

The Research Help Book

New User

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Chapter 1

Research prompts

I am a beginner trying to read research papers with the aim of identifying research gaps so I can publish my own papers.

However, I have no prior experience with research or reading academic papers, and I find it quite challenging due to several issues.

These include difficult English, complex paper structures, poorly explained content, and limited background knowledge on the topics discussed.

Currently, I have decided to focus my research on AI/ML, specifically the use of large language models (LLMs) in education.

I would like to discuss how you can assist me in understanding research papers.

It would be helpful if you could provide me with a list of clear, well-structured prompts that I can use to gradually build my comprehension—from the basics to a thorough understanding of any research paper.

1.1 Prompts to understand a paper

1. part 01 : GPT-Based Code Review System.

i have attached a paper with this. I have also attached a sample latex file named(stages_example.tex) to describe pipeline stage. Will be you be able to answer questions so that i will not have to attache it with every new prompt of this thread? Link to both files.

2. summerize the abstract for me in easy language for a novice in very easy sentences.
3. What is the the initial input and final output of the work proposed by this paper. your content should be in easy language aimed at a novice beginner.
4. fill following empty latex structure with input and output of the papers proposed work. Marks the lines as explicit or inferred.

```
\item Input
\begin{enumerate}
\item zzz
\end{enumerate}
\item output
\begin{enumerate}
\item zzz
\end{enumerate}
```

5. My goal is to know the step by step alogorithm that transform input to output and create a flowchart that transforms input to output. There are various stages that will convert input to final output, just like the a pipeline, where each stage takes some input uses a tool/method to convert it to output and this output acts as input to next stage. These stages shoud be considered as methods/function whose arguments are the inputs of the stage and its return value is the output of the stage. This process goes on and finally the final output is created. search the the paper to extract(identify) all explicitly mentioned tools/methods/algorithms, arrange them in order, and present them as a list before we start creating individual stages. to understand what a stage looks like refer to the the file i attached in previous prompt named stages_example.tex. Creating of prompt to be sent to llm should be treated as one separate stage and invoking LLM using that prompt should be a separate stage. First stage should take the initial input and the last stage should generate the final output you mentioned above. Do not write any latex code now. Your first line of response should tell me if you are able to access the file stages_example.tex and then show show go ahead with your response.

6. Lets start with the stage. give its explanation in easy language for a novice in very easy sentences.
7. generate latex section for this stage. You can refer previously attached file stages_example.tex for reference. Anything that comes directly from the paper is marked as explicit, write the word explicit in green color. Anything that is not written in the paper but is normally done in such systems should be marked as inferred(Blue). When uncertain, it is safer to mark something as inferred rather than claiming that the paper said it. Use visual distinction (e.g., Blue color, [INFERRED] tags) to differentiate these in all sections. i want to keep it simple and short.
8. what should be our next stage?
9. generate latex section for next stage
10. check following for correctness.

1.2 Prompts to create pipeline stages

1. content should be aimed at a beginner school student
2. write this paper in hindi and give me a pdf to download.
3. What is the the initial input and final output of the work propesed by this paper. aimed at a beginner school student.
4. instruction to create pipe line stages
 - (a) write step by step alogorithm that transform input to output.
 - (b) There are various stages that will convert input to final output, just like the a pipeline, where each stage takes some input uses a tool/method to convert it to output and this output acts as input to next stage. This process goes on and finally the final output is created
 - (c) Identified all tools, methods, and algorithms mentioned in the paper. After that, these tools should be arranged in the order in which they work, from beginning to end. Each tool or method then becomes one stage. Finally, the whole pipeline must be checked to ensure that the stages are correct, that each stage has only one main tool or method, and that the data flow is continuous and logical. The most important idea is that every tool, method, or algorithm used in the paper must be treated as one separate stage. Each stage should perform only one action. The output of one stage becomes the input of the next stage, forming a simple straight flow from the beginning to the end of the process. we shoud have as many stages equal to the number of tool/methods/algorithms used in the proposed work of this paper.
 - (d) For each stage, explicit information from the paper must be recorded, while inferred standard practices must be marked separately. Anything that comes directly from the paper is marked as explicit. Anything that is not written in the paper but is normally done in such systems should be marked as inferred. This difference must always be clearly shown. When uncertain, it is safer to mark something as inferred rather than claiming that the paper said it. Use visual distinction (e.g., red color, [INFERRRED] tags) to differentiate these in all sections.
 - (e) Each stage must follow a fixed structure. First, a description of what the stage does must be given, including explicit and inferred parts. Next, the input of the stage must be explained, showing exactly what type of data enters it. Then the output must be described, showing what type of data leaves the stage. Finally, the internal process of the stage must be explained. The process section should describe how the input is transformed into the output.
 - (f) search the the paper to extract(identify) all explicitly mentioned tools/methods/algorithms, arrange them in order, and present them as a list before we start creating individual stages

- (g) discuss with me description, input, output, tools/methods/algorithms and process used in Stage 1 of the pipeline based on the research paper.

