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GWUNWN NTCT (Note Taking Collaborative Tool)

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Introduction

When in class or in a meeting, people often take notes. In both cases, there is liable to be an overhead of redundant work and a lack of understanding of important information. The goal of collaborative note taking is to reduce the amount of redundant work while increasing the overall understanding of the participants. Collaborative note taking is closely related to collaborative writing. The differences are that in collaborative writing, each writer works to create a single product that is the same for all members of the group. In collaborative note taking, each writer (note taker) works to create a unique product that best records the interesting details for that writer.

Design

What are other people writing?

Our method of solving this problem is to give participants awareness of what others are taking notes about. This allows participants to collaborate silently and on the fly during a note taking session. Many participants may take notes on a laptop, tablet PC, or handheld device already – this system would augment that task with an awareness of what others are writing.

Window Style

We explore two interconnected methods of collaborative note taking interfaces. The first is “Window Style,” in which participants in the system have a dedicated window per participant. A given participant would then see several windows simultaneously. That participant could choose which windows were visible, and the size and location of each. Therefore, that participant has a customized view of each participant’s notes. These notes are updated in real time while collaborating. The intended effect, then, is that each participant takes notes as usual, with the benefit of being able to quickly scan to see what others are writing about. The participant may also highlight and copy text from another of these windows to place in to their personal notes. In this way, one participant may make a particular note, then many other participants copy that note and modify it to reflect their personal understanding. Everyone can see what everyone is doing. We do not suggest making the system attempt to balance participation, instead relying on social negotiation to determine appropriate conduct. Participants may not modify other participant’s notes directly; they may only copy notes into their personal notes and then modify them. See figures 1 and 2.

