NoteSwap: White Paper

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Abstract

NoteSwap is an AI-based online academic platform where students can share their notes, tutor each other, and join events created by teachers for community service hours. It also makes access to school information easier by allowing users to interact with NoteBot, a chatbot trained on data from the student handbook and other relevant school documents. This platform makes the acquisition and recording of community service hours fast and simple, and the sharing of notes allows for students to stay ahead in their studies, and not miss out on valuable information during absences. The tutoring feature allows struggling students to seek help from their peers, and allows tutors to be recompensed in community service hours for helping those students. Furthermore, the events tab allows schools and associations to get together.

Introduction

High School students are required to write notes for their classes, strive for good grades, and acquire as many community service hours as they can in order to have access to the best colleges. However, it is difficult to do so without feeling overwhelmed, and community service is sometimes challenging to get access to in an organized fashion. In some developing countries it can be very hard for students to get a chance to volunteer and earn community service. In addition, and especially in more fast-paced school environments, students will often miss valuable information during absences, making it difficult to fill their gaps of knowledge and catch up to their classmates. Furthermore, there are some students which simply struggle with some classes more than others, and need some help with certain concepts. Finally, new students may also find it challenging to get accustomed to the school rules, as they may vary from the ones they may be familiar with.

NoteSwap aims to address all of these issues by creating a user-friendly platform in which users can share notes, tutor each other, and volunteer for events created by teachers, for which they will receive points, which can be converted to community service hours displayed clearly in their profile. Moreover, users will also have access to NoteBot, a virtual AI assistant trained on the data from the school's student handbook, along with data about events, student

notes and inputs, and much more, to provide users with the best user experience, and render user-specific content.

Moreover, NoteSwap also provides services to teachers. With the rise and development of OpenAI's ChatGPT, and other AI language models, academic integrity is becoming harder and harder for professors and teachers to verify. However, there have been some AI generated text detectors developed to tackle this issue, and using a free api by Piratexx, NoteSwap provides teachers with their own AI detector. This allows for better management of AI-related plagiarism, and verification of academic integrity.

Another problem is the organization of events. Teachers are sometimes required to organize events in which community service hours are offered, but doing so can often be more difficult and complicated than it has to be. NoteSwap provides teachers with a much more effective model for organizing events, and makes awarding community service hours much faster and easier (more information regarding this model can be found in the **"Events"** section of the **"Features and Functionalities (Student Users)"**).

Problem Statement

<u>Students:</u>

- **Feeling stressed or overwhelmed during highschool:** Highschool is a time where students often tend to feel stressed, and pressured to get good grades, and academic pressure statistics show that 75% of American highschoolers (which can also be generalized to students of American schools) reported "'often or always feeling stressed' by schoolwork."(research.com, 2023). Furthermore, based on a survey launched as ASI highschool by our own company, several students showed concerns related to keeping up with the workload, and "unreasonable deadlines". They also showed concern regarding teachers' teaching methods not being suitable for them.

  NoteSwap aims to address this issue by providing students with access to other students' notes so as not to fall behind (which can be a cause of stress), and easy access to students volunteering as tutors, which can be very helpful for those who don't find teachers' teaching methods a good fit for their own learning style. Moreover, colleges like Al Akhawayn University also have their students step in

as tutors, showing that they can, in fact, provide valuable aid to students struggling in certain subjects (aui.ma).

- **Access to school rules and information:** Virtually every school has a student handbook containing information regarding school policies such as dress code, attendance requirements, or academic integrity guidelines. However, it is rather tedious and time consuming to go through the guidebook, despite the important and relevant information found inside it, so many students could not go through it at all.

  This could lead to many disciplinary issues, dress code violations, and other breaches of rules students may not have been aware of. As such, by interacting with NoteSwap's AI chatbot, students will be able to interact with it and inquire about specific rules and regulations without having to flip through a long guidebook. And the effectiveness and popularity of the chatbot model is very clear, and we can see this with the unprecedented spike in users of Open AI's AI chatbot ChatGPT, which famously reached 1 million users in only 5 days; it took Instagram approximately 2.5 months to do the same, and Netflix 3.5 years (Duarte, 2023).

