THE UNIVERSITY OF HONG KONG

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Final Report

Inbox Genius – Your Next Productive Email Client

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Abstract

This report serves as a summary of the background, content, progress, and next steps of Inbox Genius in details.

As the number of spam emails is only increasing, problems like digital noise, email fatigue, and phishing are only worsening exponentially. Although mainstream email clients usually provide their own filtering systems, the algorithms tend to be ineffective and unreliable.

Hence, this project aims to alleviate these problems with an AI-driven mail filtering service. Not only will it effectively filter out spam emails and block phishing attempts to ensure users' security and privacy, but it will also categorize and prioritize emails based on importance, significantly boosting users' productivity and focus.

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1. **<u>Introduction</u>**

1.1. <u>Overview</u>

This section serves as a comprehensive introduction to the project, providing readers with a thorough understanding of its background, motivation, objectives, scope, deliverables, similar products in the literary review, and a complete outline of this report.

The background of the project aims to shed light on the context in which it is being conducted. It delves into the relevant historical, social, and technological factors that have influenced the need for this study. By exploring the background, readers will gain a deeper appreciation for the significance and timeliness of the project.

The motivation behind the project is another crucial aspect that this section addresses. Here, the driving factors and reasons for undertaking this project are articulated. It may include identifying gaps in existing research or recognizing a pressing need for innovation within a particular field. By elucidating the motivation, readers will understand the purpose and importance of the study.

The objectives of the project are outlined to provide a clear direction for the research. These objectives act as guiding principles for the study, specifying the desired outcomes and goals to be achieved. By clearly stating the objectives, readers will have a clear understanding of the intended results and the purpose of the project.

Moreover, this section explores similar products or solutions that currently exist in the industry. By analyzing and comparing these existing products, readers will gain insights into the competitive landscape and potential opportunities for improvement or differentiation.

1.2. <u>Background</u>

Despite the growing number of communication tools available on the market, email remains one of the most prominent options, especially for school and work. This enduring popularity is evidenced by a survey-based report conducted by Gated, which revealed that

a staggering 82% of individuals rely on email as their primary source of internal communication in the workplace [1]; in fact, the average professional receives 71 emails per day, as highlighted by the same report [1]. Such a substantial volume of emails translates into a significant amount of time spent on email management. Astonishingly, statistics indicate that employees spend nearly 30% of their workweek solely dedicated to managing their inboxes [2]. This alarming ratio raises concerns, as such tasks are highly time-consuming yet not necessarily directly related to their core job responsibilities.

Moreover, a study conducted by Harvard Business Review found that employees spend an average of 2.6 hours per day reading and responding to emails [3]. This not only highlights the remarkable time investment but also emphasizes the need for more efficient email management systems.

To address said issue, more and more companies are looking and investing into email management software solutions. According to a report by SkyQuest Technology, the global email management market is projected to grow at a compound annual growth rate (CAGR) of 11.8 % from 2024 to 2031, which is undoubtedly driven by the need for streamlined email workflows and improved productivity [4]. This reflects the growing recognition of the importance of optimizing email management processes.

By streamlining and optimizing email management, businesses can not only save valuable time but also improve overall efficiency and productivity. By ensuring that users are able to focus on tasks that truly matter, organizations can enhance employee satisfaction and engagement. As a result, higher levels of job performance and organizational success may be achieved.

1.3. Project Motivation

1.3.1. Digital Noise

In this digital age, one of the major sources of distraction is digital noise, which notably hinders one's productivity, engagement at home or work, and even well-being. According to a study conducted by RescueTime, a productivity software company, the average person spends approximately 3 hours and 15 minutes per day on their phone

[5]. This showcases the noteworthy impact of digital distractions on our daily lives, with potential consequences for our mental health and productivity.

Referring to the survey-based report conducted by Gated, 62% of people expressed that digital distractions significantly lower their focus [1]. As email is the default communication platform for most work and academic environments, it surely plays a vital role in digital distraction. In fact, a study by the University of California, Irvine found that it takes an average of 23 minutes and 15 seconds to return to a task after being distracted by email [6]. This not only demonstrates the effects that email has on productivity but also emphasizes the need for effective email management strategies.

1.3.2. Email Fatigue

According to the same report by Gated, it has been revealed that a staggering 67% of interviewees admitted to feeling overwhelmed by the sheer volume of spam and sales emails inundating their inboxes [1]. This constant bombardment of irrelevant content not only leads to a cluttered inbox but also affects productivity, as 82% of individuals reported having missed important emails due to the chaotic nature of their inboxes [1]. This startling statistic illustrates the detrimental impact of email overload on individuals' ability to effectively manage their work-related communication.

