Accelerating Problem Solving in Collaborative Social Networks

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1. OVERVIEW

Problem solving is ubiquitous in organizations such as companies, institutions, and government agencies. Problems can be diverse in nature, including IT problems, expert finding, information search, decision making, etc. In large organizations, it is sometimes extremely difficult to pinpoint the right problem resolver due to the great diversity of problems and people's expertise. Typically, when an expert is assigned with a problem, she tries to diagnose and resolve it using her own knowledge. If the problem cannot be resolved, she will then forward it, along with her diagnosis, to other experts she considers capable of resolving it. The problem may continue being routed among experts until it is resolved by the right person.

The problem solving processes are social computing tasks performed in a social network, in which a node represents an expert, and an edge represents a collaborative relationship. The efficiency of these processes depends on two key factors. One is the capability of each expert to solve a problem in her technical area, i.e., the effectiveness of the nodes in the network. The other is the effectiveness of collaboration between experts, in particular, the ability of an expert to make wise routing decisions for an unresolved problem based her understanding of the problem and awareness of others' expertise, i.e., the effectiveness of the edges in the network. While it is easy to assess an expert's technical expertise and provide corresponding training, it is much harder to assess and enhance the collaboration effectiveness. Our analysis shows that the latter problem is also a practical one because we commonly found experts who did not know other peoples' expertise well, and made wrong decisions about to whom a problem should be transferred, thus leading to a long resolution sequence.

In this work, we study the problem of accelerating problem resolution processes in a social network, given logs of historical problem solving processes. Two questions are investigated: (1) Can we quantitatively model the collaboration effectiveness between experts? and (2) how can we improve the problem solving efficiency?

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Collaboration effectiveness hinges critically on an expert's awareness of others' expertise in order to make wise decisions on problem routing. Typically, qualitative surveys are used to measure expertise awareness of an expert, using questions like "how well do you know expert A's skills?" Such surveys are costly and the results subjective. We approach this problem from a unique angle: we develop a computational framework to objectively and quantitatively assess expertise awareness, which provides a cost-effective alternative to social experiments. Specifically, we design a method to evaluate the effectiveness of a node in the social network. By tentatively removing the node from a network, we are able to compare the problem solving efficiency of the network with this node versus the one without. The difference tells us the value of this node in the network [1]. Based on this assessment, targeted training can be provided to improve collaboration effectiveness.

Furthermore, we develop a computational model to capture historical decisions by mining problem logs, and leverage this information to make recommendations on future problem routing. The observation is that in many cases, long resolution sequences were results of a few local misrouting decisions, while the majority of the local problem transfer decisions were correct and thus can be learned to guide future routing. Different from existing works, which typically focused on the textual description of the problems, we investigate how to leverage the routing sequences for improving problem solving efficiency [3] and how to combine the knowledge of routing sequences with the textual information to provide context-aware routing guidance for further optimization [2, 4].

2. ACKNOWLEDGMENT

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3. REFERENCES

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