  This shows that acquiring information through an AI chatbot is currently seen as easier, faster, and more efficient, so by training NotBot on the student handbook, students are more likely to seek out information about the school, and therefore become more aware and less likely to make mistakes.

- **Access to community service:** Community service is quite beneficial in a student's college application, with a recent survey of 264 American college admissions officers showing that 58% agreed that community service has a positive impact on a student's acceptance to a college or university, and 53% saying that community service was a tie-breaker in the case of 2 equally qualified students (Patel, 2023). However, getting access to a consistent source of community service can sometimes be more challenging than it has to be, and staying updated on new opportunities through Microsoft Teams announcements is not ideal.

As such, NoteSwap provides an organized "Events" page with all upcoming events clearly and neatly displayed, along with the date of the event, a brief description, and the amount of community service offered. There, students can sign up for the event until there is no room left, which allows for a far more consistent and effective way to keep up with community service opportunities.

- **Tracking community service:** Some highschools, ASI highschool for example, have a minimum requirement of community service required to graduate. However, tracking how many community service hours you already have can sometimes involve reaching out to a member of the school staff – perhaps a teacher or administration member – who has that information.

  This is more complicated than it has to be, and NoteSwap allows users to see how many community service hours they have attained so far from sharing notes, tutoring, and participating in events, displayed clearly in their profile. This makes tracking community service hours easier for students, and far less complicated.

Teachers:

- **Organizing events and awarding community service hours:** Organizing events is often done with school announcements, posters, announcements on Microsoft Teams, etc. And while volunteers writing their names on a piece of paper or replying to a post may be somewhat organized, it is outdated, and awarding community service after the event can involve contacting other individuals, and can take a lot more time than it should.

  As such, NoteSwap provides teachers with a simple process to organize and post events, and allows student users to sign up directly from the platform. Teachers then have access to a clear display of all the students that have signed up to their event, can then take note of which students from those listed actually showed up and did the work, and award them community service hours directly from the platform. This saves teachers a lot of time, and combines informing students about events, getting volunteers, and awarding volunteers into a single simple process.

- **Detecting AI generated text:** According to a recent survey, 26 percent of the 203 surveyed K-12 teachers have caught their students using ChatGPT to complete assignments, and experts estimate that half of college students do so as well (Waugh, 2023). And because every one of GPTs outputs is original, it is now ever more difficult for teachers to verify that it is really their students who have done the work, or if they are using the language model to do their assignments for them.

  As such, several AI text detectors have been developed, and among them is an AI content detector by Piratexx. And by using this detector's free API, NoteSwap allows teachers to input a sample of their students' work into the detector to find out whether or not the text was generated by AI. And while some technologies have been developed to humanize AI generated text, this detector is still a good way to limit assignment completion by students using AI language models like ChatGPT.

Platform Overview

User Roles and Responsibilities

Students:

Users logged in as students can:
- View notes published by other students.
- Publish notes to earn CSPs.
- Become tutors and create a tutoring session to earn community service hours.
- Find tutors and join a tutoring session.
- Sign up for events posted by teachers and be awarded certificates and community service hours.
- Interact with NoteBot, the platform's AI-based chatbot, about anything related to the website (more details in the "NoteBot" section).

Teachers:

Users logged in as teachers can:
- View notes published by students but are not able to publish notes themselves.
- Create events that students can join for community service hours.

- Create certificates to award students which sign up to their events.
- Gain access to an AI generated text detector to detect whether or not a student's work was generated by AI.
- Interact with NoteBot, the platform's AI-based chatbot, about anything related to the website (more details in the "NoteBot" section).

Features and Functionalities (Student Users):

Sharing Notes

Details:

Using NoteSwap, users will be able to share their notes – by typing them down or taking a photo of their notebooks – and be rewarded with Community Service Points (CSPs) for doing so. These points can be converted into community service hours, with 20 points being equal to 1 minute of community service.

