Tutorial: Exploring Interaction Networks for Services Industry

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One of the distinguishing features of the service sector is high emphasis on people interacting with people and serving the customer rather than transforming physical goods in the process. In traditional manufacturing, the machines are characterized by their ability to do only pre-specified set of tasks, with quantifiable and predictable productivity rates. These properties makes it is relatively easy to understand, model and analyze the interactions e.g. One machine of type X can process the output of three machines of type Y. However, People, the analogue of machines in service chains are characterized by, (i) unpredictable productivity rate (ii) ability to become proficient and diversified in skill-set with time. Hence, people to people interaction which is pervasive in services industry provides technical challenges from analysis, diagnostic and optimization purposes. It is evident that analysis of such interactions is an essential aspect of designing effective and efficient services delivery. The results of analysis can be used to handle various aspects, e.g., training, team building, risk management etc. Analysis of interaction networks extracted from the service operations is the focus of this tutorial. In many ways, interaction networks are similar to the well-studied social networks. Traditionally, social network analysis has been used to study structural properties of the networks and the positional properties of the individuals. However, from the perspective of interaction networks, it is important to derive information on effectiveness of the interactions and the process of effective team formations. When these objective are taken into account, a rich set of problems emerge, some of which are further generalizations of traditional analysis. Typically, solving these problems involves multidisciplinary approach as in understanding the constraints of the domain, import of mathematical analysis techniques and appropriate interpretation of the results.

Typically, the data needed for the construction of service interaction networks is sensitive in nature and organizations may not readily share the data. Therefore, it is imperative that we build realistic simulations of service interaction networks so as to enable not only the development of novel analyses, but also to validate their applicability. We would present some of our on-going initiatives in building a *people centric* simulation framework.

Indian School of Business and IBM Research, India are engaged in a Open Collaborative Research program which is addressing some of the interaction network analysis with applications to services sector. In this tutorial, we shall share our experience of working in this area and the challenges therein. Specifically, we cover the following:

1. Brief introduction to Services, their characteristics, and unique challenges.
2. Examples of Interaction Networks arising from Services Industry
3. Motivation for analyzing such networks with focus on business problems.
   a. Efficient Distributed Software Development
   b. Reliable 4PL Logistics and Supply Chain
   c. Effective Business Process Outsourcing
4. Unique Technical Challenges in analyzing Service Interaction Networks
   a. Modeling Challenges
   b. Algorithmic Challenges
5. Present novel techniques developed by us (and within IBM Research) in the above context, for
   a. Aggregate scoring of individuals and teams in a service interaction network
   b. Application of the above for composition of teams for a stream of service requests
   c. Ranking the individuals based on their structural importance in the network and their contribution to the effectiveness.
   d. Determining if the interaction between the different members of a team is in accordance with the requirements and dependencies between the tasks they are executing.
6. Simulation challenges of Service Interaction Networks.

Presenters

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