

Semi-Automatic Information Management for Collaborative Spaces

Duration 3 years
Level Ph.D.
Team Loki (Inria, France), HCC (Aalborg University CPH, Denmark)
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Direction

This Ph.D. project will take place at the Inria center of the University of Lille (France) in the **Loki team**. It will be directed by **Sylvain Malacria** (Inria), and co-supervised by **Bruno Fruchard** (Inria), and **Carla Griggio** (Aalborg University CPH).

Summary

We often discuss and share data collaboratively regarding websites, tools, or information that is relevant to a given topic. Knowledge shared this way often ends up scattered across multiple applications and tied to them, with no easy means to retrieve it other than by opening the applications and manually extracting the information. Collaborative systems such as Google Drive or Microsoft Teams enable the clustering and sharing of such knowledge, but they require agreement on structures, such as folder hierarchies, to store and efficiently retrieve pieces of information. However, users' mental models may differ regarding how data should be structured, and a single solution applied to everyone might be significantly limiting.

In this Ph.D. thesis, we aim to explore the use of a semi-intelligent system that assists a group of collaborators in storing, accessing, processing, and presenting data, with a set of interactions that allows users to easily define constraints, such as where to store information and with whom to share it. The primary goals are to identify efficient interactive means of communication between users and intelligent systems, and to explore ways to adapt the structure of shared information spaces to accommodate all collaborators.

Context

Collaborative work is increasingly mediated by multiple systems and devices. For example, a team of software engineers may access and generate diverse types of data across Slack, Github, Google Docs, Figma, Calendars, Email, etc. for design, development and management activities. Teams may collaborate on multiple platforms for a project to benefit from diverse functionality and switching between personal and shared spaces [3], and communication can start and end on different platforms based on the way we split information across them [2]. While collaborating on multiple platforms expands the range of tools available to the team, it also scatters their resources and information across "information silos", therefore creating boundaries that pose challenges when trying to retrieve and make sense of information shared with others over time [1].

Currently, preserving information over time requires users to manually store it in dedicated places that are organized with a structure they decided to use. This can clash when mental models of users are different and rely on constraints that are incompatible. Similarly, relying on indexing systems such as Apple Spotlight to retrieve information using queries requires comprehending its model to be efficient. Furthermore, not all information might be worth keeping over time (e.g., casual discussions of how a meeting went might not be significant when exploring information related to a project) as it might clutter the informational space and create noise that could be captured when searching for information or using queries.

Goal

The primary goal of this Ph.D. is to explore interactive solutions leveraging intelligent collaborative systems that support users in registering, accessing, processing and presenting data generated across a team's software ecology. We want to study mixed-initiative approaches for which the system can proactively store and structure data relevant to the team and their goals but also allow users to intervene and explicitly ask for help in managing their data. We are particularly interested in studying how such systems can support long-term collaborations mediated by complex collections of software. The intelligent system would help structure the team's information space by taking into account constraints and goals from each user and help them retrieve information

efficiently and across platforms, as opposed to navigating through traditional folder hierarchies and "apps" designed as information silos.

We anticipate that the project may include goals, challenges and activities that involve:

- exploring the design space of techniques for interacting with an intelligent system to register, access, process and present data in diverse collaborative activities, for instance, combining direct manipulations of media with natural-language processing and/or large language models
- implementing interoperable methods to fetch any kind of media across a team's complex ecologies of software
- investigating methods to let multiple users structure their shared informational spaces collaboratively, negotiating the balance between automatic and user-controlled approaches to shape their data to fit their mental models and goals
- evaluating how efficiently users and systems can communicate with each other to achieve their goals while the system remains as transparent as possible in the collaborative process

Potential Use Cases

The exact use cases we will focus on during the project will mostly depend on the candidate's interests. We identify several interesting collaborative scenarios to explore:

- online conversations with collaborators, friends, and relatives
- computer-supported collaborative note taking in classrooms
- research proposal writing processes
- computer-supported collaborative planning and authoring of teaching materials
- brainstorming processes (e.g., research workshops)
- collaborative creative sessions (e.g., music production)

Candidate

The candidate must have (or be about to obtain) a Master's degree or equivalent in Computer Science or Human-Computer Interaction, and demonstrate a strong interest in research. They should have experience and a strong interest in software development, machine learning and strong programming skills. Creativity, independence, team spirit and communication skills are valuable assets. A good level of technical and scientific English is also required.

To apply, send your resume and a cover letter by email to Bruno Fruchard (bruno.fruchard@inria.fr), Carla Griggio (cfrg@cs.aau.dk), and Sylvain Malacria (sylvain.malacria@inria.fr) with [Application: Automatic Information Management for Collaborative Spaces] as object of the e-mail. In addition to what is generally expected, the cover letter should highlight what you find particularly interesting in this topic, why current solutions are limited, as well as describe your overall vision for this project. Ideally, it should also elaborate on why you are interested in working in academic research. All applications are welcome, regardless of age, gender, social or ethnic origin, sexual orientation, or disability. For the integration of people with disabilities, we are working on possible adaptations of the positions to be filled - within the limits of the applicable rules for the safety of people: do not hesitate to contact us to tell us about your situation.

References

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"Collaborative writing across multiple artifact ecologies."
In: *Proceedings of the 2020 CHI conference on human factors in computing systems*. 2020, pp. 1–14.