Typing notes: If a student chooses to type out their notes, they will be provided with a user-friendly interface where they can type out formulas, make certain letters bold, and much more to make writing notes as easy as possible. The time they take to write out the notes is recorded, and to minimize cheating, the following measures have been incorporated:

- **Typing:** If a student has not typed for 30 seconds, the timer stops, preventing users from letting it run without writing anything down.
- **Moving to other tabs:** If a student moves to another tab, the timer stops, preventing them from engaging in activities other than typing out notes and still being rewarded for it.
- **Disabling copy/paste:** Students cannot copy/paste text ensuring they actually take the time to type out the notes.
- **Time limit:** The maximum amount of CSPs a user can acquire per day by typing is 15 minutes.
- **Notes Rubric:** Before points are awarded, the typed notes will be given a percentage score by an AI trained on the following rubric:

Noteswap Rubric			
	Proficient	**Emerging**	**Beginning**
Organization and structure	Notes are well-organized and structured logically, with clear headings, subheadings, and bullet points. Information is grouped and categorized effectively.	Some organization and structure are present, but the notes may lack consistent headings or subheadings. The information may be loosely organized.	The notes lack organization and structure. Ideas may be scattered or disorganized, making it difficult to locate specific information.
Accuracy of information	Notes accurately capture and summarize key information from the source material. Important details and concepts are included.	The notes include mostly accurate information, but some minor errors or omissions may be present. Important details may be missed or misunderstood.	The information presented in the notes contains significant inaccuracies, misunderstandings, or is incomplete.
Clarity and readability	The notes are clear, concise, and written in a way that is easy to understand.	The notes are mostly clear, but some sections may be difficult to read or understand.	The notes lack clarity and readability.
Engagement and Examples	The notes demonstrate active engagement with the material, including relevant examples, explanations, and connections to other concepts	Some engagement is evident, but additional examples or connections to related concepts may be beneficial. The notes may lack depth or original insights.	The notes lack meaningful engagement with the material. Examples or connections to related concepts are absent or insufficient.
Grammar, usage & mechanics	The notes have minimal grammar, usage, and mechanics errors. Sentences are well-constructed, and spelling and punctuation are accurate.	Some grammar, usage, or mechanics errors may be present, but they do not significantly interfere with understanding. Spelling and punctuation may have minor issues.	The notes contain frequent grammar, usage, or mechanics errors that make understanding difficult. Spelling and punctuation may be consistently incorrect.

The time they spend writing the notes in minutes will be multiplied by 20, the result being the total number of CSPs they have acquired. That number will then be multiplied by their percentage score:

$$(Time\ spent\ typing\ in\ minutes\ \times\ 20) \times \frac{AI\ Score}{100}$$

This ensures that quality notes are rewarded more, regardless of how much time was spent writing them, encouraging users to be more mindful of the notes they publish. Furthermore, before the publication, students will be given the option to receive AI feedback on their notes based on the above rubric, allowing them to then go back and edit their notes in order to receive a higher score.

Taking pictures of notes: Students also have the option to upload an image of their notes. This allows them to use the platform with minimal time and effort, however, the quality is difficult to assess, and it is not as beneficial to the platform in that the images they upload do not contribute to the training of NoteBot. As such, to encourage typing out notes instead, the amount of CSPs offered for pictures is very limited, with every image uploaded rewarding the user with 20 CSPs (the equivalent of a minute of community service). Moreover, students may only earn up to 5 minutes of CSPs per day by uploading images of their notes, meaning that they can earn 3 times more if they type out their notes instead.

Daily Limit: The daily limit to the amount of CSPs available per day is 400, the equivalent of 20 minutes of community service. (300 CSPs (15 minutes) for typing out the notes + 100 CSPs (5 minutes) for uploading images of notes).

How it works:

Notes Display: To access notes, students click on the **"Notes"** tab on the nav bar. They will then be directed to a page containing the notes posted by themselves and other students. These notes will be organized according to the following algorithm by default to improve user experience:

Recommendation Algorithm:

The first factor in NoteSwap's recommendation algorithm is how likely a user is to frequent notes falling under a certain subject (Math, Science, English etc…). This value will be known as **Theta,** which is determined by the following formula:

Theta = Number of minutes spent reading a note from a certain section / Number of minutes spent reading notes * 100

Given enough values **Theta (θ)** for each respective section, we can assign a certain value θ to each category based on how many times they visit notes of a certain category.