Moreover, the consequences of this email overload extend beyond mere inconvenience. Studies have shown that email fatigue is a major contributor to burnout and job dissatisfaction [2]. The inability to keep up with the incessant influx of emails leads to feelings of guilt or stress for 74% of workers who are unable to read or respond to every email [7]. Not only do. the resulting negative emotions affect the overall health and well-being of employees, but they also have wider implications for the productivity and morale of an entire organization.

The consequences of email overload have become so severe that 30% of individuals have resorted to purging or even abandoning their inboxes altogether [7]. This drastic measure further emphasizes the dire need for effective email management strategies. Companies and individuals are increasingly recognizing the importance of implementing tools and techniques to streamline their email systems and reduce the overwhelming burden it places on their daily routines.

1.3.3. Cybersecurity

One of the most pressing concerns when it comes to the usage of online resources is cybersecurity. Cyberattacks are on the rise, and over 75% of them start with an email, specifically through phishing attempts [8]. Phishing is a fraudulent technique used by cybercriminals to trick individuals into revealing sensitive information or clicking on malicious links. The consequences of phishing attacks can be devastating, leading to data breaches, financial losses, and reputational damage.

It is found that approximately 39% of people have opened a phishing email at work [2], which underlines the need for relevant preventive measures. These statistics indicates the importance of cybersecurity education and training, as well as the implementation of effective security measures, to protect against phishing attacks.

Email filters and spam blockers can help to reduce the number of phishing emails that make it to the inbox.

1.4. Objectives

1.4.1. Productivity

This project aims to address the aforementioned problems that existing systems have failed to effectively solve. One of the primary objectives is to enhance users' focus and productivity by minimizing digital distractions caused by email usage. This will be achieved by implementing advanced filtering and categorization mechanisms to identify and separate spam emails based on their importance. By reducing the influx of spam emails or eliminating them altogether, users will be encouraged to engage with their inboxes more frequently and attentively. Consequently, the likelihood of missing out on important information will be significantly reduced. This proactive approach not only prevents the onset of email fatigue but also leads to a substantial boost in the performance of employees and the overall efficiency of companies.

1.4.2. Efficiency & Accuracy

This project also strives to maximize efficiency by minimizing the time spent on email management and optimizing the overall user experience. Recognizing that managing an overflowing inbox can be a time-consuming task, the project aims to introduce additional features that will revolutionize the way users interact with their emails. One of the key features includes a comprehensive inbox summarization tool that analyzes and condenses the contents of the inbox, providing users with a concise and organized overview of their email activity. By presenting users with a summarized view, they can quickly and efficiently identify and prioritize important emails, reducing the time spent sifting through a cluttered inbox.

Besides, the project will leverage automation to streamline organizational processes. By implementing intelligent automation algorithms, routine tasks such as scheduling and follow-up reminders can be automated. This automation will eliminate the need for manual intervention and decision-making, saving users valuable time and mental energy as well as minimizing the occurrence of careless mistakes.

1.4.3. Security & Privacy

In addition to improving productivity, this project also places a strong emphasis on users' security and privacy. By implementing robust filtering algorithms, the system will effectively identify and filter out phishing emails. By proactively detecting and preventing phishing attempts, the project aims to safeguard users' security and privacy, instilling a sense of trust and confidence in their email communication.

By addressing these critical issues of digital distractions, missed information, email fatigue, and phishing threats, this project aims to revolutionize the way individuals and organizations manage their email communication. Through the implementation of advanced filtering and categorization mechanisms, users' focus, productivity, and security will be significantly enhanced, ultimately leading to a more efficient and secure digital workspace.

1.5. Scope Deliverables

This project aims to develop an email client that specializes in filtering emails efficiently and effectively, with a strong emphasis on automation. While conventional email filtering techniques like DMARC, SPF, and DKIM [9] are essential, our model aims to go beyond these standard practices by utilizing advanced machine learning algorithms to generate filters automatically.

By analyzing users' email activity and learning from their preferences, the system will identify and categorize incoming emails based on their relevance and importance. This will enable users to focus on critical emails while minimizing the time spent on less important messages. The system will also continuously adapt and learn from users' behavior, ensuring that the email filtering remains accurate and up-to-date.

In addition to advanced filtering techniques, the email client will also incorporate a categorization system to sort received emails to enable users to prioritize their emails based on importance, allowing them to quickly identify and respond to urgent or time-sensitive information. Simultaneously, the email client will also feature customizable settings that allow users to tailor their email experience to their specific needs and preferences. Users will be able to adjust the categorization system to fit their own unique workflow and organizational practices.

