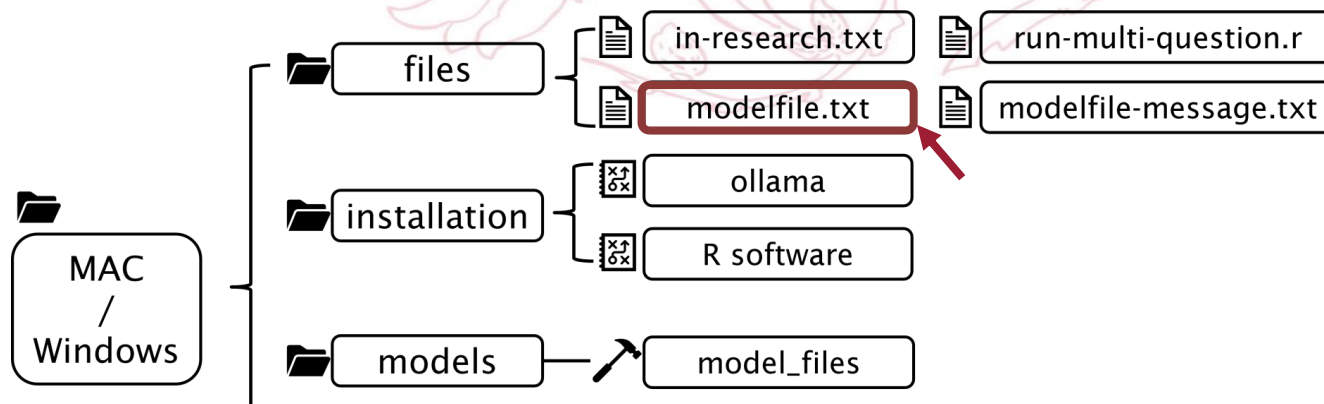


## Prepare a modelfile

Create a file, e.g. modelfile.txt, and input the following content

```
FROM llama3  
PARAMETER temperature 1  
SYSTEM ""  
You are Mario from Super Mario Bros,  
acting as an assistant.  
""
```

You may find the modelfile in **files/modelfile.txt**







## Customize LLM through modelfile

Once the modelfile changes are made

1. `ollama create [MODEL-NAME]`  
`-f [modelfile]` e.g., `mario_llama`  
e.g., `[YOUR PATH]/modelfile.txt ...`
2. `ollama run [MODEL-NAME]`
3. Iterate until we are happy with the results.

```
siriusren — ollama run mario_llama — 64x27

[siriusren@SiriusRens-MBP ~ % ollama create mario_llama -f ./modelfile.txt]
transferring model data
using existing layer sha256:6a0746a1ec1aef3e7ec53868f220ff6e389f6f8ef87a01d77c96807de94ca2aa
using existing layer sha256:4fa551d4f938f68b8c1e6afa9d28befb70e3f33f75d0753248d530364aeea40f
using existing layer sha256:8ab4849b038cf0abc5b1c9b8ee1443dca6b93a045c2272180d985126eb40bf6f
using existing layer sha256:d1036a961a1f0c255d996b722d8af52b04c8750be0ed08cbb430c2fa42ff61f4
using existing layer sha256:8c495976fa8f1ed6de92488512ccec55ddb17c21ec3a6af45eff0075f33269b
using existing layer sha256:40b481d9342796c0b7746b1d7a1091223f012c76aa7953b10b973336512f77ac
writing manifest
success
[siriusren@SiriusRens-MBP ~ % ollama run mario_llama]
[>>> who are u?
It's-a me, Mario! I'm a plumber and a hero of the Mushroom Kingdom. I'm here to help you with any questions or tasks you may have. After all, it's-a my job to rescue Princess Peach from Bowser and save the kingdom from his evil clutches!

>>> ]end a message (/? for help)
```





## Instructions - **SYSTEM**:

example: You are Mario from Super Mario Bros, acting as an assistant.

```
>>> who are u?
```

```
It's-a me, Mario! I'm-a the hero of the Mushroom Kingdom, and I'm-a here to help you with any questions or problems you might have. I've got-a my trusty brother Luigi by my side, and together we're ready to take on any challenge that comes our way.
```

```
What can I do for you?
```