The next factor in the algorithm is the user's preference based on authors they frequent, which is given a value **Delta (Δ)** which is determined by the following formula:

Δ = How many times they visit notes by a certain author / The amount of times they visited any notes * 100

And for the **final score** of how likely a user is to visit a **specific note**, we do the following calculation:

Final score = (θ * Theta_weight) + (Δ * Delta_weight)

With the following as the weights for θ and Δ:

Theta_weight = 2

Delta_weigth = 1

Using the score for each note the user has visited, it is now possible to predict what type of content they will prefer. We do this by constructing a matrix:

Users	Note 1	Note 2	Note 3	Note 4
User A	?	1	?	0.3
User B	0.8	0.3	0.6	?
User C	?	0.6	0.8	?
User D	?	0	?	?

        Due to the inherent overlap of data and the amount of notes people will be viewing, a recommendation algorithm is required. The system used here is **collaborative filtering,** which is to incorporate the principle that similar users have similar tendencies into our overall algorithm. To calculate the similarity between users, we use the following formula:

$$similarity(a, b) = \sum ir(a, i) \cdot r(b, i) / \sqrt{\sum ir(a, i)^2} \cdot \sqrt{\sum ir(b, i)^2}$$

        The numerator is the sum over **p**, **the number of notes user A and user B have both seen**. We multiply that value by the product of **the score user A gave the note** and **the score user B gave the note**. We then divide that by **the magnitude** in order to ensure the values are between -1 and 1.

        And after having calculated the similarity between user A and B. We can predict **the user-item interaction** using the following formula:

$$prediction(a, i) = \sum j \, similarity(i, j) \cdot r(a, j) / \sum j \, | \, similarity \, (a, j) \, |$$

The prediction is equal to **the sum of all the similarity rating for a user u** and **all the other users i** multiplied by **the amount Theta the other user rated the note**.

Users will also have the option to sort the notes based on the **most popular** (the notes that have been clicked most), and in terms of which ones were the published **latest**.

Notes Publishing: To publish notes, users can click on a green icon in the bottom right of their screen, which will provide them with 2 options:

- **Type out notes:** Students can type out their notes on the platform for a maximum of 300 daily CSPs (15 minutes of community service) for using this method.
- **Upload an image:** Students can upload an image of a picture they took of their notes for a maximum of 100 daily CSPs (5 minutes of community service) for using this method.

The final maximum amount of CSPs which can be acquired for sharing notes is 400 (20 minutes of community service), but users can receive more through other means using the platform such as tutoring, or joining events.

Tutoring
Details:

Using NoteSwap, students can tutor each other for CSPs. In this case, the only limit on how many CSPs you can acquire is how much time is allowed by the school, since it is happening on school grounds; every minute of tutoring is 20 CSPs, or 1 minute of community service. However, there are also measures put in place to minimize cheating or exploitation:

- **Sessions are recorded and analyzed:** For a session to be valid, the audio must be recorded on the platform. Transcripts of the recording are then generated, and analyzed by an AI to ensure that work was in fact done during the session, and that the students were not wasting time.
- **Confirmation:** For a session to be valid, both students – the tutor and the person they are tutoring – must confirm via email, and must both be joined in for the recording to start. And since students can only sign up to the platform using their unique school email address, that means no single student can be rewarded with CSPs by 'tutoring' themselves, making it difficult to cheat on the acquisition of points.

- **Student feedback:** At the end of a session, students can grade their tutors out of 5 stars. This makes it so that tutors can receive valuable feedback from the ones they have tutored, and since these ratings are public, it encourages tutors to strive for good ratings and a good performance so that more students want to be tutored by them.
- **Sessions happen in school:** Tutoring sessions must happen inside the school, and during a fixed time period.
- **Supervisors:** Sessions are supervised by a student supervisor, who will need to ensure that tutors that tutor on that day are present, and that they are doing the work.

How it works:

Access: To access tutoring services, users must visit the **"Tutor"** tab on the nav bar. They will then be redirected to a page featuring all available tutors, the different subjects they are willing to teach, and a brief description of them.

Becoming a supervisor: Supervisors are elected by the website admin, and must fill out a google form. They will be elected based on qualifications and availability, and since very little students are available every day, a team of supervisors will be chosen. Their job will be to:

- Supervise and monitor tutoring sessions.
- Take attendance.
- Confirm or deny tutoring requests (this could and should involve reaching out to teachers to inquire about a student's qualifications). They can do this directly from the platform on the "supervisor" tab.
- Observe students as they tutor, and inquire themselves about how qualified they are based on the following rubric:

Category	Subcategory	Criteria
Knowledge and Expertise	1.1 Subject Mastery	Demonstrates a deep understanding of the subject matter being taught.