To ensure the effectiveness of the system, the project team conducted rigorous testing and validation to verify the accuracy and efficiency of the email filtering and categorization features.

In conclusion, this project aims to revolutionize the way individuals and organizations manage their email communication. With advanced filtering techniques, automated machine learning algorithms, and customizable settings, users will be able to streamline their email workflows and enhance their productivity. Ultimately, this project aims to deliver a powerful email client that maximizes efficiency and productivity while minimizing digital distractions.

1.6. Literary Review

1.6.1. Default Filtering Systems

Mainstream email clients typically rely on filtering systems that identify spam emails by scanning through the headers of emails to extract information such as the sender, recipient, subject, and other metadata. While this approach has proven somewhat effective, it is not the most efficient filtering system available. One of the limitations is that it may be unable to accurately screen out irrelevant emails if they do not match the header information exactly. As a result, some legitimate emails may end up in the spam folder or get overlooked.

Additionally, the existing default filtering systems may also suffer from the issue of over-filtering. These systems often employ broad-sweeping filters that categorize certain senders as spam, regardless of the content of their emails. Consequently, even emails from trusted senders may be mistakenly categorized as spam and never reach the intended recipient. This can lead to missed opportunities, important messages going unnoticed, and a lack of effective communication.

1.6.2. External Extensions

Gmail and Outlook, two popular email clients, offer users the option to install external extensions for accessing additional features and functionalities. One notable extension is Clean Email, which leverages the Google Workspace and Outlook APIs to provide users with more comprehensive filtering capabilities. This extension offers a range of features, with its core offering being Smart Views. It provides users with pre-set filters that can sort emails based on various criteria such as the age of the email, size of attachments, and Cc'd emails, among others. These filters aim to help users organize their inbox and prioritize important emails. For example, the "Read Later" folder serves as a destination for filtered emails that can be addressed at a later time [10].
However, while Clean Email's pre-set filters may be useful for organizing and managing emails, they may fall short when it comes to effectively filtering out spam emails. The metrics used for measurement, such as email age or attachment size, may not be relevant indicators of spam content. As a result, some spam emails may still make their way into users' inboxes, leading to potential distractions and security risks.

1.6.3. Paid Email Clients

There are numerous paid email clients available on the market, with Superhuman being one of the most prominent options. Superhuman provides a variety of features that aim to boost users' productivity, such as email categorization by searching through email content for domain names in shared links [11]. While these features may help users manage their email workflows more efficiently, they do not necessarily address the specific issue that our product aims to tackle – the root cause of digital distractions caused by email usage.

1.7. Outline of the Report

The remainder of this report will provide a detailed overview of our solutions to the mentioned problems, including the product features, future prospects, as well as difficulties that the team has encountered during the development stage. This section will outline the various components that were incorporated into the development process and provide insights into how the project team approached the challenge of creating an innovative email management solution.

Next, the report will highlight some of the difficulties encountered by the team during the development process. These challenges could include technical issues, resource constraints, or unforeseen setbacks that impacted the project's progress. The report will examine how the team addressed these challenges and share insights into how other teams can overcome similar obstacles in future projects.

Following the discussion of the challenges faced, the report will turn its attention to potential features that could be developed in the future. These features will be based on the insights gathered during the development process and will aim to further enhance the functionality and user experience of the email management solution. The report will explore how these features could be integrated into the existing solution and how they could benefit users.

2. **Our Solution**

2.1. Overview

In this section, the main features of the email management solution developed by this project and the technology used for its implementation and development will be elaborated. The solution is designed to provide users with a comprehensive email management experience that prioritizes efficiency and productivity.

2.2. Product Features

2.2.1. Time Data Collection

One of the innovative features of the email management solution developed by this project is the ability to collect and analyze data on users' email activity. By collecting the amount of time spent on reading each email, the system will be able to deduce the categories of contents that a user tends to be more engaged in. This information can then be used to generate personalized filters, ensuring that users only receive emails that are relevant to their interests and priorities.

The collection and analysis of email activity data is made possible by leveraging advanced data analytics and machine learning algorithms. These technologies enable the system to analyze large volumes of data and identify patterns and insights that would be impossible to detect through manual analysis. By collecting data on users' email activity, the system can gain a deeper understanding of their needs and preferences, enabling it to provide a more personalized and effective email management experience.