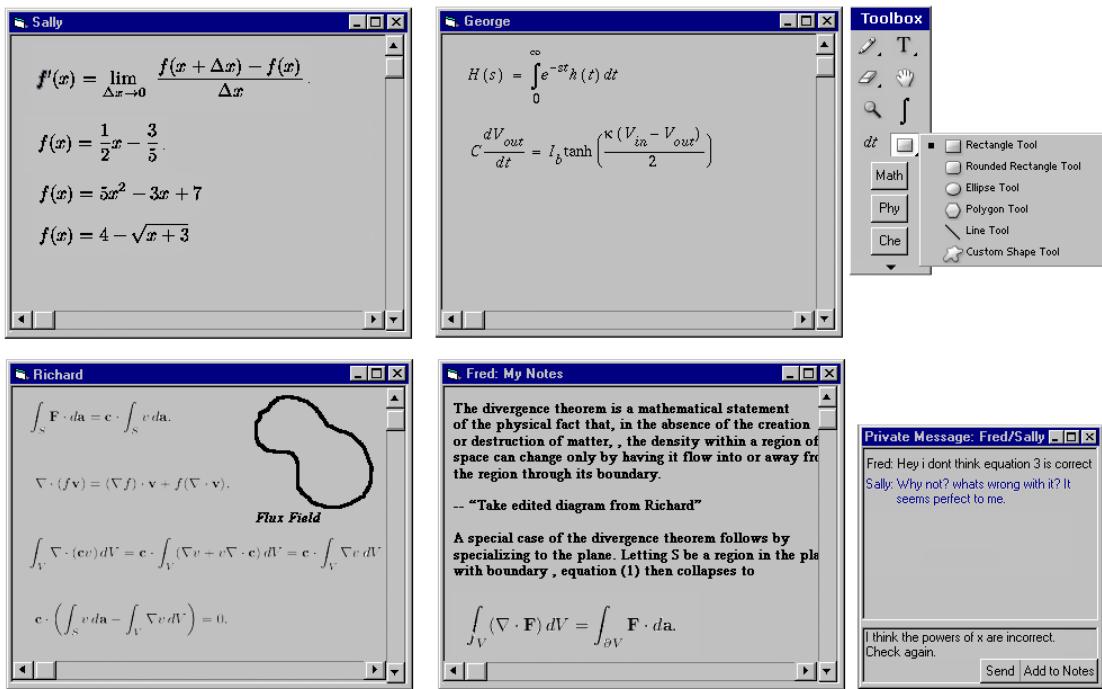


Figure 1: Window Style Monitoring

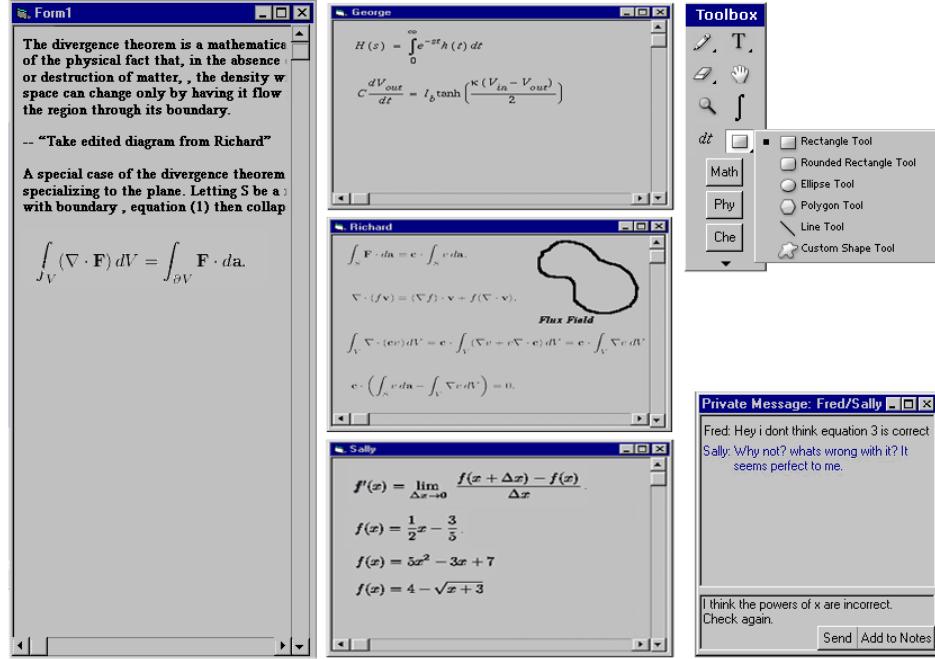


Figure 2: Window Style Monitoring (another view)

IRC Style

A second method to monitor other's notes is an IRC style message window. Lines are placed in the IRC window automatically. Participants may copy a particular line by clicking a button. This allows a participant to focus on his own notes primarily with a channel for quickly monitoring other's notes. In addition, it should be easy to get a participant's notes in context: clicking on the participant's name will bring up a window with that participant's notes as a whole. These two styles of monitoring do not exclude each other; a participant might have a few others' notes in dedicated windows while monitoring others in an IRC style window.