Communication Skills	2.1 Clarity	Communicates ideas and instructions clearly and concisely.
	2.2 Active Listening	Listens attentively to students, understanding their concerns and needs.
Teaching Techniques	3.1 Patience	Exhibits patience when students struggle or make mistakes.
Assessment and Feedback	4.1 Constructive Feedback	Provides constructive feedback that helps students improve.
Professionalism	5.1 Punctuality	Arrives on time for sessions and respects agreed-upon schedules.
Ethical Considerations	6.1 Integrity	Acts with honesty and integrity, avoiding unethical practices such as cheating or academic dishonesty.

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Becoming a tutor: To become a tutor, users simply click on a green button on the bottom left of their screen that says "become a tutor". They will then be shown a modal where they can specify:

- The email address they can be reached at.
- The subjects they are willing to teach.

- The days of the week in which they are available.
- The times of those days in the week in which they are available.

They can then click another green button on the bottom right of the modal saying "next", where they will be given a text area where they can provide a brief description of themselves, their skills, qualifications, and anything else students would want to know about them.

Users must then click another green button on the bottom left of the modal saying "finish", where their name will be updated to the supervisor page.

Finding a tutor and starting a session: On the tutors tab, students can pick the tutor which suits their needs, click on them, and be presented with a modal, where they will be required to type a custom message that will be sent to the tutor in an email, and the date and the time that they would like to be tutored at.

And when they click "book", it will immediately send an email to the tutor in the following format:

{

Thank you for your interest in becoming a tutor on Noteswap. We have received a request from a student who is looking to be tutored on **${subject}** by you.

Student's Name: **${name}**
Student's Email: **${senderEmail}**
Preferred Tutoring Schedule: **${date}** from **${time}**

Additionally, a personalized message from **${name}** has been sent to you: **${message}**

If you are interested in tutoring this student, please click the button below to be redirected to Noteswap and accept the request:

[Accept Request]

In case you need to further contact **${name}** please reach out to the email address provided above. We thank you again for considering the opportunity to make a positive impact on a student's academic journey.

Best regards,
Sami Laayouni and Ali Zaid
The Noteswap team
}

The tutor can then accept the request from their email account, and be redirected back to NoteSwap, where they will have to wait for the student who requested the tutoring session to join the session for it to start recording (on the tutor's device only). The way then for the student to join the session with the tutor, a confirmation email has been sent to their account in the following format:

{
Dear, **${name}**

This is to confirm that your recent tutoring session has been confirmed for **${date}** from **${time}**, with **${tutorName}**. When you are ready for the tutoring session please click the button below and follow the steps to connect and start your tutoring session.

Start
}

By pressing the "start" button, the student will be redirected to a NoteSwap page, where they will be considered joined to the session, and the tutoring session can begin recording on the tutor's device. At the end of the session, the student can rate their tutors out of 5 stars.

School Calendar
Details:

Using NoteSwap, students will be able to access a simple virtual school calendar featuring future events, vacations, and so on.

How it works:

Linked to google calendar: This virtual calendar is linked to the school director's own google calendar such that any updates made there will be updated on the website.

Easy student/teacher access: The calendar is easily accessible, and is on the index page of the website such that it is the first page users are taken to once they log in; it can be accessed later by clicking on the website logo on the top left of the page.

Signing Up for Events

Details:

Using NoteSwap, students will be able to sign up for events posted by teachers which offer community service hours. On the "Events" page, they can look through all upcoming events, their dates, and the amount of community service hours offered for them.

How it works:

Access: To access the "Events" page, users need only click on the "Events" option on the nav bar. They will then be directed to a page displaying:

- Each upcoming event.
- The date of the event.
- The amount of community service hours offered.
- A

Signing up for events: To sign up for an event, students need only click on the green "Sign Up" button on the event which they wish to sign up to. Then, if they are confirmed to have done what is required of them on the day of the event, they will be sent a signed certificate by the teacher who posted the event, and the community service hours will be directly sent to their profile.