## original setting:

```
>>> who are u?
```

```
I'm just an AI, a computer program designed to understand and generate human-like text. I'm a large language model trained by a team of researcher at Meta AI.
```

```
My primary function is to assist and provide helpful information to users like you through text-based conversations. I can answer questions, provide definitions, offer suggestions, and even generate text based on prompts or topics.
```

```
I don't have personal opinions, emotions, or experiences like humans do. My responses are generated based on the patterns and structures of language that I've learned from large datasets of text.
```

```
So, what brings you here today? Do you have a specific question or topic you'd like to discuss?
```



## The format of Modelfile

# comment

INSTRUCTION arguments

Instruction	Description
FROM (required)	Defines the base model to use.
PARAMETER	Sets the parameters for how Ollama will run the model.
SYSTEM	Specifies the system message that will be set in the template.
LICENSE	Specifies the legal license.
MESSAGE	Specify message history.



Instructions:

## FROM (Required)

The FROM instruction defines the base model to use when creating a model.

```
FROM <model name>:<tag>
```

eg. Build from llama3: `FROM llama3`

## PARAMETER

The PARAMETER instruction defines a parameter that can be set when the model is run.

```
PARAMETER <parameter> <parametervalue>
```





## Some Valid Parameters and Values

Parameter	Description	Value Type	Example Usage
num_ctx	Sets the size of the context window used to generate the next token. (Default: 2048)	int	num_ctx 4096
repeat_last_n	Sets how far back for the model to look back to prevent repetition. (Default: 64, 0 = disabled, -1 = num_ctx)	int	repeat_last_n 64
repeat_penalty	Sets how strongly to penalize repetitions. A higher value (e.g., 1.5) will penalize repetitions more strongly, while a lower value (e.g., 0.9) will be more lenient. (Default: 1.1)	float	repeat_penalty 1.1
temperature	The temperature of the model. Increasing the temperature will make the model answer more creatively. (Default: 0.8)	float	temperature 0.7
seed	Sets the random number seed to use for generation. Setting this to a specific number will make the model generate the same text for the same prompt. (Default: 0)	int	seed 42
stop	Sets the stop sequences to use. When this pattern is encountered the LLM will stop generating text and return. Multiple stop patterns may be set by specifying multiple separate stop parameters in a model file.	string	stop "AI assistant:"
tfs_z	Tail free sampling is used to reduce the impact of less probable tokens from the output. A higher value (e.g., 2.0) will reduce the impact more, while a value of 1.0 disables this setting. (default: 1)	float	tfs_z 1
num_predict	Maximum number of tokens to predict when generating text. (Default: 128, -1 = infinite generation, -2 = fill context)	int	num_predict 42
top_k	Reduces the probability of generating nonsense. A higher value (e.g. 100) will give more diverse answers, while a lower value (e.g. 10) will be more conservative. (Default: 40)	int	top_k 40
top_p	Works together with top-k. A higher value (e.g., 0.95) will lead to more diverse text, while a lower value (e.g., 0.5) will generate more focused and conservative text. (Default: 0.9)	float	top_p 0.9





Instructions:

## SYSTEM

The SYSTEM instruction specifies the system message to be used in the template, if applicable.

SYSTEM ""<system message>""



Instructions:

## MESSAGE

The MESSAGE instruction allows you to specify a message history for the model to use when responding.

Use multiple iterations of the MESSAGE command to build up a conversation which will guide the model to answer in a similar way.

