Think Wider, Write Stronger

YKnow
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Agenda

liner ✕ SBVenture

Challenge

How can Liner further differentiate itself from competitors and increase its market penetration among students and researchers?

Tactic1. Introducing new capabilities

Liner Mission

"Helping people become smarter faster"

Liner Vision

"Quickly delivering reliable information through recommendations"

#2. 10 Pain Points
Identifying 10 specific pain points
students face during research

10 Pain Points

1. Difficulty of expressing mathematical symbols

2. Lack of automatic word count functionality

3. Absence of utilizing information on YouTube

4. Absence of a feature to export generated content as PDFs or to GoodNotes

5. Inconsistency in the response language when using multiple languages

6. Inability to adjust response depth based on education level

7. Lack of creativity in generated content

8. Lack of functionality to retrieve sources from subscribed websites

9. Absence of a feature to refine essays based on field-specific characteristics and considerations
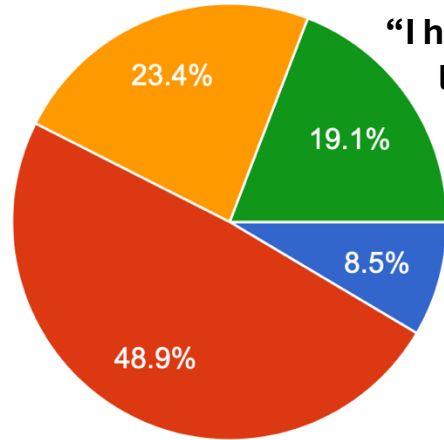
10. Inability to directly generate images or tables
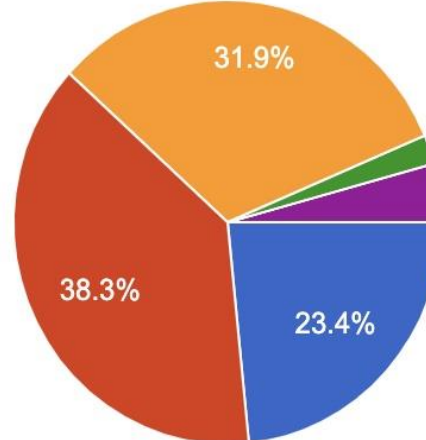
#3. Five Feature Ideas
Developing feature ideas to address
the Identified pain points

Developing Feature Ideas

| Pain Points	Features
1. **Difficulty of expressing mathematical symbols**	Display a mathematical keyboard window to make symbol input more accessible
3. **Absence of utilizing information on YouTube**	Provide YouTube videos along with the specific sourced part referenced in the content
4. **Absence of a feature to export generated content as PDFs or to GoodNotes**	Add options to export generated content directly as PDFs or to GoodNotes
6. **Inability to adjust response depth based on education level**	Include an adjustable scale (1–5) to customize the depth of responses based on user's choice
7. **Lack of creativity in generated content**	Provide responses from various viewpoints and include constructive feedback to enhance creativity

Survey on Developed Features

We conducted a survey to gather insights on any challenges or discomforts experienced while using generative AI platforms such as ChatGPT, Claude, and Perplexity, and 47 people completed.

"I have encountered a lack of creativity in AI-generated content."

Chart 1: 23.4% Neutral, 19.1% Disagree, 8.5% Strongly Agree, 48.9% Agree

"I have experienced difficulties using mathematical functions or special symbols when asking questions to generative AI tools."

Chart 2: 31.9% Neutral, 38.3% Agree, 23.4% Strongly Agree

Chart 3: 25.5% Neutral, 8.5% Disagree, 31.9% Agree, 34% Strongly Agree

"I have experienced situations where GenAI provided answers that did not align with my education level."

Chart 4: 23.4% Neutral, 14.9% Disagree, 42.6% Agree, 19.1% Strongly Agree

"I have wanted to extract content or answers generated by GenAI into a file, such as a PDF or GoodNotes."

"I have experience transitioning to video-based platforms like YouTube for a more comprehensive and user-friendly understanding even after receiving AI-generated content/ answers."

Chart 5: 29.8% Neutral, 12.8% Disagree, 40.4% Agree, 17% Strongly Agree

● Strongly Agree   ● Agree   ● Neutral   ● Disagree   ● Strongly disagree

Process of narrowing down to one feature (1/2)

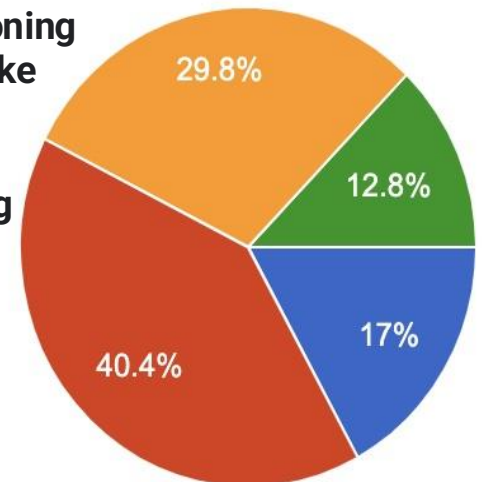"I have encountered a lack of creativity in AI-generated content."