Signing out of an event: If a student signs up for an event, and no longer wishes to attend, they can simply click on the "Sign Out" button which will have taken the place of the "Sign Up" button once they have signed up.

This is an important practice because if a student signs up for too many events without being awarded a certificate (they did not show up and/or did not do what was required of them),

they will no longer be allowed to sign up for events for a period of time **(details still to be determined)**.

NoteBot

On NoteSwap, users will be able to interact with NoteBot, a virtual AI assistant trained on the school's students handbook, notes shared by other students, events posted by teachers, and more, to provide an optimal user experience. The chatbot is an AI-based tool to help students and teachers alike.

Technical Details:

Word embedding: As it would be inefficient to train the AI again every time it learns new information, we store the new information in the form of a word embedding, in a vector database like Pinecone or Milvus. Converting the text to a vector allows us to query information based on the semantic resemblance of the information.

The Chatbot comes with an easy to use interface for schools and other education institutes to teach. Schools can upload a handbook (max: 50MB), where the text will be extracted from the word or pdf document. From there the text is stripped and split into sections to store. Once we have all these text sections we can convert them to word embeddings by tokenizing them, and passing them through Openai's Text-Embedding-Ada-002. Once we have these vectors, which will be stored in the 1536th dimension, we can store them in our vector database.

When given a prompt the Chatbot will use Euclidean's distance to calculate which piece of information or vector is the most semantically related to the prompt using the following formula:

$$d(p, q) \ = \ \sqrt{n \Sigma i (qi \ - \ pi)^2}$$

Where p, q = two points in Euclidean n-space

qi, pi = Euclidean vectors, starting from the origin of the space

n = n-space

Once the Chatbot has received the relevant information, the information will be given to an LLM like the open-source LLAMA 2 model by Meta or GPT-3.5-Turbo by Openai.

Examples of how to use:

Users can interact with NoteBot by clicking a green icon on the bottom right of their screens, and ask it about things like:

- **School Rules and Policies:** Students can inquire about school rules and policies, such as dress code, attendance requirements, or academic integrity guidelines, to ensure they are in compliance.

- **Privacy Policy Information**: Users can ask NoteBot to explain specific sections of the privacy policy to better understand how their data is handled and protected.

- **Academic Assistance:** Students can ask for help on specific academic topics by referencing the notes shared by other students. NoteBot can provide relevant notes or direct them to available tutors.

- **Event Information (both):** Users, both students, and teachers, can ask NoteBot for details about upcoming events, including dates, times, locations, and event descriptions.

- **Event Registration:** Students interested in participating in events can ask NoteBot to guide them through the registration process or confirm their registration status.

- **Tutoring Services:** Students seeking academic support can inquire about available tutors, their areas of expertise, and scheduling tutoring sessions.

- **Certificate Requests (teachers):** Teachers can request NoteBot to assist in generating certificates for students who have completed community service hours or participated in specific events.

- **Search for Notes:** Users can ask NoteBot to search for notes related to specific subjects, topics, or keywords, making it easier to find relevant study materials.

- **General Information:** Users can ask general questions about the platform's features, how to navigate it, or request help with common tasks like changing their account password.

- **FAQs and Troubleshooting:** Users can seek answers to frequently asked questions or troubleshooting assistance for common issues they encounter on the platform.

Features and Functionalities (Teacher Users):

<u>**Posting Events**</u>

Details:

On NoteSwap, teachers will be able to post events on the **"Events"** tab, where students can sign up to earn community service hours and be awarded a certificate designed by the teachers.

How it works:

Creating an event: To create an event, teachers will need to click the green button in the bottom right of their screen saying "create an event". They will then be presented with a modal where they will be required to specify:

- The name of the event.
- A description of the event.
- The number of community service hours offered.
- The date of the event.

They can then click the "next" button on the bottom right and be presented with another modal. There, they will then need to specify:

- The event category from a long list of community service related categories.
- A link to sign up to the event (e.g. Google Forms).
- A short award message to put on the certificate.

They can then click the "next" button on the bottom right and be presented with another modal. There, they will need to either:

- Type in their full name, which will be written into a signature-like font to be put on the certificate.
- Draw their signature directly on a drawing area in the modal.

Finally, they can click "next", and be presented with a modal displaying their finished certificate containing:

- Their signature.
- The event date.
- The amount of community service hours awarded.
- The short custom message they wrote.