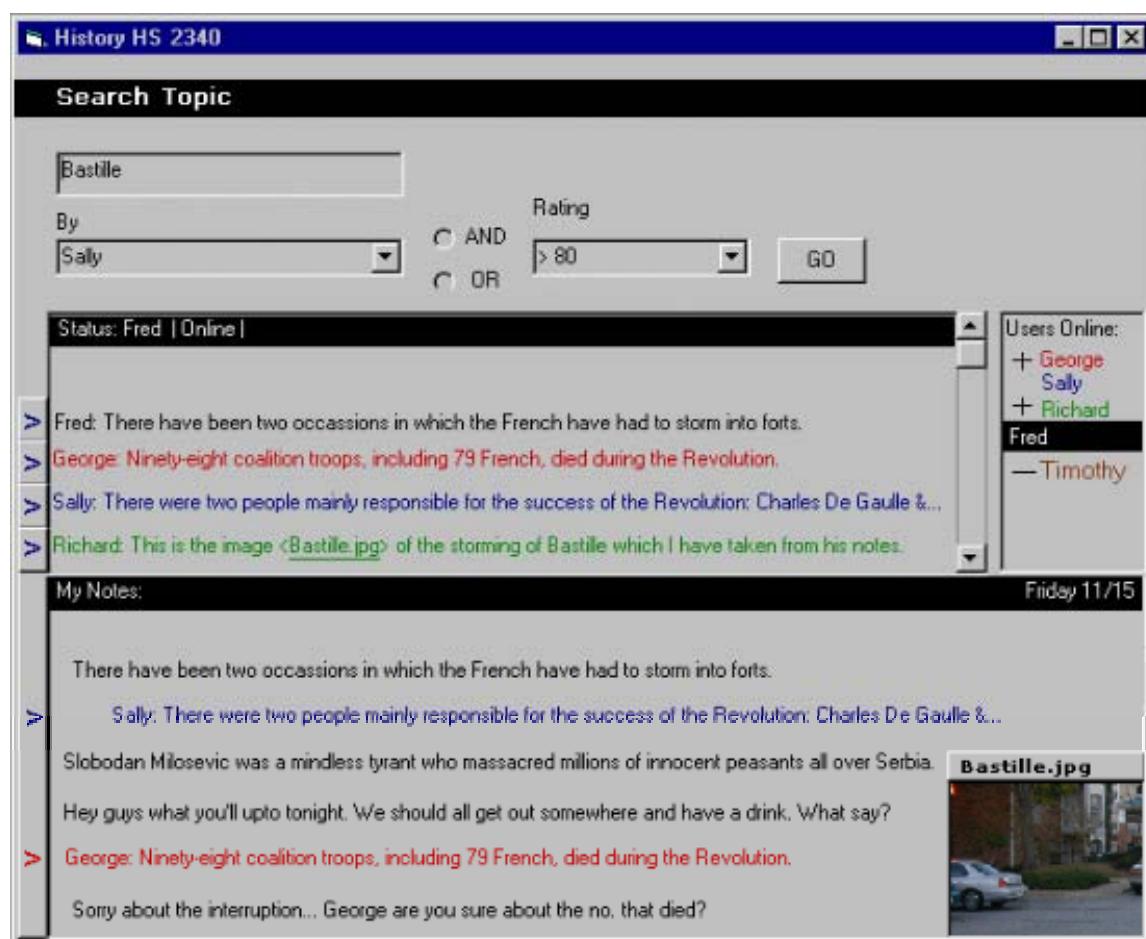


Figure 2: IRC Style Monitoring

What is a Note?

In note taking, there are several different possibilities for deciding what is a complete "note". Without high level semantic processing, the system is limited to guessing. For the multiple windows version of monitoring notes, this is not a problem. All text and images are handled as in a word processor. A user may highlight any amount of text and choose to copy that into his notes. These will place the selected text at the end of the user's notes, and the user may now edit them as he desires.

In the IRC format of monitoring notes, this is more of a problem because the system must decide when to post an IRC style message. There are a few options: post whenever a user comes to a new line (either by hitting return or by wrapping); post whenever a user indicates the end of a sentence (entering a period or semicolon); post any image. We feel that the best solution is the first, or posting whenever a user comes to a new line. This follows the IRC style of messaging that people may expect.

Centralized versus Decentralized Architecture

Two differing models we have considered for the collaborative note taker application are centralized and distributed. In the centralized model, each participant would log into a central server to take notes. The central server would maintain the most current version of each participant's notes and update versions on each participant's machines. When a participant logs in, the participant's version or his personal notes replace the server's version, and the server's version of everyone else's' personal notes replace that participants version. In the decentralized architecture, this knowledge would be difficult to maintain - a participant is only assured to get a current version of another's notes from that person. There are, however, ways around this detail (such as using timestamps). We feel that a centralized architecture would be easier to implement and allow for more controlled interaction between users.

Collaboration awareness and control

Participants should be aware of other participants. In such a collaborative setting, "lurking" or "leeching" would probably been looked down upon and discouraged. The idea for this technology is that everyone takes notes and can benefit from each other, not that a few people can take notes and the rest benefit from that work. One might imagine a participant rating system that could be applied automatically, counting the number of individually contributed lines, say. Such a rating could be used to see who produced notes, regardless of their quality. Another rating could be the number of lines the participant produced which other people have taken, which implies a quality measure. A person with high production rating and low taken rating may simply be producing a lot of garbage, where a person with low production rating but high taken rating tends to write few, but well considered notes.

In addition, participants should have mechanisms for controlling the other participant's input into the system (from his perspective). For example, a participant might take copious notes on a subject, so much that it distracts another participant. The second participant should be able to "turn off" the first's input into the second's screen to control

such distraction. Turning a participant's input off and on is a rather coarse control method. Perhaps more fine-grained control could be implemented, such as shrinking text font or showing only the first part of lines.

In our system, we have a simple window similar to an ICQ window showing which participants are connected to the system. A particular participant's notes can be displayed by double clicking that participant's name. Additionally, in the IRC style viewing, the displayed messages may be controlled in two ways. A particular participant can be "Always On" or "Always Off" meaning that the participants are always displayed or never displayed respectively. Additionally, a filter can be applied using the automatically generated rating system. One may choose to view only messages from participants with a particular rating. These two filters work together. One can show everything by George, nothing by Sam, and everything from anyone within a particular rating range.

Single user modes

Participants should be able to review and modify their notes while not connected to the system. In addition, it would be nice if participants could review other participants' notes while not connected to the system. Such ability could lead to improved understanding, but could also lead to leeching. In our system, users have the same behavior for reviewing as for actively taking notes. The window style views act the same regardless of connection state. The IRC window also works the same; IRC messages are displayed in the order they were sent from the server. Filters work the same as well. The only difference is that when connected, others' notes are dynamic and may change as you work.

Handling private notes versus public notes

Because of the nature of collaborative note taking, we feel that notes should be considered public by default. Users should explicitly specify private notes. This can be done before "publishing" the note (by hitting a hot key, for example) or afterwards. By publishing, we mean before the note is made visible to the server and thus to other users. A private note would be removed from the server if it had ever been there. Notice, however, that another user could have copied that note while it was on the server. In the context of collaborative note taking, this is acceptable and the creator of the private note is simply out of luck – such a note has become public.

