Quantifying the Impact of Acquisitions and Partnerships in the Computing and Communications Industries using Network Analysis

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Abstract

Network analytics provide a novel lens for corporate decision makers to understand past activities of collaborators and competitors in their ecosystem, anticipate possible future actions, and plot their own course. The dynamic computing ecosystem from edge to cloud is modeled using a structured network methodology derived from unstructured textual analysis from a broad range of available data sources (press releases, announcements, etc.). The recent convergence of computing, communications, and analytics companies involved in decentralized AI applications at the Edge and the Cloud is revealed in detail. The resulting association networks are analyzed via weighted centrality measures. Weights are specific to the market and data that have been collected. The Edge Computing environment is highly diverse and involves both small and very large companies with core competencies in semiconductor manufacturing, communications technology, analytics and artificial intelligence. A new measure locating the position of a company along a continuum describing the interaction between analytics, communication and computational expertise is developed. The measure is based on a company's core competencies and its interactions with other players. Companies create a path in this space based on i) temporal evolution of their involvement in the particular market and ii) securing new competencies through mergers and acquisitions. Illustrative mergers are evaluated in this context and their impact for the participants as well as for the overall markets are discussed.

A similar analysis is also performed on a network describing the business ecosystem of the Hardware Accelerator market. During the timeframe covered by our data several consortia have been created to share R&D and to develop standards. We use eigenvector centralities to determine the impact of these consortia on the leading players in this market. As a byproduct of this analysis, we are able to quantify the signal strength of textual unstructured data. We develop tools to distinguish signal from noise which allows us to find the postings that have a much larger impact than the average posting.

Following this descriptive analysis of the structure of the Edge ecosystem, we perform agent based simulations based on the class of *random networks* of the Edge ecosystem type. Typical characteristics for such a random network are the density of the network, the degree distribution, the number of clusters, the in-cluster degree distribution and the trans-cluster degree distribution. Algorithms to create scalable networks of the desired type, called *tunable networks* are developed. As a result we can create simulations on different sized random networks that can still be identified as belonging to the class of Edge networks.

These simulations allow predictive management and anticipatory analytics of the dynamical evolution of an ecosystem under different policies for merger and acquisitions and collaborations. Specifically we are interested to analyze changes in the network structure like the development of new clusters, the emergence and disappearance of dominating nodes under e.g. the disruption of an industry norm through a group of companies that follow different policies.