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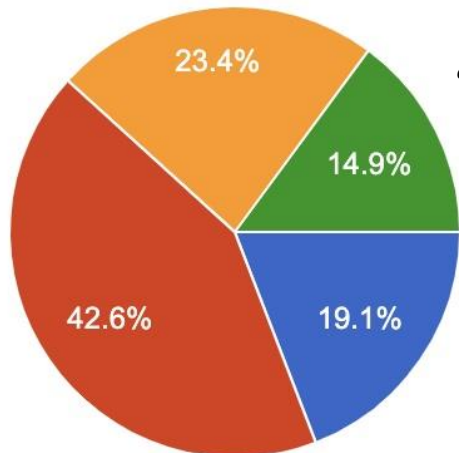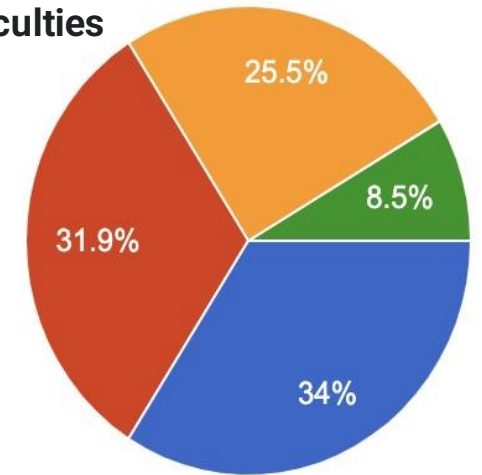
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● Strongly Agree ● Agree ● Neutral ● Disagree ● Strongly disagree

1	Compared to other features, it was the only one to receive a rating of 'strongly disagree.'
2	Similar to Liner's Fine-Tune Answers feature.

Process of narrowing down to one feature (2/2)

- **The one pain point :** **7. Lack of creativity in generated content**

- **The one feature :** **Provide responses from various viewpoints and include constructive feedback to enhance creativity**

- **The reason for choosing this feature among the remaining features in the survey:**

  - **Information diversity**: Users can access a variety of sources due to the inclusion of diverse perspectives and constructive feedback.

  - **Information reliability**: By providing multiple pieces of information rather than just one, it addresses reliability issues that may arise from a user relying on a single incorrect source.

  - **Company's direction**: Liner's goal is "Helping people become smarter faster." The ability to access rich and diverse information contributes directly to making people smarter.

"Liner Agent"
Think Wider, Write Stronger

"Your Agent" enhances your writing by broadening perspectives, offering opposing viewpoints, and providing constructive feedback on your essays
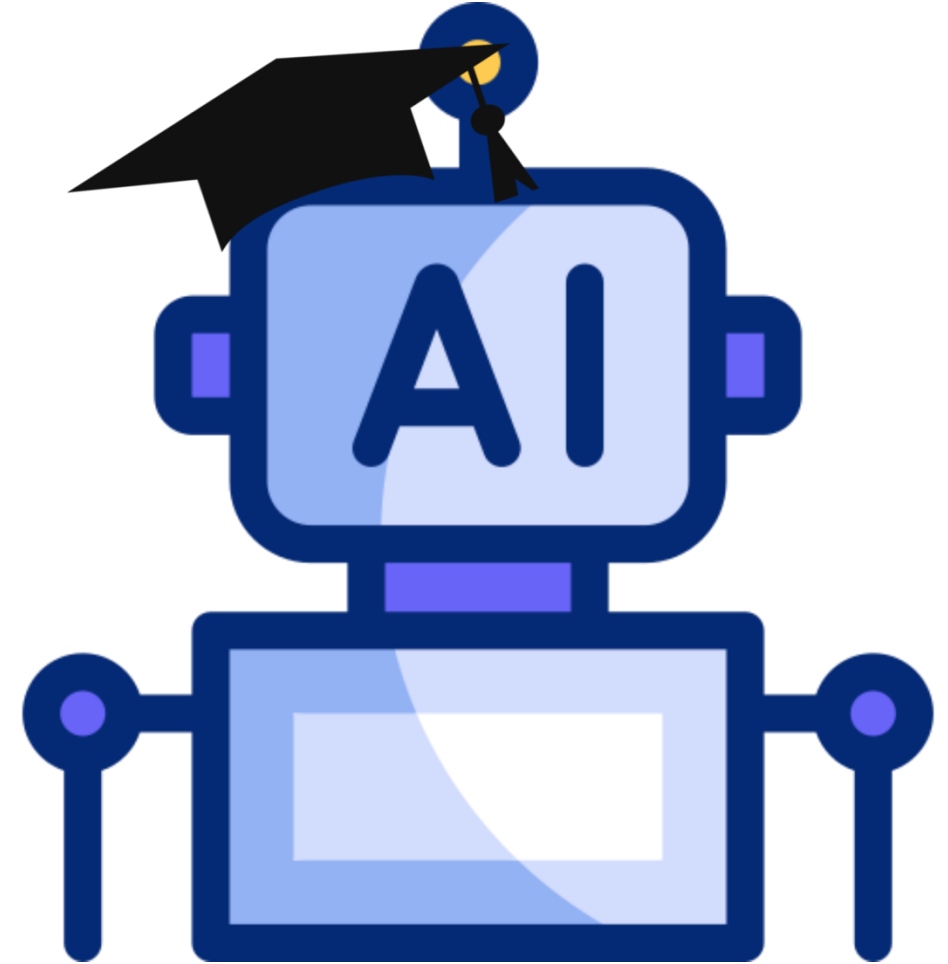
"Liner Agent"
Think Wider, Write Stronger