After examining the certificate, teachers can click "next", and be presented with a final modal informing them that their event has been created, and a URL which they can visit to see which students have signed up to their event and award them with the custom certificate.

AI Generated Text Detector

Details:

Users logged in as teachers will be able to use an AI generated text detector based on a free api by Piratexx, which allows teachers to input a sample of their students' work to verify whether the text they wrote was original or just AI generated.

How it works:

To access the AI text detector, teachers simply click on the large green icon on the top right of their screen surrounding their profile picture. They can then choose the "Detect AI generated text" option where they will be directed to a page with a text area. They can then input a sample of their student's work, and be provided with 2 possible responses:

- **"The following text is likely AI generated"** If the detector believes that the text was in fact generated by AI.
- **"The following text is likely human"** If the detector does not believe that the text was generated by AI.

Technical Architecture

NoteSwap uses a modern cutting-edge technology stack in order to ensure its advanced features such as the NoteBot can fit any school's need and work at scale. We have taken in all considerations to ensure scalability and optimal performance.

Platform Construction:

Our platform is built upon a serverless architecture, which allow us to scale quickly, develop faster, and offer high availability while remaining cost effective. The core components of our platform include:

1. **User Interface:** The front-end is developed using Next.js, a framework built on the well-known React framework. Next.js offers the same simplicity and consistent user experience across devices as React, but adds several optimizations

such as Server-Side Rendering (SSR) for SEO and speed purposes, and Next Images, a CDN for faster delivery of images.

2. **API Gateway:** API gateways are also handled by Next.js, making it easier for frontend and backend developers to work together and making the integration between the front and back end as frictionless as possible.
3. **Databases**: Data storage is managed through a combination of NoSQL and vector databases. MongoDB serves as our NoSQL database to handle most of our data, (notes, users, events etc…), while Pinecone serves as our vector database to store information such as events, handbook rules etc. as this allows us to calculate the similarities between vectors to find which one is most relevant to the user's prompt.
4. **Cloud infrastructure**: In order to be able to handle all the images that user's will be uploading to the platform we compress the images before uploading them to Google Cloud Platform. This will ensure that our images are highly available anywhere the users are located.

Technology Stack:

Our technology stack is also carefully selected for ease of use and optimization for users.

- Front-End: Next.js, Vanilla Css
- Hosting: Vercel
- Domain: Namecheap
- API Gateway: Node.js, Express
- NoSQL Database: MongoDB
- Vector Database: Pinecone
- Cloud infrastructure: Google Cloud Platform
- Analytics: Google Analytics
- 3rd Party Api: OpenAI
- Code management: Github

Third Party Integration:

To enhance the capabilities of our platform, we integrate third-party APIs that provide specialized services. The integration process goes as following:

- **API Selection:** Before integrating any third-party APIs we carefully select and review the quality of the API based on their functionality, reliability, security, and scalability.
- **Authentication and Authorization:** We implement secure authentication to ensure that only authorized requests are made to these APIs.
- **Error Handling:** We implement robust error-handling to handle cases where third-party APIs are experiencing downtime or return errors.

Data Privacy and Security

As outlined in our Privacy Policy, NoteSwap collects very little data on it's users in order to respect the privacy of younger kids who may use the platform. NoteSwap collects and stores the information user give us such as their first and last name, email and profile picture. By deliberately limiting the scope of data collected, we protect the anonymity of our users while still providing a personalized and user-friendly experience.

Our data collection does not include any sensitive information and no sensitive information is stored on our servers. This approach significantly reduces the potential impact of any data breach and helps safeguard users against identity theft, unauthorized access, and misuse of confidential information.

Additionally NoteSwap uses modern encryption practices such as the Blowfish encryption algorithm. This cryptographic measure enhances the confidentiality of user information, even in the event of unauthorized access to the data storage infrastructure.

Access to the NoteSwap database is under very strict control, following industry best practices. We use multiple layers of security, including heavily secured private keys and network access lists. These measures are in place to ensure no unauthorized access to our database.

Legal and Compliance:

To ensure everybody understands our Terms of Service and Privacy policy we have trained the NoteBot to be able to answer questions related to these documents.
The link to the Terms of Service can be found at this URL: [Terms of Service](#)
and the privacy policy at this URL: [Privacy Policy](#).