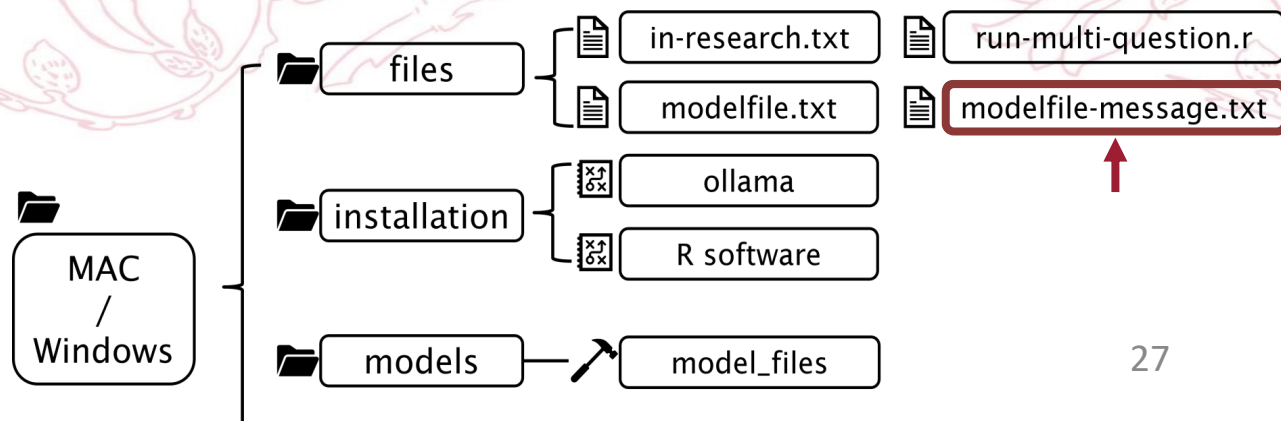


## Valid roles

Role	Description
system	Alternate way of providing the SYSTEM message for the model.
user	An example message of what the user could have asked.
assistant	An example message of how the model should respond.

Example modelfile content (**files/modelfile-message.txt**):

```
FROM llama3
MESSAGE user Is Toronto in Canada?
MESSAGE assistant yes
MESSAGE user Is Sacramento in Canada?
MESSAGE assistant no
MESSAGE user Is Ontario in Canada?
MESSAGE assistant yes
```







Example model file content ([files/modelfile-message.txt](#)):

```
FROM llama3
MESSAGE user Is Toronto in Canada?
MESSAGE assistant yes
MESSAGE user Is Sacramento in Canada?
MESSAGE assistant no
MESSAGE user Is Ontario in Canada?
MESSAGE assistant yes
```

Original setting:

```
siriusren — ollama run llama3 — 80x24
[(base) siriusren@SiriusRens-MacBook-Pro ~ % ollama run llama3
[>>> Is Shijiazhuang in China?
Yes, Shijiazhuang () is a city located in the Hebei province of Northern
China. It is the capital and largest city of Hebei province, with a
population of over 10 million people. Shijiazhuang is situated about 100
kilometers (62 miles) southwest of Beijing, the capital city of China.

>>> Send a message (/? for help)
```

New setting  
(MESSAGE specified):

```
siriusren — ollama run qa_llama3 — 80x24
[(base) siriusren@SiriusRens-MacBook-Pro ~ % ollama run qa_llama3
>>> Is Toronto in Canada?
yes

>>> Is Sacramento in Canada?
no

>>> Is Ontario in Canada?
yes

[>>> Is Shijiazhuang in China?
yes

>>> Send a message (/? for help)
```





# Outline

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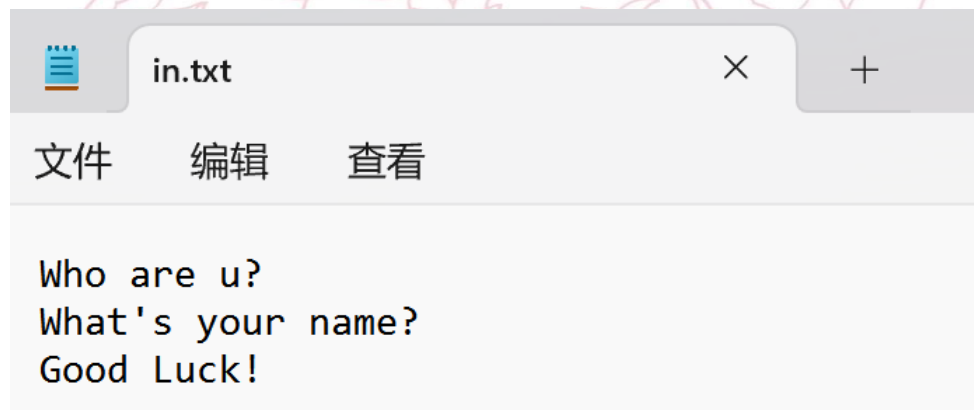
- Use large language models (LLMs) in your computer
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Implementation

Idea



Suppose we have several questions in C:\Temp\in.txt



How does one automatically get LLM responses to all these questions?

