Network-Informed Idea Selection Strategies for Electronic Brainstorming

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Increasing complexity in both design and development of products has led to collaborative business strategies that rely on groups to provide innovative solutions to problems that are too complex for an individual to successfully address within the same timeframe. One tool frequently used in group problem-solving and idea generation is brainstorming, which due to the globalization of the workforce, has evolved to enable electronic brainstorming when teams are not collocated. Electronic brainstorming programs usually list all ideas or a random assortment thereof, allow for anonymity, and allow participants to work in parallel. These additions to classic brainstorming aid in correcting several weaknesses, such as social repercussions for creativity, production blockage, and slacking. However, one noted drawback of electronic brainstorming is the continuously growing list of ideas without much organization. This can quickly become overwhelming and redundant. How to represent such accumulated ideas and present them to the human user remains an unresolved research question.

To improve the quality of the electronic brainstorming experience and assist groups in efficient use of problem solving time, we developed an electronic group brainstorming program based on a Human Based Genetic Algorithm (HBGA) and idea network (a genealogy of ideas generated in the brainstorming). We explore the effects of different algorithmic parameters, particularly selection strategies, on the standard measures of brainstorming. The standard measures are quantity, quality, and creativity of ideas generated. The selection strategies examined are two-step human-computer hybrid selection processes. They address such issues as randomly selected ideas (called "random") and the selection of ideas far apart on an idea network (called "rank-based").

Our brainstorming program was evaluated through experiments where 120 students in groups of four participated in several electronic brainstorming tasks. Each experiment involved a three electronic brainstorming task session and an online Big 5 personality survey. First, participants independently worked on Guilford's Alternative Uses Task to assess their individual creativity. Then they did two brainstorming sessions as groups of four. The first task was to generate marketing catch phrases for a laptop, while the second was to generate marketing catchphrases for a new pizza restaurant. In each of the two sessions, either "random" or "rank-based" selection mechanism was used for idea suggestion, which was hidden from the subjects. The overall experimental design was 2 x 2 x 2 (laptop vs. pizza; random vs. rank-based; and first session vs. second session). Figures 1 and 2 show sample idea networks that were generated from the brainstorming processes. It was seen in these figures that the "rank-based" selection mechanism prevented brainstorming from converging on a few "hub" ideas. Details of the framework, data gathering process, and preliminary results will be discussed in the presentation.

Figure. 1: One idea network generated from the interplay of humans and a network-informed computer selection using a prompt requesting marketing catch phrases for a pizza restaurant. Node size connected with node degree and the color shows the direction of influence. This network was obtained with the "rank-based" selection mechanism.

Figure. 2: Another idea network generated for the same task as the one in Figure 1, but with the "random" selection mechanism.