

Inbox Harmony: A Recommendation System to Manage and Organise Emails Based on PIM Principles

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In today’s digital era, email communication has become a fundamental aspect of personal and professional interactions. However, the increasing volume of emails causes significant challenges in efficiently organising and managing a user’s mailbox. Existing email clients provide automation such as rule-based filtering and spam detection. However, Park et al.’s [4] investigation highlights that users expressed the need for better automation within email clients. This thesis investigates the reasons why users refrain from using rule-based filtering and folders when managing and organising their emails [5].

In our literature study on the state of the art of email overload [7] and the challenges related to it, we observed the lack of a recent study identifying the gaps between the automation provided by email clients and the effective usability of this functionality by users. Much research has been conducted to optimise spam filters and provide users a platform to filter emails by defining their own rules using richer data models [2,4,3,1]. However, there is less recent research on identifying the reasons behind a user’s cluttered inbox and their reluctance to use the available feature of folders for organising their emails. Therefore, we first conducted an exploratory survey to gain insights on arbitrary users’ email management practices. We examined how often they check their emails, how many emails they receive per day, how they manage emails in their inbox, whether they create and maintain folders, whether they are aware of the available rule-based filtering, whether they prefer using rule-based filtering and if not then why and whether users would be interested in a machine learning-based component in their email client which could recommend them to move certain emails to folders based on their previous actions. Thereby, we observed that participants have a large number of emails in their inbox and do not manually create and manage folders to organise their mailbox [6].

Based on our findings, we designed *Inbox Harmony*, a recommendation system to manage and organise emails. Given that ‘harmony’ means an orderly and pleasing arrangement of parts, our recommendation system, consisting of two parts, intends to bring harmony to a user’s inbox. The first part is the selection, optimisation and deployment of the machine learning model to perform some

natural language processing and text classification. We decided to choose Classifier Chains, a multi-label classification algorithm and Fuzzy C-Means, a soft-clustering algorithm based on the principles of fuzzy logic. Further, we utilised a hybrid deployment approach by training both of these models on an individual’s Gmail account and providing personalised yet accurate machine learning-based recommendations to move a user’s emails from their inbox to other folders. Our solution not only shows suggestions for moving emails to already existing folders, but it also finds similar emails present in an inbox, groups them and recommends creating a new folder for those emails. In contrast to existing rule-based filtering where an email can only be assigned to a single folder, Inbox Harmony can suggest multiple folders for a given email.

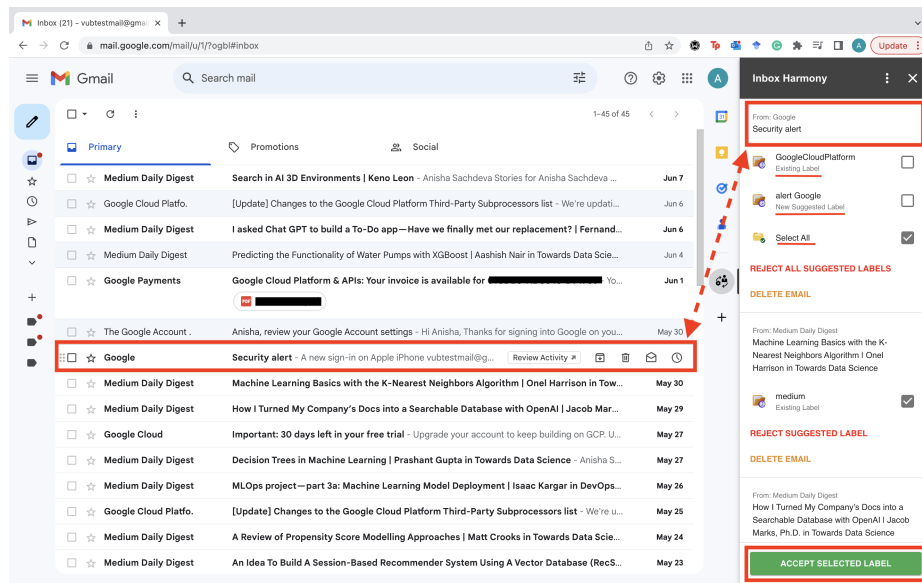


Fig. 1. Screenshot of the *Inbox Harmony* email recommendation user interface as a Gmail add-on on the right-hand side

Inbox Harmony can currently be used as an add-on for the popular Gmail email client. As highlighted in Figure 1, we display the add-on in an individual user’s Gmail interface based on the Google Apps Script. The Inbox Harmony user interface presents users various machine learning-based recommendations to move different emails from their inbox to suggested folders (labels). A user can then easily move, delete or reject the recommendation with a single click. New folders can also be created while moving the email from the inbox to the newly suggested folder (i.e. add a label). Finally, the machine learning model learns from the actions taken by the user in order to provide better recommendations over time. A main contribution is the insight gained from our survey on email use and management, resulting in the successful development of Inbox Harmony’s machine learning-based recommendations.

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