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Abstract

Large numbers of messages keep distracting people from current tasks and interests. Also, messages take up valuable resources of devices and deteriorate performance. This thesis aims to explore the combination of rule-based approach and personal ontology to mitigate these issues.

Two types of information are identified: one from messages, user profiles and context. This information is semantically uplifted into ontological instances for further processing. However, it poses a number of issues as messages are dynamic, and context and user interests can be fickle. These problems will be mitigated by proposing personal ontologies. The other information is from domain knowledge, intended to form into rules for logical reasoning and taking actions.

Two use cases are created that contain interrelated messages, dynamic context, and interrelated persons, etc. Two corresponding research objectives in the thesis are 1) exploring the effectiveness of rule-based approach, by comparing rule languages and employing complex rules derived from use cases; 2) combining static keyword lists and dynamic personal ontologies, to semantically match message-message, message-context, and message-interest.

In response to novel messages and novel senders without historical reference, the thesis designed rules to automatically learn and test the result of this rule-based approach.   Another key challenge of the system is how to deal with large numbers of messages. The thesis proposed a chaining, distributed approach to making the phased operational decision on pending messages. Another challenge is how users can give feedback and involve into scrutiny. To meet the requirement of scrutability, the system asserted rules to changing the level of user interest. The current approach combined the research in the area of semantic uplift, ontology modelling, personalisation, rule-based system, etc. to face the addressed challenges. Afterwards, the application are evaluated iteratively to validate the goals of the research.

An experimental rule system called message assistant is designed and implemented with contextual information and user interests. A Java message simulation was implemented to generate controllable numbers of metadata messages of selected time period as required.