5. pipeline summary

- (a) Using the pipeline stages we previously created, identify all innovations introduced by the authors. Present the answer as a structured section titled "(PAPER TITLE) Paper Innovations Mapped to Pipeline Stages". For each item give short description of the innovation as the main item, then uses sublists to specify: (1) the affected pipeline stage or "NEW STAGE", (2) what is explicitly stated in the paper marked [EXPLICIT], and (3) what is inferred from standard practices or logical analysis marked [INFERRED] in red. Include both major innovations and minor improvements. End with a summary sentence counting total modified/new stages and their concentration area. Use the following pipeline stages: [PASTE YOUR PIPELINE HERE].
- (b) We already created the pipeline stages for this paper. Now explain what new contribution or innovation the authors introduced. Identify whether the paper adds any new stages to a standard pipeline or whether it introduces improvements or innovations inside existing stages. Describe clearly what is genuinely novel compared to traditional approaches.
- (c) Using the pipeline stages we previously created, identify all innovations introduced by the authors in the paper. Present the answer as a structured list, where each item names the innovation and specifies which pipeline stage it modifies or whether it represents a completely new stage. Include both major innovations and minor improvements or tweaks. For each item, clearly indicate what is explicitly stated in the paper and what is [INFERRED] from standard practices or logical analysis. Mark all inferred components with the [INFERRED] tag. Produce a clear, organized list of innovations and ideas, each linked to its corresponding stage or identified as a new stage.
- (d) create a new latex section and use list(enumeration) and write this content in it. instead of writing the stage name as heading of the list write a short description of the innovation. and under that list state the stage name or weather its a new stage.
- (e) Using the pipeline stages we previously created for this paper, analyze the research and explain all the innovations introduced by the authors. Describe both technical innovations and conceptual or framework-level contributions. Your explanation should be written in clear paragraphs, not in list form. Identify whether the paper adds any entirely new pipeline stages or whether it introduces new techniques, modifications, or improvements within existing stages. Discuss both major innovations and minor tweaks, but make it clear which ones are significant and which ones are incremental. For every innovation you describe, clearly separate what is explicitly stated in the paper and what is [INFERRED] based on common research practices or logical interpretation. Mark all inferred content using the [INFERRED] tag. Focus on accurately revealing what the authors have truly contributed beyond standard or baseline pipelines. your content should be aimed at a beginner school student written in easy language.

1.3 My prompts

1. TL;DR of this paper aimed at a novice school student (beginner-friendly) in point vise manner
2. Summarize this paper in aimed at a beginner school student. Cover these aspects: the problem the paper addresses, why this problem matters, what the authors did to solve it, how they tested or evaluated their work, and the main result or finding.
3. List all tools / technologies / methods / methodologies used in this paper (e.g., models, libraries, datasets, metrics), aimed at a beginner school student
4. What is the the initial input and final output of the work propesed by this paper. aimed at a beginner school student.
5. What the pipeline stages which converts input to final output. Give a step-by-step narrative explanation of each stage (like how data flows and decisions happen)? your answer should be aimed at a beginner school student. Just write the names of the stages we will discuss each stage later.
6. for each stage write the algorithm that converts input to the output.
7. Make a table with 5 columns: stage name, input to this stage, description, tools used, outputs of this stage. your answer should be aimed at a beginner school stu- dent. write latex code. the table should not be truncated in page. all collumns should be visibel.
8. write all the tools used in the order they have been used in the pipe-line.

1.4 Prompts

1. Act as my research mentor. For each part or section, explain key ideas and ask me reflective questions so I can build understanding.
2. Give a list of tools/technologies/methods/methodologies they used in this paper
3. What is the initial input and final output of the work proposed by this paper.
4. What are the stages which converts input(example a prompt) to final output(example mcq questions)
5. Create a diagram/table/flowchart showing how all these components interact in the MCQGen pipeline?
6. Convert this into a visual diagram (flowchart-style image) showing arrows and boxes
7. Give a step-by-step narrative explanation of each stage (like how data flows and decisions happen)?
8. What new thing the paper has done or proposed and what was the earlier approach
9. Summarize this paper simply for a beginner
10. Explain what each section of this paper contributes
11. Explain the technical terms and equations simply.
12. Explain how their experiment works and what they found
13. Evaluate the paper's methodology and reliability
14. List research gaps or open problems from this paper
15. Suggest related works or follow-up papers
16. Based on these gaps, suggest possible research ideas for me

Prompt Categories for Understanding Research Papers

A. Quick / Beginner Prompts

- TL;DR of this paper aimed at a novice school student(beginner-friendly) in point vise manner.
- Give a 2-sentence explanation aimed at a high-school student
- Summarize this paper in aimed at a beginner school student. Cover these aspects: the problem the paper addresses, why this problem matters, what the authors did to solve it, how they tested or evaluated their work, and the main result or finding.
- Translate the abstract into plain English. Replace technical words with everyday words.
- List all glossary terms from this paper and explain each, aimed at a beginner school student.
- Translate the abstract into plain English. Replace technical words with everyday words
- Explain what each section of this paper contributes
- Explain the technical terms and equations simply.
- Explain how their experiment works and what they found
- Evaluate the paper's methodology and reliability
- What new thing the paper as done or proposed and what was the earlier approach , aimed at a beginner school student.