1
Linking information to the user's original sentence rather than the one revised by Liner

By directly linking the sentences in the user's essay to the source, it eliminates the need to compare Liner's revised sentences with the user's original ones.

2
Providing various viewpoints and constructive feedback to enhance creativity

By providing various viewpoints and constructive feedback, students can broaden their perspectives, refine their ideas, and strengthen their arguments, fostering creative thinking and improving the overall quality of their work.

Liner

When a user inputs their essay into Liner, it returns detailed explanations and insights from the user's original essay while citing sources for its explanations.

However, Liner's generated essay does not align precisely with the order of the user's essay sentences, resulting in additional time and effort for comparison.

What Liner Agent can Help you

Liner Agent 🔘

🤖 Acceleration of Global Warming Due to Carbon Emissions

Global warming is one of the most pressing challenges of our time, driven largely by carbon emissions from human activities. The burning of fossil fuels, such as coal, oil, and natural gas, has significantly increased greenhouse gas concentrations in the atmosphere, intensifying the natural greenhouse effect. This has caused global temperatures to rise, leading to melting ice caps, rising sea levels, and more frequent extreme weather events like hurricanes and heatwaves. Ecosystems and human societies are already feeling the impacts of these changes.

Energy production, transportation, industrial processes, and agriculture are the primary sources of carbon emissions. ₃ Fossil fuel reliance for electricity, heating, and transportation is a major contributor, while deforestation and livestock farming also exacerbate the issue. Addressing these emissions requires a shift to renewable energy sources, improved energy efficiency, and widespread adoption of sustainable practices. On a global scale, agreements like the Paris Climate Accord emphasize the importance of international collaboration to curb emissions.

While the challenges are immense, solutions are within reach. Transitioning to renewable energy, reducing consumption, and supporting green technologies can mitigate the worst effects of global warming. ₁ The climate crisis demands urgent and collective action, as the future of the planet and its inhabitants depends on the choices made today. ₄

Ask a follow-up question

Sources

↑↓ Most relevant | 🤖 Liner Agent 🔘 | Scholarly papers only 🔘

1 Economic Impact of Transitioning to Renewable Energy
Transitioning to renewable energy sources may have significant economic implications, including job losses in the fossil fuel industry and increased costs for consumers.
Min Liu et al. | Apr 27, 2023 | **11** Citations

📖 Cite

2 Technological Limitations of Green Technologies
The current green technologies may not be advanced enough to fully replace fossil fuels in all sectors, leading to potential gaps in energy supply and reliability.
J. Carnicer et al. | Jun 20, 2022 | **56** Citations

📖 Cite

3 Provide specific examples and data
To strengthen the essay, consider incorporating specific examples and data to support the claims made. For instance, you could include statistics on the amount of carbon emissions produced by different sectors or the impact of global warming on specific regions or species. This will enhance the credibility and persuasiveness ...
Yong Zhu et al. | Jun 19, 2022 | **59** Citations

📖 Cite

4 Offer practical solutions
While you mention transitioning to renewable energy and adopting sustainable practices as solutions, provide more specific and actionable steps that individuals, communities, and governments can take to reduce carbon emissions. Offering practical solutions will ...

