THEORY BEHIND "WISDOM OF CROWDS"

This effort uses a "Wisdom of Crowds" approach to forecast various characteristics (refered to as "targets") of the influenza season by capturing votes from a group of people who choose the model they believe is most accurate for each target.

In general, the "Wisdom of Crowds" method combines the insight and knowledge from many people into a collective wisdom. For example, the average guess of a group of people for the number of jelly beans in a glass jar is often reasonably accurate. By capturing the input of a "crowd", results are often better than relying on the input of a few experts, as was described in the introduction to James Surowiecki's 2004 book, The Wisdom of Crowds: Why the Many Are Smarter than the Few and How Collective Wisdom Shapes Business, Economies, Societies, and Nations[1]. Surowiecki recounts the story of British scientist Francis Galton who attended a 1906 regional fair contest to guess the weight of an ox after it had been "slaughtered and dressed." Galton analyzed 787 guesses to support his misguided theory that very few people had the intelligence to be given the power and control to keep a society healthy and strong. He wrote of the contest, "The average competitor was probably as well fitted for making a just estimate of the dressed weight of the ox, as an average voter is of judging the merits of most political issues on which he votes." Galton was surprised to learn that the crowd's mean guess (1,197 pounds) was very close to the measured weight (1,198 pounds) and relayed this observation to *Nature*[2]. Surowiecki explains that groups are remarkably intelligent and often smarter than any individual within the group. Furthermore, the groups do not need to contain experts or geniuses to be collectively wise. Surowiecki discusses the following conditions for the crowds to be wise: diversity, independence, and decentralization.[3]

For decisions related to influenza, outputs from various influenza models may be given to a leader in the Public Health community to aid in the decision-making process. The Public Health community has several options to mitigate the risk of influenza: social distancing (e.g., school closures), environmental surface cleaning and disinfecting (e.g., cleaning frequently touched surfaces in schools and airports), or public service announcements[4]. Decision makers may incorporate their own judgment as to the relative merits of each model and may combine the information with their own expectations of the epidemiological trajectory to formulate the likelihood of various outcomes.

Relative to this effort, a "Wisdom of Crowds" approach to influenza forecasting has been successfully demonstrated by Carnegie Mellon University's DELPHI, Developing the Theory and Practice of Epidemiological Forecasting, team[5] and the Virginia Bioinformatics Institute's Network Dynamics & Simulation Science Laboratory (NDSSL). Their crowds provided input as it directly relates to the epidemiological curve rather than to the output from various models.[6]

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[1] Surowiecki, James. The Wisdom of Crowds. Doubleday. New York: 2004.

[2] Surowiecki, p.XI-XIII

[3] Surowiecki

[4] Qualls, Noreen et.al. Morbidity and Mortality Weekly Report (MWWR) "Community Mitigation Guidelines to Prevent Pandemic Influenza – United States, 2017". April 21, 2017, 66(1):1-34.

[5] https://delphi.midas.cs.cmu.edu

[6] https://www.bi.vt.edu/ndssl/tools/getting-started-my4sight