Moreover, the analysis of email activity data can also help to optimize the system's performance and efficiency. By identifying patterns in email activity, the system can learn and adapt to users' behavior, improving its accuracy and effectiveness over time. For example, if the system detects that a user tends to spend more time on emails related to a specific project or topic, it can automatically prioritize these emails and ensure that they are not overlooked.

2.2.2. Whitelist

The email management solution developed by this project includes a whitelist function that empowers users to manually input email addresses that should never be filtered. This essential feature ensures that important content will never be missed or miscategorized as spam, even if a user does not always spend a remarkable amount of time reading these emails.

The whitelist function offers users a sense of control and certainty over their email management experience. By manually inputting trusted email addresses into the whitelist, users can ensure that emails from these senders will always reach their inbox, regardless of the system's filtering algorithms. This is particularly valuable for individuals who receive important emails from specific contacts or organizations and need to ensure that these communications are never overlooked or misclassified.

By incorporating a whitelist function, the email management solution addresses the limitations of relying solely on automated filtering techniques. While the system's advanced algorithms can accurately identify and categorize emails based on various criteria, there may still be instances where important emails are mistakenly flagged as spam. The whitelist function offers a safeguard against such situations, allowing users to prioritize emails from specific senders and ensure their visibility and accessibility.

2.2.3. Natural Language Input

To ensure a seamless and user-friendly experience, the email management solution allows users to provide their preferences in natural language. This means that users can simply express their filtering requirements in everyday language, without needing to navigate complex settings or technical jargon. By enabling users to provide input in natural language, the solution removes barriers and empowers users to easily communicate their needs and expectations.

The system processes the user's natural language input using advanced natural language processing (NLP) algorithms, which analyze and interpret the meaning and intent behind the user's preferences. By understanding the user's requirements in a more nuanced manner, the system can provide more accurate and personalized filtering results, ensuring that users receive the emails that are most relevant and important to them.

Moreover, the customization options are not limited to basic filtering rules, but also extend to various aspects of the email management experience. Users can specify preferences related to email organization, email notifications, and other features of the solution. This level of customization allows users to create a highly tailored and personalized email management system that aligns with their unique needs and preferences.

By utilizing user input and allowing users to provide their preferences in natural language, the email management solution aims to enhance and smoothen the user experience. This user-centric approach ensures that the system adapts to each user's specific requirements, providing a highly personalized and efficient email management experience. The advanced NLP algorithms enable the system to understand and interpret user preferences accurately, further enhancing the accuracy and effectiveness of the filtering system.

2.2.4. <u>iCalendar Generation</u>

The email management solution developed by this project includes an innovative feature that automates the creation of scheduling events based on the content of incoming emails. Specifically, if the system detects a date, a time, and a venue in an email, it will automatically generate an ICS file that can be added to the user's scheduling assistance of choice. This automation not only enhances user workflow and increases efficacy, but it also ensures the accuracy of information being marked down.

By automatically generating scheduling events, the system saves users time and effort that would otherwise be spent manually creating events in their scheduling assistance tool. This is particularly valuable for individuals who receive a high volume of scheduling-related emails, as it allows them to quickly and efficiently add events to their schedule without needing to navigate complex interfaces or workflows.

Furthermore, the automation of event creation ensures the accuracy and completeness of information being marked down. The system analyzes the email's content and identifies key information, such as the date, time, and venue of the event. It then generates an ics file that includes all the relevant details, such as the event name,

location, and time. By automating this process, the system eliminates the possibility of human error or oversight, ensuring that all scheduling information is accurately recorded and easily accessible.

The ics file generated by the system is highly customizable and can be easily integrated into a variety of scheduling assistance tools. Users can choose to add the file to their preferred scheduling tool, such as Google Calendar, Microsoft Outlook, or Apple Calendar. This flexibility allows users to seamlessly integrate the scheduling event into their existing workflow, ensuring that they never miss an important appointment or meeting.

2.2.5. Smart Search

Traditional search systems rely on keyword mapping to retrieve information, which can sometimes be inefficient when searching through vast amounts of content from various sources. However, with the implementation of the Smart Search feature in the developed system, users can expect a significantly enhanced and streamlined searching experience. This intelligent searching system revolutionizes the way users find information by moving beyond simple keyword mapping.

Instead of solely relying on keywords, the Smart Search system utilizes advanced algorithms to analyze and understand the context of the user's search query. By considering not just the keywords, but also the surrounding vocabulary and relevant terms, the system significantly increases the probability of finding the desired information. This intelligent approach to searching ensures that users are presented with highly relevant and accurate results, even when searching through extensive and diverse content sources.