Challenges, Scalability, Future Developments and Monetization

Challenges, and Scalability:

Challenges that we have encountered during early stages of development include the shortage of finances and human resources. The current project is created entirely free of funding with very little financial support. Additionally, schools are some of the hardest markets to get into, and are known for their tendency to resist change. However, our product has several potential advancements to make it overcome these challenges, scale, and ensure it can make profit:

- **A free version:** Our platform offers a free less-feature version with ads and affiliate marketing to users in or outside of schools that have not yet paid for the service. This allows students to become more acclimated to using the platform, increasing their reliance on it, and, as a result, encouraging the school to pay for the service once they see its merits.

- **Sponsored events:** Our platform will also allow local organizations and associations to post their own events to specific schools for a small fee. According to a project organizer on LinkedIn, while some event organizers get a very large response, others often struggle to get "even a handful" of volunteers (Mirza, 2023). However, using NoteSwap, there organizations will be able to post details about events they are hosting, and community service opportunities. And since students require community service hours, they can sign up for these events, giving group organizers easy access to free human resources and support. NoteSwap may even sponsor events in the future, in order to increase our presence within the schools.

- **A need for the service:** NoteSwap is planning to reach out to universities and other educational institutions around the globe in order to make community service earned through the platform valid and recognized. Once NoteSwap can successfully get accepted

into enough universities, it will create pressure and incentive for schools to pay for the service in order to aid their students in getting into better universities.

Future Developments:

NoteSwap's model fixes many of the problems faced by both students and teachers, and it still has a lot of potential. These are some examples of how the platform could be developed in the future:

- **Using an OCR model:** One possible improvement could be using an OCR model to scan users' notes, and then convert it into text. This means that not only will students be able to get AI feedback on notes they submit in the form of images, but NoteBot, the platform's AI, can be trained on more data, making it more equipped to aid and assist users.

- **Integrating NoteSwap Tutoring with Zoom or Microsoft Teams:** NoteSwap allows users to engage in tutoring sessions online, but all that the platform can do (for now) is record the session to ensure its viability. As such, users may use resources like Zoom or Microsoft Teams to facilitate the session, because these resources allow for the sharing of screens, recording sessions, etc. And so, one possible advancement could be the integration of these resources such that if a session occurs using them, the recorded tutoring session can be saved to the platform. This allows users to go back and review the session to improve their academic performance, which could make NoteSwap an even more valuable tool for students.

The future of NoteSwap holds promising innovations and continued growth, driven by our dedicated team's passion, the many problems that our platform aims to solve, and the evolving needs of our users.

Sources:

- *50 current Student Stress Statistics: 2023 data, Analysis & Predictions*. Research.com. (2023, July 28). https://research.com/education/student-stress-statistics#:~:text=Schoolwork%2Fcoursework&text=36.5%25%20of%20U.S.%20college%20students,pressure%20to%20get%20good%20grades.

- User, S. (n.d.). *Tutoring*. Al Akhawayn University in Ifrane. http://www.aui.ma/en/cle/tutoring.html

- Duarte, F. (2023, July 13). *Number of CHATGPT users (2023)*. Exploding Topics. https://explodingtopics.com/blog/chatgpt-users#:~:text=The%20Guardian%2C%20Similarweb-,ChatGPT%20User%20Growth,to%20reach%201%20million%20users.

- Jason Patel. (2023, March 2). *Why community service is so important for college admissions*. Niche. https://www.niche.com/blog/why-community-service-is-so-important-for-college-admissions/#:~:text=In%20a%20survey%20of%20264,breaker%20between%20equally%20qualified%20students.

- Rob Waugh Tech Correspondent For Dailymail.Com. (2023, March 26). *Half of students are using CHATGPT to cheat, and it could rise to 90%*. Daily Mail Online. https://www.dailymail.co.uk/sciencetech/article-11899475/Half-students-using-ChatGPT-cheat-rise-90.html

- Mirza, S. (n.d.). *Overcoming the challenge of attracting hard-to-find volunteers*. LinkedIn. https://www.linkedin.com/pulse/overcoming-challenge-attracting-hard-to-find-volunteers-shehana-mirza/

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