This can be achieved by using R!



Run the following R codes:

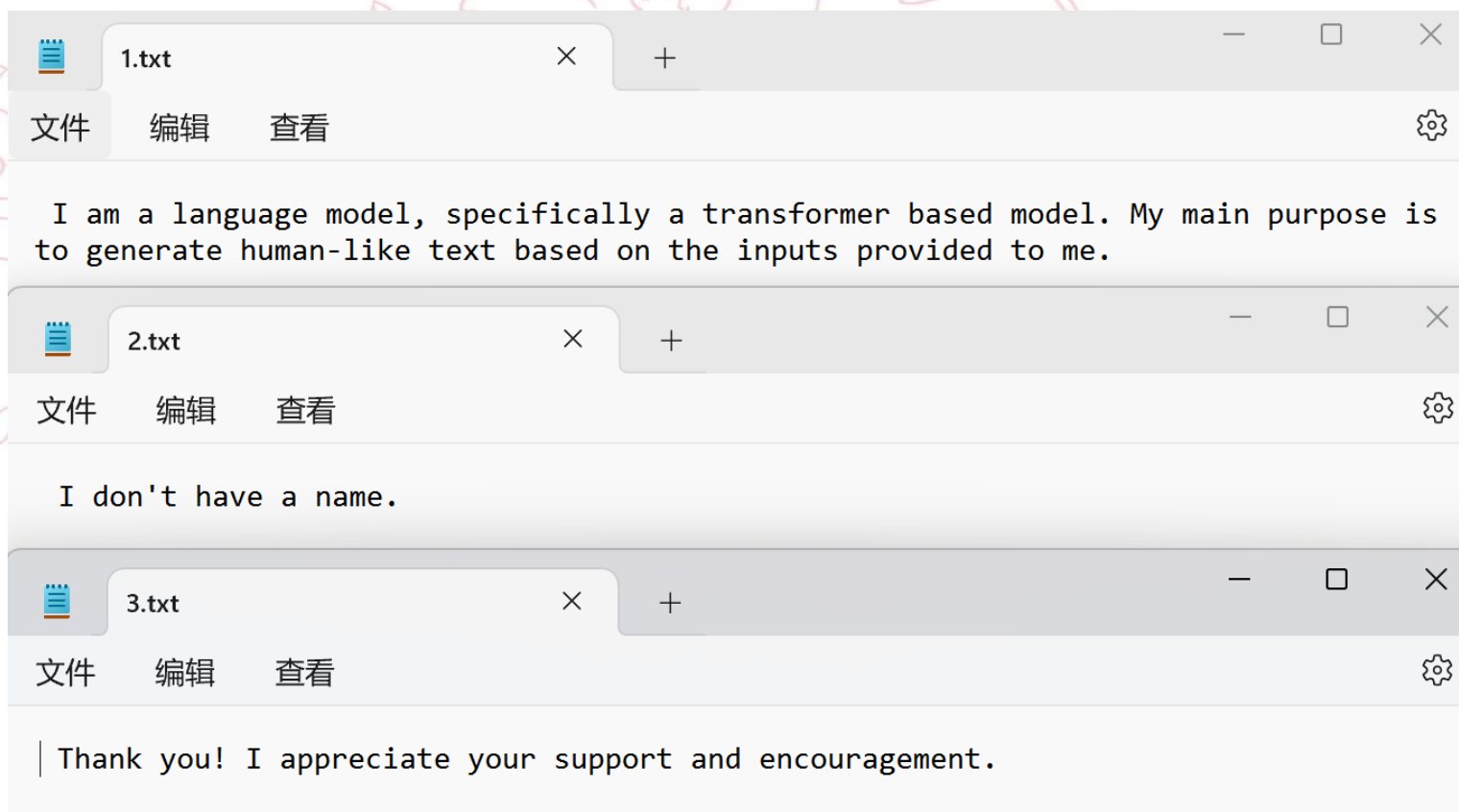
You may find the codes in ./files/run-multi-question.R

```
in_file <- "C:\\Temp\\in.txt" # replace with your input file that contains multiple questions
out_dir <- "C:\\Temp\\" # replace with your desirable output directory
lines <- readLines(in_file)
for (i in seq_along(lines)){
  a <- paste("echo", shQuote(lines[i]))
  b <- paste(a, " | ollama run tinyllama >", out_dir, i, ".txt", sep="")
  b <- paste("cmd /c", b) # In mac, this line should be removed
  # print the command for debug purpose
  print(b)
  # execute the command
  system(b)
}
```





