Net Conversations: Applying a neural network analysis to computer mediated communication

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Abstract:

As the global mesh of computer networks expands, reaching into homes and organizations, and high-speed network highways provide a medium for communication and community formation on a scale that has never been feasible before, new mores are created. Virtual groups are changing communication practices and social structures. The network is populated with people who invest varying amounts of time and energy in communicating on computer mediated discussion groups with other people they have mostly never met face-to-face. The groups that form thus vary along a continuum of communication interrelatedness. Why does this social phenomenon occur? More importantly, why do groups differ in communication styles?

Rafaeli (1986, 1988), Rogers and Rafaeli (1985) and Rafaeli and Sudweeks (1994) argue that the variable that affects the interactive nature of messages, threads and groups is the theoretical construct of interactivity—the degree to which communication transcends reaction. Interactivity is a pivotal measure of the social dynamics of group communication.

In this paper the analysis is focused on one aspect of interactivity, namely the type of messages that contribute to longer and lasting threads. All analyses were conducted using a large dataset that was created by ProjectH (Sudweeks and Rafaeli, 1995), a group of researchers who collaboratively collected a representative sample of computer mediated discussions. More than a hundred people from fifteen countries used computer networks to plan, organize and implement a quantitative study of social and linguistic dynamics in public newsgroups and mailing lists. Batches of 100 messages were downloaded from randomly selected discussion groups on Internet, Bitnet and Compuserve and coded on 46 variables (see Rafaeli et al (1994) for a detailed description of the methodology). For the analysis conducted here, a few additional variables were computed from the raw data. These entries were used to determine the type of interaction with other messages, measuring the amount of referencing and the impact on other messages.

Statistical approaches to find regularities and typical messages that contribute to longer threads do not provide a feasible tool, since the focus of analysis has to be predefined and a systematic approach towards finding correlations is computationally too expensive. One possibility, a form of multivariate statistical analysis may provide a useful indication of where the aggregation (boundaries) within a given data set might appear. The characteristic features of a typical message could then be identified from the most cohesive clusterings of features. But the resulting clusterings are based entirely on pair-wise correlations. In human cognition, however, the clusterings are more dynamically created across all features synchronously. As features are drawn into particular groupings they form dynamic allegiances which can effectively overrule the original cohesion based on a simple pair-wise correlation. This dynamic clustering is the effect to be explored in this paper.

Here we use a connectionist model to analyze and explore the features of messages that

typically initiate or contribute to longer lasting threads. The connectionist (or autoassociative neural network) approach (Rummelhart and McClelland, 1987; Hertz, Krogh and Palmer, 1991; Mehra and Wah, 1992) exploits a distributed description of each particular message as a pattern of activation across all features. A particular clustering of features (category) emerges as the network stabilizes on a particular pattern of activation. Each message is described in terms of features, such as relevance, time, tone and so on. The pattern of activation captures complex information about dependencies between combinations of features. This analysis led to typicality sets of features associated with messages that tend to enhance or inhibit longer, lasting discussions. In using the Neural Network to find these sets of features, a correlation among a set of variables rather than just pair-wise correlations could be found.

In identifying typicality in mediated discussions, a profile emerges of the features of messages that engage the attention of others, encourage participation, and predict the formation and/or maintenance of interactive communication settings.

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