

# Spreading Activation - An Autobiographic Memory Retrieval Mechanism for Social Companions

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## 1 Artificial Social Companions and Memory

The aim of our research is to develop companion agents with certain features of a human-like autobiographic memory that support natural and social interactions. We applied the Spreading Activation retrieval mechanism [1] in the companion’s autobiographic memory which enables our companion to associate different events with one another based on different attributes such as location, people involved, objects and so on, hence improving the companion’s ability in answering questions. A comprehensive description of the memory architecture can be found in [2, 3]. In order to allow retrieval through the spreading activation mechanism, the companion’s autobiographic memory events are assumed to be nodes that are associated to one another via attributes forming a network. These relations between nodes form associative pathways between them. Similarly, associative paths are also formed among attributes in each node. Each attribute have a strength associated to each link, which is a function of its frequency of occurrence.

**Table 1.** Some simplified events in the companion’s AM

| Node | Who  | What  | Whom | When      | Where      |
|------|------|-------|------|-----------|------------|
| 1    | John | watch | TV   | Afternoon | LivingRoom |
| 2    | John | read  | book | Afternoon | StudyRoom  |
| 3    | Jane | watch | TV   | Evening   | LivingRoom |
| 4    | John | watch | TV   | Morning   | LivingRoom |
| 5    | John | play  | game | Afternoon | StudyRoom  |

Figure 1 illustrates the relation between attributes for the nodes related to “John” from Table 1 (the numbers refer to frequency of appearance). When an attribute of the memory network is activated, activation will spread along the associative pathways to related attributes and nodes based on attributes known to the companion. For example, based on the memory snapshot in Table 1, if

the companion is being asked who watched TV, TV will become the attribute for activation. The companion will search in its memory for events related to TV and find node 1, 3 and 4. It then spreads the activation to the subject of the events. Since activation is currently calculated based on a function of the frequency of occurrence, John (frequency 2) will be selected as an answer to the query. The activation can continue spreading to other attributes depending on the level of details required by the query. For instance, if now the companion is being asked for John's location and the current time is afternoon, activation will spread as illustrated by dotted arrows in Figure 1.

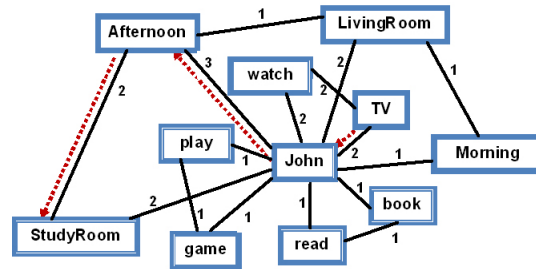


Fig. 1. Spreading activation in the companion's AM

## 2 Conclusion

This paper proposes a human-like computational memory, specifically, the retrieval mechanism - spreading activation for a companion agent's autobiographic memory that will help the agent to manage its memory more efficiently and enable it to have a more natural interaction with the user. The application of the spreading activation retrieval mechanism will allow the companion to connect different memory events and generate appropriate response to the user's query.

## References

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