2.2.6. Email Summarization

Many users find themselves inundated with lengthy emails that often contain more information than they actually need or have time to thoroughly read. This can be highly time-consuming, even just to skim through the contents. However, the challenge lies in the fact that important information can easily be missed if one does not pay sufficient attention to these lengthy emails.

To address this issue, the email management solution developed by this project includes an innovative email summarization tool. This tool is designed to extract crucial information from lengthy emails, saving users valuable time while also ensuring the accuracy and reliability of the extracted information.

By providing users with email summaries, the tool allows them to quickly grasp the main points and important information without having to sift through lengthy paragraphs or lengthy attachments. This not only saves time but also reduces the cognitive load associated with processing large amounts of text. Users can efficiently prioritize their email reading and decision-making based on the summaries, ensuring that they do not miss out on crucial information while still managing their time effectively.

2.2.7. Daily Summary

Managing a large volume of emails can be a daunting task, especially when users receive an extensive amount of emails in their inbox. It can be challenging to distinguish between highly informative emails and those that may be ignored. Additionally, it is easy to overlook certain emails, leading to missed opportunities or important information. The daily summary tool developed by this project provides an effective solution to these challenges, helping users to manage their emails efficiently and effectively.

The daily summary tool is designed to provide users with a concise and informative summary of the most important and time-sensitive emails that they receive throughout the day. Instead of having to sift through a large number of emails, users can quickly and easily skim through the daily summary to identify the most critical emails that require their attention.

In addition to providing a concise summary of important emails, the daily summary tool also helps to reduce stress associated with email management. Users can rest assured that they are not missing out on crucial information, and can focus their attention on the

most important emails, without having to worry about sifting through a large number of emails.

3. <u>Difficulties Encountered</u>

3.1. <u>Overview</u>

This section serves as a comprehensive exploration and in-depth analysis of the numerous challenges faced by the team in their endeavors. These challenges encompass a wide range of intricacies, including but not limited to the sophisticated procedures of synchronizing email platforms, the paramount importance of privacy and security concerns, and the inherent uncertainties stemming from the utilization of cutting-edge, state-of-the-art technology.

3.2. <u>Syncing Email Platforms</u>

Given that the team lacks prior experience in the development of an email client, the process of implementing and retrieving new emails from various email platforms was fraught with networking challenges, as anticipated. These challenges manifested in various forms, as the team grapples with the intricacies of integrating the new email client seamlessly with existing platforms, ensuring smooth communication and data exchange. The team's lack of familiarity with such tasks further compounds these challenges, making it crucial to anticipate and address potential hurdles in the implementation and retrieval process.

3.3. <u>Email Platforms' Priority</u>

At this current stage of development, the product faces a significant hurdle in covering the entire email industry due to the distinctive APIs employed by each email service. The complex nature of these APIs presents a formidable challenge, making it impractical to encompass the entire industry within our product's scope. As a result, our initial focus will be on catering primarily to the widely-used email platforms, namely Gmail, Outlook, and Yahoo Mail. By prioritizing these platforms, we can ensure a more streamlined and

efficient user experience while laying the groundwork for potential expansion and integration with other email services in the future.

3.4. Privacy & Security

Given the longstanding establishment of mainstream email clients over the course of several decades, it is important to recognize that many of these platforms may still rely on infrastructures that could potentially be outdated. This reliance on outdated infrastructures introduces a significant risk factor, particularly in terms of information leakage when retrieving emails. The outdated nature of these infrastructures may render them more vulnerable to security breaches and unauthorized access, thus necessitating a heightened level of caution and vigilance when handling sensitive information. As a result, it becomes imperative to consider alternative solutions that prioritize robust security measures and modern infrastructure to mitigate the risks associated with information leakage.

Furthermore, it is worth noting that the email client will incorporate GPT models developed by OpenAI. However, it is essential to consider the privacy implications associated with this integration. In the privacy policy provided by OpenAI, it is explicitly stated that user inputs and responses may be utilized to train and improve their GPT models [12]. This raises valid concerns regarding the privacy of users, particularly since the team lacks comprehensive insights into the technological infrastructure and data handling practices employed by OpenAI. As such, it becomes imperative to address these concerns by implementing robust privacy measures within the email client, ensuring transparency and explicit consent from users regarding the usage of their data. By prioritizing user privacy and adopting stringent data protection protocols, the team can instill confidence and trust in users while maintaining the integrity and effectiveness of the GPT models integrated into the email client.