Offering Opposing Viewpoints

Constructive Feedback

Depth Interviews with Five Students

Student 1

"Providing diverse perspectives when recommending papers or information can be highly beneficial for writing academic reports. Particularly, including opposing viewpoints can help create a more balanced and well-rounded argument."

Student 4

"There is a risk of overwhelming users with excessive information, forcing them to filter out relevant points. This may lead to losing the original direction of the essay, feeling inundated by criticism, or even having their initial ideas shaken."

Student 2

"Technically, implementing such a feature seems feasible with current search engine algorithms. The technology to extract and match relevant content from academic papers already exists, and algorithms that link related search queries can be leveraged."

Student 5

"The complex and nuanced language often used in academic papers might lead to difficulties in correctly identifying opposing perspectives or could result in misinterpretations. To address this, advanced natural language processing techniques would be required to accurately discern the key arguments of a paper and match them appropriately."

Student 3

"It can enhance students' critical thinking skills. Since they cannot search for what they don't know, directly recommending relevant information will make their learning experience more comprehensive."

Solutions to students' concerns

Student4 → To avoid overwhelming user with excessive information, we should make giving extra information <u>as an option</u> with a filter function.

Student 5 → The technical aspects were tested directly 'LLM → DistilBERT-based Sentence Transformers', and it was confirmed that the following features make this possible.

Implementation1: Sentence Matching

User Essay

Generated essay/content by Liner

Acceleration of Global Warming Due to Carbon Emissions

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Energy production, transportation, industrial processes, and agriculture are the primary sources of carbon emissions. Fossil fuel reliance for electricity, heating, and transportation is a major contributor, while deforestation and livestock farming also exacerbate the issue. Addressing these emissions requires a shift to renewable energy sources, improved energy efficiency, and widespread adoption of sustainable practices. On a global scale, agreements like the Paris Climate Accord emphasize the importance of international collaboration to curb emissions.

While the challenges are immense, solutions are within reach. Transitioning to renewable energy, reducing consumption, and supporting green technologies can mitigate the worst effects of global warming. The climate crisis demands urgent and collective action, as the future of the planet and its inhabitants depends on the choices made today.

(1/2)   (2/2)

To find the research paper for the highlighted sentence in the user's essay, the user needs to find the sentence revised by Liner. → We want to link the user's created sentences with the information.

Providing Source from User Essay Directly

User Essay

Used Metrics and Models

- The Characteristics of Comparative Sentences

"Not all words match exactly, but they are semantically similar."

Cosine Similarity	Jaccard Similarity	Euclidean Distance	Edit Distance
Highly Suitable. It works with embedding vectors to capture the semantic meaning of sentences rather than relying on exact word matches.	**Not Suitable.** Jaccard Similarity calculates the ratio of the intersection to the union of word sets, requiring exact word matches to score high.	**Moderately Suitable.** Shorter distances indicate closer vectors, but it's less interpretable than Cosine Similarity, especially without normalization.	**Not Suitable.** Edit Distance measures the number of operations (insertions, deletions, substitutions) required to transform one string into another. It is more suited for exact string matching or similarity in word sequences.

Comparing various 'Model' based on Cosine Similarity

Method: Sentence matching between 'a simple essay on global warming caused by carbon emissions' and 'the text revised by Liner'.

SBERT(all-MiniLM-L6-v2)	BM25	DistilBERT-based Sentence Transformers (distilbert-base-nli-stsb-mean-tokens)
It has the longest execution time but matches sentences closer to the correct answer than BM25.	It has the shortest execution time but assigns low similarity scores to sentences with weak relevance.	The execution time is shorter than SBERT. It shows results similar to the SBERT model.

Therefore, we determined that 'the DistilBERT-based Sentence Transformers model (distilbert-base-nli-stsb-mean-tokens)', which is based on 'Cosine Similarity', performs the best in sentence matching.

