Proposed title: The Noisy Work of Uncertainty Visualisation Research

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1 Rationale

Better ways of including representation of the uncertainty in a data visualisation is a focus of recent research activity. A problem with the current literature is that there is a lack of clarity about the definition of uncertainty, and what it means to represent it in a plot. This confusion can also be seen in the literature describing experiments on the effectiveness of different uncertainty representation. The purpose of this review article is to summarise the current literature, provide workable definitions, and illustrate these with examples. It is hoped that it will be useful for guiding new graphics methodology and experimental research.

2 Outline

1. Common uses of the term "uncertainty visualisation": Here we will provide some background to the use of the term "uncertainty visualisation" and tie it to statistical definitions of uncertainty.
2. Dangers of ignoring uncertainty representation in a visualisation. This part motivates the reason for the importance of this area of research.
3. Review of current approaches to representing uncertainty in plots, as gathered from discipline journals in information visualisation, statistics, environmental science and psychology.
4. Review of literature describing experiments testing effectiveness of different representations. The information visualisation literature is especially prolific in describing experiments assessing the relative merits of different uncertainty visualisations, and this section will critically summarise these efforts, and propose refining of procedures.
5. Examples:

- Comparing distributions with the purpose to illustrate definitions of uncertainty, and distinction between representations of signal vs noise. It is also a place where software exists providing some good choices but are not yet sufficient.
- Spatial data poses substantial challenges because of the difficulties of using the page for the map coordinates, and hence little room for representing uncertainty. It also has been a place with useful recent work, providing some good solutions.

6. Recommendations for research directions. Here we will gather the discussion into some suggestions for framing new work, developing methodology and designing experiments.

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