B. Structure / Components Prompts/ Process & Dataflow Prompts

- List all tools / technologies / methods / methodologies used in this paper (e.g., models,libraries, datasets, metrics), aimed at a beginner school student
- What is the initial input and final output of the work proposed by this paper. aimed at a beginner school student.
- What the pipeline stages which converts input(example a prompt) to final output(example mcq questions)
- Create a short checklist of what I'd need to implement a minimal working version (code libraries, hardware, dataset, hyperparameters).
- Explain step-by-step how input data is transformed into the output — write it as a numbered sequence.
- Make a table with 5 columns: stage name, input to this stage, description, tools used, outputs of this stage. your answer should be aimed at a beginner school student.write latex code. the table should not be truncated in page. all columns should be visible.
- Make a table: left column = stage name, middle = what happens there, right = inputs/outputs of that stage.

C. Visuals & Diagrams Prompts

- Create a concise flowchart description (text) I can use to draw a diagram: nodes and arrows labeled.
- Create a diagram/table/flowchart showing how all these components interact?
- Convert this into a visual diagram (flowchart-style image) showing arrows and boxes
- Give a step-by-step narrative explanation of each stage (like how data flows and decisions happen)? your answer should be aimed at a beginner school student
- Convert the pipeline into pseudocode (short, main functions only).
- Generate a flowchart description (boxes + arrows) for the model pipeline suitable for slide creation.
- Create a simple diagram caption and a short legend for each box in the flowchart.
- List the exact labels and a recommended layout (horizontal/vertical) to draw the diagram in PowerPoint.

D. Math, Algorithms, and Code Prompts

- Explain the main equations line-by-line. For each variable, say what it represents and its units if any.
- Show a worked toy example (numerical) through the core equation / algorithm (use small numbers).
- Translate the method into Python-like pseudocode, with function names and comments.
- If I wanted a minimal reproducible code snippet, what are the 8–12 lines of code I could start with?
- Identify hyperparameters, their roles, and good starting values (with justification).

E. Evaluation, Baselines, and Experiments Prompts

- List the datasets used, their sizes, and why they are appropriate or not.
- Summarize the evaluation metrics and explain what each one means in practice.
- Compare the paper’s method with the baselines: what improves and by how much (numbers)?
- Suggest 3 ablation experiments to test which parts of the model matter most.

F. Critique & Limitations Prompts

- List 8 strengths and 8 weaknesses of the paper — be concrete and specific.
- Identify any unstated or hidden assumptions the authors make.
- Find possible failure modes or data regimes where their approach will break.
- Point out questionable experimental choices or missing baselines.

G. Research Gap / Idea Generation Prompts

- Based on this paper, suggest 6 follow-up research questions or directions.
- Propose 4 concrete, publishable project ideas that extend or improve this paper (include a one-sentence hypothesis and one experiment each).
- Find low-effort / high-impact experiments I could run in 1–2 weeks to get publishable results.
- Suggest related fields or communities (conferences/journals) that would be interested in this work.
- List research gaps or open problems from this paper
- Suggest related works or follow-up papers
- Based on these gaps, suggest possible research ideas for me

H. Reproducibility & Implementation Prompts

- Give me a step-by-step reproducibility checklist: data download → preprocessing commands → training command → evaluation command.
- List exact hardware and runtime estimates (GPU type, memory, time) for training the model at published scale (rough estimate).
- Create a minimal dataset / toy dataset and the code to test the idea quickly.

I. Writing, Presentation & Literature Mapping Prompts

- Write a concise Related Work paragraph that places this paper among similar efforts (3–4 sentences).
- Draft a paragraph that summarizes this paper to include in my literature review.
- Create 6 slide titles and one-line bullet points for a 6-slide presentation of this paper.
- Find 8 papers cited by this paper and give a 1-sentence summary for each (if you can access them).

J. LLM-in-Education Specialization Prompts

- Explain how this paper’s method could be adapted for educational use-cases (MCQ generation, feedback, tutoring).
- Give 6 concrete ways a large language model could be integrated into this pipeline for education-specific improvements.
- List ethical / fairness / safety issues when using LLMs in education and how to test for them.

K. Practical Usage Prompts

- I am uploading [paper.pdf]. Start by giving me: 1) TL;DR (1 sentence), 2) Beginner summary (3 bullets), 3) Top 5 weaknesses.
- Here is the PDF. Produce a slide deck outline (6 slides) and a diagram description of the pipeline.

- Take this paper and suggest 3 reproducible experiments I can run in 2 weeks on a single GPU; include datasets and approximate time.

1.5 Goal

1. Learn how to read and understand research papers
2. Extract the key ideas and identify research gaps
3. Gradually build enough knowledge to design and publish your own paper in AI + Education (LLMs)
4. LLM can generate
 - (a) Plain-English summary (for beginner comprehension)
 - (b) Concept map (explaining how ideas are related)
 - (c) Methodology flow explanation
 - (d) Glossary of technical terms
 - (e) Critical evaluation (strengths, limitations, assumptions)
 - (f) Research gaps + possible extensions
 - (g) Template for your literature review