Version History

Version history refers to the fact that users should be able to modify and/or review their own notes at any point, either while connected to other members of the group or not. This is essential, as one of the main purposes of note taking is review. During review, a user may realize that some detail is incorrect, and make a correction. Thus this user's notes are updated, and hopefully more correct. Another user may have copied this detail for their own notes; such users should be notified if a change has been made. The second user may then accept the change, or disagree and question the change. Such interaction between users could lead to explanation and clarification. However, the technology must be able to

- 1) Recognize when a change has been made
- 2) Recognize when a change impacts other users
- 3) Allow for communication between the users
- 4) Allow disagreements to stand

Our system does not explicitly differentiate (or recognize) a note modification from a note creation, and therefore cannot communicate note modification per se to other participants. However, we do allow a back channel communication between two participants, intending for participants to elicit clarification, express doubt, or otherwise discuss the notes being taken. This back channel is intended to be a temporary two-way conversation equivalent to passing notes in class. Parts of such a conversation can be added into either participant's notes and edited, and as such are "semi-public." They are not recorded immediately by the system, but permission is not necessary for either participant to place comments into personal notes, which by default becomes public. This follows with email correspondence or IRC chat – once a message has been sent, ownership no longer implies control.

Social Issues Discussion

Privacy

As in any collaborative system users privacy is an extremely important concern. Users will be apprehensive about using any technology that broadcast their notes to any group - no matter how small or intimate the group might be. In order to allay these fears we are providing features that explicitly control the people who have access to the notes.

While taking notes: User will have an option to mark any notes they take as private, private notes are visible only to the user who makes the notes and will never be recorded in the public notes record.

During review: Users can also mark their notes as private during later review; this will remove that particular note from the public record. However if some other user has included that note in their personal record it will remain in that personal record.

Group forming

We envision the system as supporting static club-like groups as well as ad-hoc short term groups. This will allow the system to be used by different people in different locations.

Club-like groups: These are pre-established groups, which will require users to get explicit permission to join the group. This club-like setting will be akin to a private wiki and will allow users who skipped a meeting to review the public group notes of previous meetings. New user may also be granted permission to review public notes made prior to their joining the club. The advantage of such a closed setting is that users will be more open about their views since they know exactly who will be able to see their notes.

Ad-hoc groups: We also envision using the system in an ad-hoc method where users can publicly publish their individual notes to the server. When a user starts taking notes the

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server will give them the option of collaborating with public users already in the room. Users will not need any permission to join an ad-hoc group though they will have to join a group before they are able to view its notes. The system will also publicly announce the entry of new users into a group. We believe that the ad-hoc groups system will provide users interesting ways to collaborate and will be most useful in settings where users are new and may not know too many people. The ad-hoc groups may even become a new way of making acquaintances.

Attribution

It is crucial that users be able to attribute the notes that they are seeing to a specific user, for this reason each line that is transmitted has the authors name attached to it. Users have the option of concealing the username on their client but they are not allowed to post any notes anonymously. Additionally, notes taken from another source can optionally appear in a color other than the default typing color.

Back Channel

Members of a group note taking session will be able to communicate with each other using an Instant Messenger type of application built into the note taking system. This will provide a back channel for communication during a meeting/class that will not disturb any other people in the room. This back channel can be used for any number of things including clarification/correction of notes. Users have the option of adding the entire text of the back channel conversation to their notes

The most important social issue regarding this is whether people will misuse the back channel for personal messaging. People who are presenting will usually be displeased if they do not have the complete attention of the room and this should prevent the users from using the system for too much back channel communication. Also the back channel system does not create a new problem in this regard-it merely makes it easier for users to communicate without needing a separate IM application.

Affecting personal note taking behavior

This system will definitely affect users note taking behavior. It will discourage creating short cryptic notes and will encourage longer, more coherent notes. While this may initially appear to be a deficiency we believe that encouraging users to write clearer notes will in fact be an added bonus, in that note takers will be considering how to express the subject matter in a clear way.

Roles

While the system is designed to give users parity it may emerge that certain users may be designated as note takers and the rest of the users merely use that persons notes with little or no modification. Users may also unintentionally fall into a scribe role if their note taking practices include taking copious notes

Trust

Trust is an important feature of any collaborative system. We have chosen not to allow any type of anonymous messaging or posting in order to reduce the possibility of flaming or spamming the group notes. Requiring users to identify themselves to their notes will also promote more informed opinions since users know that they may have to defend what they have written.

Review

During the review process users can use their own personal notes or use the group notes. The group notes will be especially useful to users who were unable to attend a class/meeting. Reviewers can filter the notes based on importance rating, number of messages, user, and so forth. This will allow user to avoid the problem seeing replicated notes about the same topic.

Time to live

Groups also have the ability to set a Time To Live (TTL) value to the group meeting notes. Once the notes have exceeded the TTL value the server will automatically delete the group record. Users will however still have access to their own private record, which will still include any notes that they took from other users. The purpose of the TTL value is to help ensure the group members privacy, once the TTL has expired.

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