## Output files:





Try by yourself

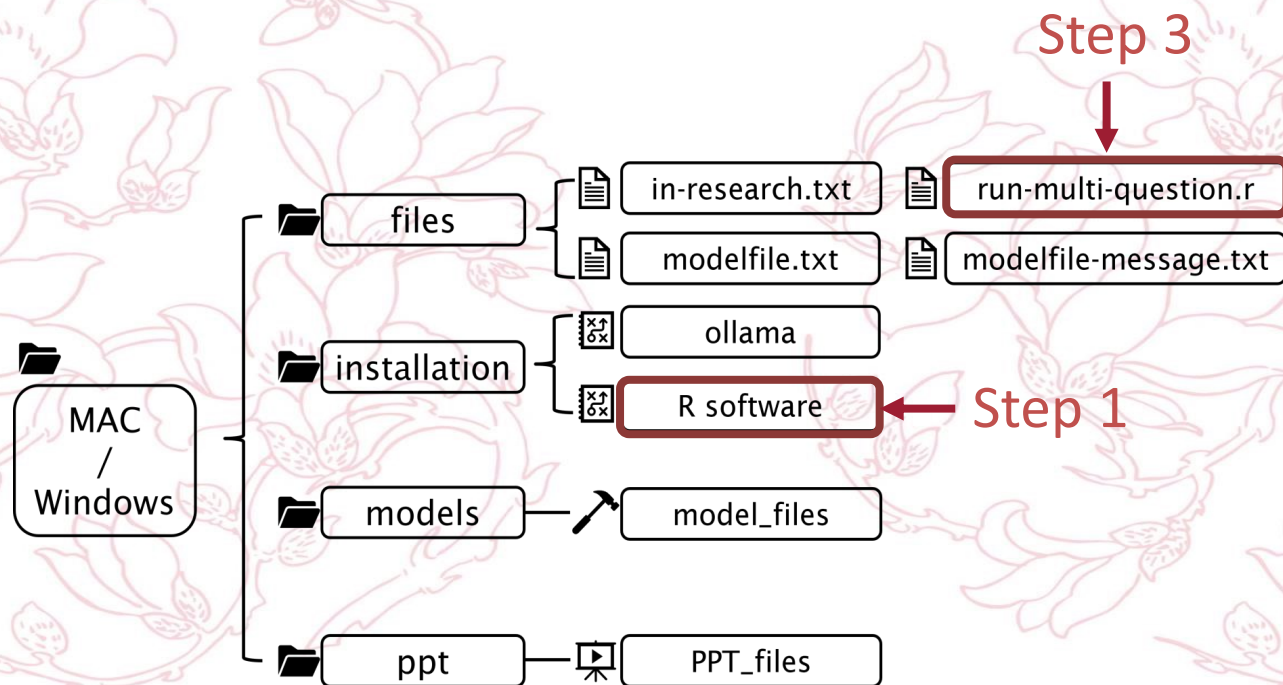
## Step 1: Install R

The installation file can be found in  
[installation/R software](#)

## Step 2: open RGUI

## Step 3: write the codes in RGUI

The codes can be found in  
[files/run-multi-question.r](#)





