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Architecture of Internet Agent with Social Awareness

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Abstract

We describe approach, architecture, implementation and practical applications of personal software agent with social awareness, capable to capture socio-temporal context of its user on the Web and in social networks in the course of interactions of the user with agent itself and user's Internet environments online.

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Keywords: cognitive architecture, personal agent, social awareness, social network

1 Introduction

Importance of social phenomena study and accounting for them in development of complex systems driven by artificial and collective intelligence gets more and more important from day to day. Rapid emergence of markets of autonomous devices and so-called *smart things* gets human users more and more dependent upon decisions made by software running these devices. Effectively, that software runs algorithms of artificial intelligence and machine learning, in certain cases relying on collective intelligence collected from personal *big data* assets growing online. Moreover, the importance of social phenomena gets applicable for every level of biological and social systems. The very recent works show effective social behavioral patterns even at metabolic level [1]. Earlier works render how principles of social organization enable efficient construction and development of multi-agent environments at the levels of technological and financial systems and ecosystems [2]. Classic works outline social impacts on decision making process for every individual person in society [3].

From practical perspective, impact of social context can be tremendous involving huge volumes of human population in very short time intervals [4]. Recent studies outline possible complexity of social interactions driving these impacts and so importance of study of them and accounting for them in practical work can be hardly overestimated [5]. In our work on *Aigents* project [6], we target to create personal software agent capable to make online experiences of the user more safe, comfortable and efficient. We realize this can't be done without of complete account of social context of the user including user's sources of information online as well as user's interactions in social networks.

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2 Approach and Architecture

Overall approach for the development of software agent serving its human user is described in our earlier works [7], [8]. In short, we assume that the data perceived, processed and produced by such agent is bound to 3-dimensional spatial temporal attentional continuum. Hence, three key dimensions of the data are the time specific to experience of the data, social context of the data and the attention allocated to the data at given point of time in such context. First, temporal dimension reflects time frame of the data importance for agent and its user. Further, social context indicates importance of the data related to social environment of agent's user – including producers and consumers and of the data and ones related to the data in other ways, such as providing evaluations of the data such as positive or negative valuations, confirming its trustability and validity, etc. Finally, attentional dimension reflects extent to which data is important to the agent and its user at the moment to keeps it in *long-term* or *short term* areas of agent's memory based on that.

Agent Architecture

Overall agent architecture in *Aigents* system incorporates basic principles of development of cognitive functional systems accordingly to B. Goertzel [9] and E. Vityaev [10]. Its original design is described in one of our earlier works [11]. Latest design also includes components required to support dealing with the spatial temporal attentional continuum mentioned above (Fig. 1). That is, *Social Feeder* component is added to deal with social context. Then, *Archiver* layer is added to *Storage* to deal with attentional focus representing *long term* and *short-term* memories respectively. At last, there is *Thinker* layer included to implement associative learning, reasoning, clustering and categorization.

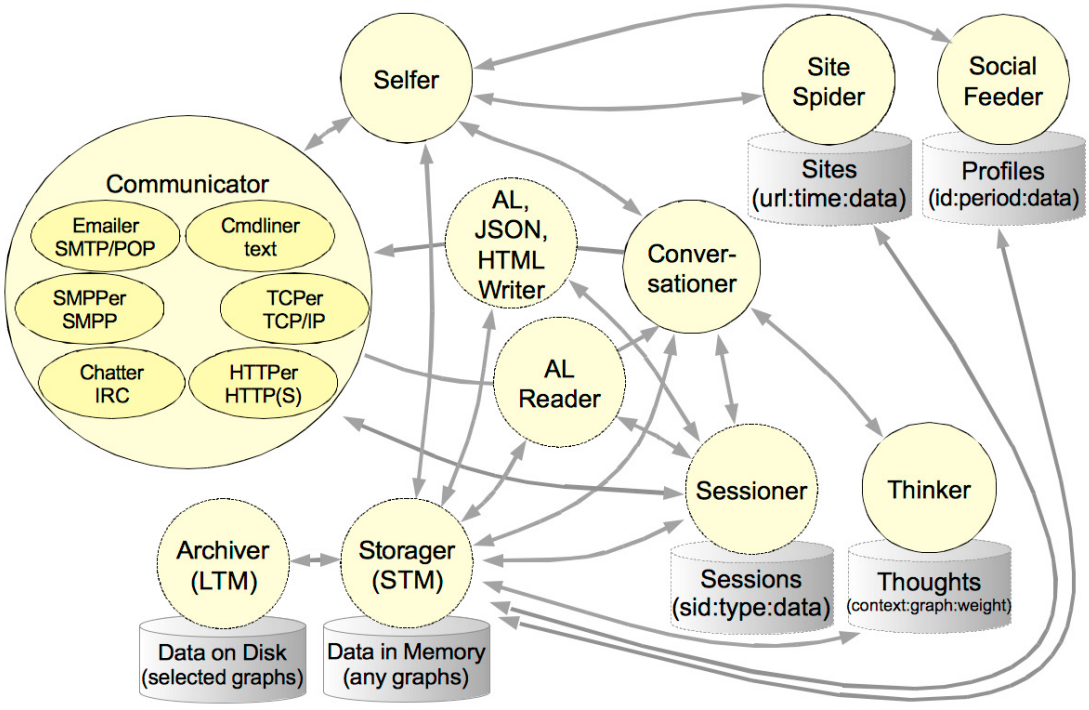

Figure 1: Architecture of *Aigents* system with Social Feeder, Archiver and Thinker components added.