3.5. Unknown Knowledge

It is important to acknowledge that the operations of both GPT and AI systems may not always be subject to continuous monitoring. This lack of constant oversight introduces the possibility of inaccuracies in categorizing emails and false predictions in users' preferences, potentially undermining the overall effectiveness and reliability of the email client. To

mitigate these potential errors and provide users with a safety net, the team has implemented a whitelist function as part of their safety net policies.

The whitelist function serves as an additional layer of protection, allowing users to manually curate a list of trusted contacts or domains. By adding specific email addresses or domains to the whitelist, users can ensure that important emails from these trusted sources are not misclassified or mistakenly flagged by the AI system. This feature empowers users to have more control over the accuracy and categorization of their emails, reducing the risk of important messages being overlooked or falsely categorized.

The introduction of the whitelist function not only addresses the potential errors that may arise from relying solely on GPT and AI systems but also provides users with the peace of mind that critical communications will not be inadvertently affected by inaccuracies or false predictions. By incorporating this safety net policy, the email client strives to enhance user experience and maintain a high level of accuracy and reliability in email categorization and preference predictions.

3.6. Limitations of OpenAI

It is crucial to consider the limitations imposed by the email client's integration with OpenAI for email classification. One notable constraint is the maximum token limit for each prompt, set at 4097 tokens due to platform restrictions [13]. Given that each token represents approximately 4 English characters, this token limit imposes a length restriction on the emails that can be effectively screened and classified by OpenAI. Consequently, longer emails may need to be truncated or split, potentially leading to the loss of important context or information during the classification process.

Furthermore, the email client may encounter challenges in managing a large user base and the influx of incoming emails due to the imposed rate limit of 60 requests per minute [14]. This rate limit restricts the number of requests that can be made to OpenAI's classification service within a given timeframe. As a result, the email client may experience delays in processing emails during periods of high user activity, potentially impacting the real-time responsiveness and efficiency of the classification system.

To address these limitations, it is crucial for the email client to implement effective strategies for managing longer emails within the token limit, such as prioritizing the most relevant sections for classification or implementing intelligent summarization techniques. Additionally, measures should be taken to optimize the rate at which requests are made to OpenAI, such as implementing intelligent queuing systems or exploring alternative approaches for email classification that can mitigate the impact of the rate limit.

By proactively addressing these limitations and exploring viable solutions, the email client can ensure a seamless user experience, minimize the impact of length limitations, and effectively manage a large number of users and incoming emails while adhering to the rate limit imposed by OpenAI's classification service.

4. __Future Prospect__

4.1. Overview

This section delves into an extensive exploration of the myriad potentials that lie within this project, encompassing a wide array of features that, while not currently implemented, showcase the team's visionary ambitions. These potential features are yet to be realized due to the inherent limitations imposed by time and resource constraints, but their inclusion in this comprehensive exploration serves as an inspiring testament to the boundless possibilities that could shape the future evolution of this project.

4.2. Email Platforms Coverage

As highlighted in *3.3*, it is important to acknowledge that the team's current focus and development efforts have primarily centered around integrating with the Microsoft Outlook email platform. This concentration is primarily due to the unique APIs utilized by each email service, which pose distinct challenges and requirements for integration. However, recognizing the significance of catering to a broader user base, the team has identified the expansion of email platform coverage as a top priority.

With the aim of providing a more comprehensive and inclusive email management solution, the team is actively working towards expanding the coverage of this product to encompass other popular email platforms such as Gmail, Yahoo Mail, and Hotmail. By doing so, users who rely on these widely used email services will also be able to benefit from the streamlined and efficient user experience that this product offers.

By prioritizing the inclusion of these mainstream email platforms, the team aims to ensure that a larger user base can seamlessly integrate their accounts and enjoy the full range of features and functionalities provided by the email client. This expansion not only enhances the product's market reach but also caters to the diverse preferences and needs of users who rely on different email services.

Moreover, the inclusion of these additional email platforms lays a solid foundation for potential future expansions and integrations with other email services. By addressing the

challenges and intricacies associated with integrating distinct APIs, the team is establishing a robust framework that can be leveraged to accommodate further expansion and adaptability in the ever-evolving landscape of email services.

4.3. Auto Completion

By incorporating an advanced auto-completion function into the email client, users can experience a significant enhancement in the overall email drafting and writing process. This innovative feature aims to streamline and optimize the writing experience, resulting in increased efficiency and productivity.

The auto-completion function operates by leveraging artificial intelligence and natural language processing algorithms to predict and suggest words, phrases, and even complete sentences as users type. This predictive capability not only saves time but also minimizes the occurrence of typing errors and grammatical mistakes, as the suggested text is based on context and commonly used language patterns.