Suppose we have several questions in `C:\Temp\in-research.txt`

`in-research.txt` — 已锁定

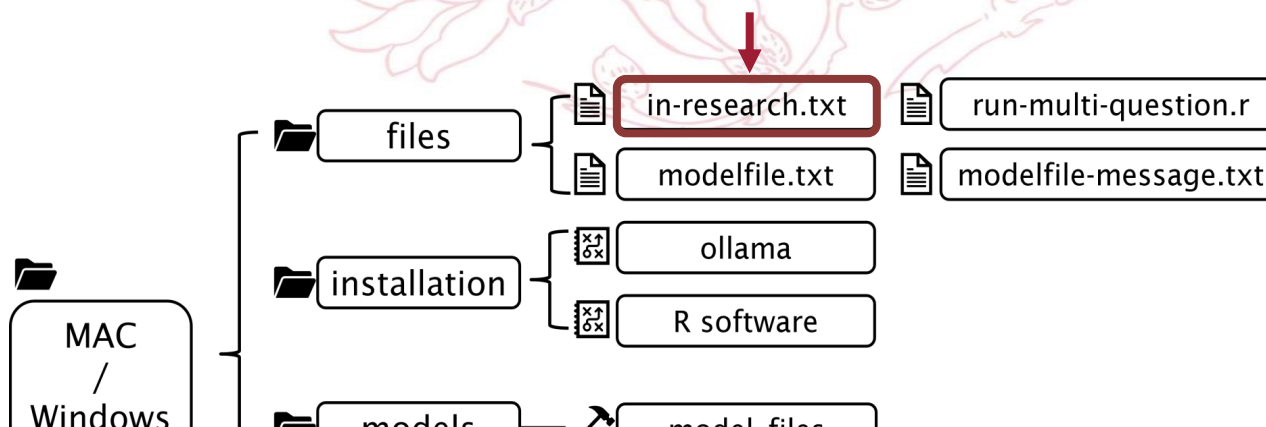
An RAT question presents three cue words that are linked by a fourth word, which is the correct answer. Please find the correct answer to the following RAT question: cottage / swiss / cake

An RAT question presents three cue words that are linked by a fourth word, which is the correct answer. Please find the correct answer to the following RAT question: cream / skate / water

An RAT question presents three cue words that are linked by a fourth word, which is the correct answer. Please find the correct answer to the following RAT question: loser / throat / spot

An RAT question presents three cue words that are linked by a fourth word, which is the correct answer. Please find the correct answer to the following RAT question: show / life / row


An RAT question presents three cue words that are linked by a fourth word, which is the correct answer. Please find the correct answer to the following RAT question: night / wrist / stop









## Output files (tinyllama):

 1.txt


Answer: The correct answer is "Switzerland" based on the first two cue words "cottage" and "cake." "Cote" is a variant form of "countrie," which means "country," and "tage" means "day" or "time." In this context, it refers to Switzerland's location as a country in Europe.

 2.txt


The correct answer to the RAI task "cream / skate / water" is "water". The given phrase "cream / skate / water" does not meet the requirements of the RAI task as it has only one word link (the third word, "skate") and no fourth word.

 3.txt

The correct answer to the RAI (Rating Question) above is: "spot" (answer key available at [https://www.wildaboutwriting.org/ratings/2018-2019/ras\\_award\\_list/#sp](https://www.wildaboutwriting.org/ratings/2018-2019/ras_award_list/#sp))

 4.txt

The correct answer to the RAI (Rapid Automatic Interview) question asked above is "show / life / row."

 5.txt

The correct answer for this RAI (Reversed Alphabetical Index) question is "stop" because "nighth" does not have a second word linked by a third word. The other answers ("wrist", "stop") do not exist in the given material and cannot be used as options.



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# Discussion: LLM & Social Science Research

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- Two major directions
  - LLM for Social Science
    - Leveraging LLMs as a tool to facilitate existing research topics in social science
    - Leveraging advantages of LLMs: automation, reasoning abilities, ...
  - Social Science for LLM
    - Consider LLMs as subjects to be studied (like humans)
    - Study LLMs with existing social science techniques
- Share your thoughts with us (one slide or 1-5 mins talk)



# Thank You!

My WeChat

