Agents that Reduce Work and Information Overload by Pattie Maes

- Autonomous agents can assist a user with information filtering, information retrieval, mail management, meeting scheduling, selection of books, movies, music, etc.
- Autonomous agents can be used to implement a style of interaction called indirect management.
  - Instead of user-initiated interaction from commands and/or direct manipulation, an autonomous agent is capable of initiating communication, monitoring events, and performing tasks.
- The agents assist the user by:
  - hiding the complexity of difficult tasks
  - performing tasks for the user
  - training or teaching the user
  - helping users collaborate
  - monitoring events and procedures

Approaches to Building Agents

- What are the 2 main problems with building agents?

- Historically there have been 2 approaches to building agents
  - semi-autonomous agents
  - knowledge-based approach
Semi-Autonomous Agents

- A semi-autonomous agent consists of a set of user-programmed rules for processing information related to a specific task.
- The user must do the following:
  - Competence
    - This approach does not deal with the competence problem satisfactorily.
    - It requires too much insight, understanding and effort from the end user.
  - Trust
    - Trust is not as much of an issue with this approach.

Knowledge-Based Approach

- The knowledge-based approach consists of programming the interface agent with extensive domain-specific knowledge about the application and the user.
- The agent then uses this knowledge to recognize the user’s plans and to find opportunities for contributing to them.
- Competence

- Trust
Training a Personal Digital Assistant

• Let the interface agent program itself.
• The conditions for success:
  – The use of the application must involve a significant amount of repetitive behavior.
  – The repetitive behavior is potentially different for different users

• Metaphor: Personal Assistant

• Competence
  – The agent becomes more competent over time.
• Trust
  – As the agent gradually develops abilities, the user gradually understands the way that the agent makes decisions.

Training a Personal Digital Assistant

• The agent acquires its knowledge from the following sources:
  – It continuously watches the user as the user performs actions.

  – Direct and indirect user feedback
Training a Personal Digital Assistant

• The agent acquires its knowledge from the following sources:
  (continued)
  – Learning from examples given explicitly by the user.
  – Asking for advice from other users’ agents

Electronic Mail Agent (Maxims)

• An electronic mail agent can learn to prioritize, delete, forward, sort, and archive mail messages.
• Main learning technique: memory-based reasoning
• The confidence level is determined by:
  – whether or not the nearest neighbors recommended the same action
  – how close the nearest neighbors are
  – how many examples the agent has memorized
Meeting Scheduling Agent

- The meeting scheduling agent assists the user with accepting, rejecting, scheduling, rescheduling, negotiating meeting times, etc.
- Meeting scheduling fulfills the criteria for learning interface agents.
  - User behavior is repetitive
  - Different people have different preferences
- The initial results for the meeting scheduling agent were promising as people found that the agent reduced their work overload.
- Suggestions for further improvement:
  - The agents need to run faster
  - Users would like to be able to instruct the agent to disregard some of their behavior.

News Filtering Agent (NewT)

- A user can create many news agents.
- The agent is initialized by giving it positive and negative examples of articles to be retrieved.
- The agent performs a full text analysis, and it also remembers the structure information such as the author, source, etc.
- The user can highlight a word or paragraph and give selective positive or negative feedback.
- The main limitation is the restriction to keywords.
Entertainment Selection Agent

- The agents in this system use “social filtering”
  - Every user’s agent memorizes which books or music albums its user has evaluated, and how much the user liked them.
  - The agent then finds other agents whose values are positively correlated to its own values.

- Two main problems
  - The system needs to be bootstrapped so that enough data is available for the agents to start noticing correlations.
  - Users may start to rely on the recommendations, and they may not enter new items.

Discussion

- How can we guarantee the user’s privacy if agents communicate with one another about their users?

- How can agents built by different developers, using different techniques, collaborate?

- Should a user be held responsible for his or her agent’s actions and transactions? If not, who should be held responsible?
Tuesday, August 3rd

• Final Exam
  – Tuesday, August 3rd 1999
  – K 9500 (19:00 - 21:00)