Moreover, this feature serves as a helpful tool for users who may struggle with grammar or spelling. The auto-completion function's ability to detect and correct typographical errors, suggest grammatically correct phrases, and offer alternative word choices can significantly improve the overall quality and professionalism of the email. Users can compose polished and error-free messages with confidence, ensuring that their intended meaning is accurately conveyed to recipients.

Furthermore, as the auto-completion function learns from user behavior and adapts to individual writing styles, its suggestions become increasingly tailored and personalized over time. By continuously analyzing and incorporating user preferences, writing patterns, and vocabulary, the system becomes more attuned to the user's unique communication style. This personalized touch not only enhances the accuracy and relevance of suggestions but also fosters a seamless and intuitive writing experience.

4.4. Additional Notifications

In order to ensure that time-sensitive or highly important information is promptly and effectively conveyed to users, the email client can incorporate an additional medium of contact for notifications. This feature serves as an extra layer of communication, guaranteeing that no vital information goes unnoticed or overlooked.

Traditionally, email notifications are delivered through the email client itself, typically accompanied by visual and auditory cues such as pop-up alerts or notification sounds. While these methods are effective for immediate notification, they rely on users actively monitoring their email client or being in close proximity to their devices to receive the alerts. However, in certain situations, users may not be actively checking their email or may be away from their devices, potentially resulting in missed or delayed access to critical information.

To address this limitation, the email client can integrate with additional communication channels, such as push notifications on mobile devices, SMS alerts, or even phone calls, to ensure that users are promptly notified of time-sensitive or highly important emails. By leveraging these additional mediums, users can receive instant notifications regardless of their current activity or device proximity, ensuring that crucial information reaches them in a timely manner. For instance, when an email marked as urgent or flagged as high priority is received, the email client can trigger a push notification on the user's mobile device, accompanied by a distinctive sound or vibration pattern to grab their attention. In situations where the user's mobile device is not readily accessible, the email client can also offer the option to send SMS alerts to the user's registered phone number. This ensures that even if the user is not connected to the internet or does not have immediate access to their email client, they still receive a text message notification containing a summary or key details of the time-sensitive email. In critical scenarios, the email client can even go a step further by allowing users to configure phone call notifications. When a highly important email is received, the email client can automatically initiate a phone call to the user, delivering a spoken notification or even reading out the email content to ensure immediate attention and comprehension.

4.5. Email Tracking

The inclusion of an email tracking feature in the email client offers users a powerful tool to enhance their professional communications and follow-ups. With this feature, users can track and receive notifications when their sent emails have been opened or read by recipients, enabling them to gauge engagement, prompt responses, and follow up more efficiently and effectively.

Email tracking provides users with valuable insights into the status and progress of their communications. By knowing when an email has been opened or read, users can determine whether their message has reached the intended recipient and whether it has captured their attention. This information is especially crucial in professional settings, where timely responses and effective follow-ups are often essential.

Armed with this knowledge, users can make informed decisions on how to proceed with their communication. For example, if an email remains unopened for an extended period, the sender may choose to send a follow-up message or explore alternative means of reaching out to ensure the message is received and acknowledged.

4.6. Email Insights

One of the key objectives of this product is to empower users to enhance their productivity. In line with this goal, it would be highly beneficial to offer users insights into their activities and engagement with the email client. By providing users with a comprehensive overview of their usage patterns and time spent on the platform, they can make informed decisions about optimizing their workflow and limiting excessive time spent on email management.

The inclusion of activity and engagement insights offers users a valuable opportunity to gain self-awareness and better understand their email habits. By visualizing data such as the number of emails sent and received, the average time spent on email management, or the busiest times of day for email activity, users can identify patterns and trends in their email usage. This awareness can serve as a catalyst for reflection and self-improvement, enabling users to make adjustments and optimize their email management practices.

For example, if the insights reveal that a significant amount of time is being spent on low-priority or non-essential emails, users can proactively implement strategies to prioritize and streamline their inbox. This could involve setting specific time blocks for email management, utilizing email filters and folders to categorize and organize incoming messages, or even delegating certain email tasks to colleagues or assistants.

Additionally, by monitoring their engagement with the email client, users can gain insights into their responsiveness and efficiency in handling incoming messages. Metrics such as average response time, email thread length, or frequency of follow-ups can shed light on areas for improvement. Equipped with this information, users can adopt strategies to boost their responsiveness, manage email threads more effectively, and minimize unnecessary back-and-forth communication.