Implementation2: ChatGPT API and LLMs

User Input
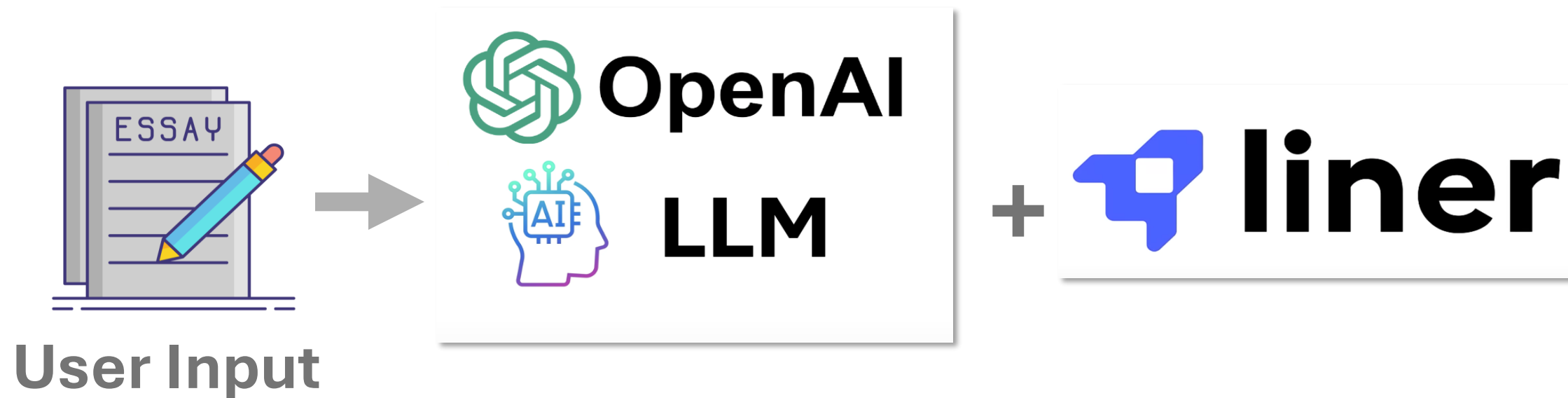
Utilize OpenAI's API or other LLMs to analyze our essay,
generating additional viewpoints and constructive feedback.
Then, Liner provides related papers along with the corresponding sources.

OpenAI

LLM

Prompt

+

liner

LLM Generated Answers

```python
1 # instruction to provide constructive feedback
2 system_prompt_constructive_feedback = '''You are a critical reviewer.
3 Read and analyze the user's essay and provide constructive feedback by identifying areas for improvement or enhancement according to the following rules:
4
5 [Rules]
6 - Respond only with specific suggestions for strengthening the essay.
7 - Start directly with the feedback and do not include introductory or concluding remarks.
8 - Use the following response format: 1. ... : Explanation of the suggestion.'''
```

```python
1 # instruction to provide additional viewpoints
2 system_prompt_opposing_viewpoints = '''You are a critical writer tasked with analyzing the user's essay.
3 The user is seeking opposing viewpoints to challenge the arguments presented.
4 Review the essay carefully and construct well-reasoned opposing viewpoints according to the following rules:
5
6 [Rules]
7 - Construct a minimum of three well-reasoned opposing viewpoints.
8 - Use the following response format: 1. ...: Explanation providing logical reasoning and context.
9 - The Main Point should be concise, expressed as a short phrase, sentence, or words.
10 - Number each response sequentially.
11 - Begin each response with the main point, followed by a clear and detailed explanation.
12 - Start directly with the main point. Avoid using introductory phrases such as "Opposing Viewpoint", "Main Point" or any labels before the main point.
13 - Do not include words like "Opposing Viewpoint", "Main Point"'''
```

1. **Provide specific examples and data**: To strengthen the essay, consider incorporating specific examples and data to support the claims made. For instance, you could include statistics on the amount of carbon emissions produced by different sectors or the impact of global warming on specific regions or species. This will enhance the credibility and persuasiveness of your argument.
2. **Offer practical solutions**: While you mention transitioning to renewable energy and adopting sustainable practices as solutions, provide more specific and actionable steps that individuals, communities, and governments can take to reduce carbon emissions. Offering practical solutions will empower readers to take meaningful action in addressing global warming
3. ....

1. **Economic Impact of Transitioning to Renewable Energy**: Transitioning to renewable energy sources may have significant economic implications, including job losses in the fossil fuel industry and increased costs for consumers.
2. **Technological Limitations of Green Technologies**: The current green technologies may not be advanced enough to fully replace fossil fuels in all sectors, leading to potential gaps in energy supply and reliability.
3. ...

From the LLM-generated answers using task-specific prompts, Linear Search Engine identifies matching papers.

What does it mean to make people smarter?

- Liner defines making people smarter as <u>providing accurate information through recommendations.</u>

- YKnow believes that, in addition to this, it is essential to offer people diverse perspectives.

- People can write incorrect content because they are not completely intelligent or always right. If Liner only provides related materials, it risks leading them down the wrong path or limited learning. However, by providing various viewpoints and constructive feedback, people can not only recognize their shortcomings but also broaden their perspectives, refine their ideas, and strengthen their arguments, fostering creative thinking and improving the overall quality of their work.

** <u>github url</u> for codes, data, and details**