Furthermore, the insights into time spent on the platform can be particularly valuable in promoting healthy work-life balance and mitigating the risk of email overload. Excessive time spent on email management can detract from other important tasks and lead to burnout. By visualizing the time spent on the email client, users can assess whether they are allocating an appropriate amount of time to email management or if adjustments need to be made to prevent email from encroaching on other priorities.

To facilitate effective usage insights, the email client can provide visualizations, reports, and customizable dashboards that allow users to easily interpret and analyze their activity and engagement data. These features can offer a holistic view of email usage, enabling users to track progress over time and set goals for improving efficiency and productivity.

5. <u>Conclusion</u>

This report covers the background and objectives of the project, as well as the features that are included and are yet to be included to tackle the aforementioned issues of existing products on the market.

Overall, this project aims to deliver a product that may enhance users' focus and productivity, prevent email fatigue, and protect users' security and privacy.

References

[1]   "67 Percent of People Feel Overwhelmed by Their Email Inbox According to New Inbox Intelligence Report from Email Management Solution Gated," PR Newswire, https://www.prnewswire.com/news-releases/67-percent-of-people-feel-overwhelmed-by-their-email-inbox-according-to-new-inbox-intelligence-report-from-email-management-solution-gated-301659242.html. (accessed Sep. 26, 2023).

[2]   "The Latest Work Email Statistics 2023 You Shouldn't Ignore," Gitnux, https://blog.gitnux.com/work-email-statistics/#:~:text=11%20hours%20is%20the%20average,spends%20on%20email%20per%20week. (accessed Sep. 26, 2023).

[3]   M. Plummer, "How to Spend Way Less Time on Email Every Day," Harvard Business Review, https://hbr.org/2019/01/how-to-spend-way-less-time-on-email-every-day#:~:text=The%20average%20professional%20spends%2028,120%20messages%20received%20per%20day. (accessed Apr. 26, 2024).

[4]   "Global Email Marketing Software Market Insights," SkyQuest, https://www.skyquestt.com/report/email-marketing-software-market#:~:text=What%20is%20the%20global%20market,period%20(2024%2D2031). (accessed Apr. 26, 2024).

[5]   J. Howarth, "Time Spent Using Smartphones (2024 Statistics)," Exploding Topics, https://explodingtopics.com/blog/smartphone-usage-stats. (accessed Apr. 26, 2024).

[6]   S. Lastoe, "This Is Nuts: It Takes Nearly 30 Minutes to Refocus After You Get Distracted," The Muse, https://www.themuse.com/advice/this-is-nuts-it-takes-nearly-30-minutes-to-refocus-after-you-get-distracted. (accessed Apr. 26, 2024).

[7]   G. Christ, "Workers overwhelmed, distracted by email," HR Dive, https://www.hrdive.com/news/workers-overwhelmed-distracted-by-email/637786/ (accessed Sep. 26, 2023).

[8]   "Top 10 Cybersecurity Threats in 2023," Embroker,
        https://www.embroker.com/blog/top-cybersecurity-
        threats/#:~:text=Over%2075%25%20of%20targeted%20cyberattacks,of%20%20stolen
        %20%20credentials%20and%20%20ransomware (accessed Sep. 26, 2023).

[9]   S. Nightingale, Email Authentication Mechanisms: DMARC, SPF and DKIM. US
        Department of Commerce, National Institute of Standards and Technology, 2017.

[10]   "Clean your Inbox of emails you don't need. Then keep it clean.," Clean Email,
        https://clean.email/?_gl=1%2A1lp92xk%2A_up%2AMQ..%2A_ga%2AMTIzNzc0MT
        MyMi4xNjk1NjQ3MDU1%2A_ga_W864N1WMEZ%2AMTY5NTY0NzA1NC4xLjA
        uMTY5NTY0NzA1NC4wLjAuMA..&_ga=2.179578273.488318465.1695647058-
        1237741322.1695647055 (accessed Sep. 26, 2023).

[11]   "Blazingly fast email for teams and individuals," The Fastest Email Experience Ever
        Made, https://superhuman.com/ (accessed Sep. 26, 2023).

[12]   OpenAI, "Privacy policy," https://openai.com/policies/privacy-policy (accessed Sep.
        28, 2023).

[13]   OpenAI, "What are tokens and how to count them?," *help.openai.com*.
        https://help.openai.com/en/articles/4936856-what-are-tokens-and-how-to-count-them
        (accessed Sep. 30, 2023).

[14]   OpenAI, "OpenAI Platform," *platform.openai.com*.
        https://platform.openai.com/docs/guides/rate-limits/overview (accessed Sep. 30, 2023).