

Interactive comment on “I-WARP: individual water main renewal planner” by Y. Kleiner and B. Rajani

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Section 3.1 in the manuscript directly and explicitly addresses the issue of whether to analyse data in homogeneous groups or in general groups. Group homogeneity is always with respect to pipe-specific covariates, such as pipe material, diameter, vintage, etc. There are two types of modeling approaches:

1. Create a model with explicit pipe-specific covariates and apply this model to the entire population of pipes.
2. Create a model without explicit pipe-specific covariates and apply it to groups of pipes that are homogeneous with respect to these (would-be) pipe-specific covariates (i.e., a group of pipes with the same diameter, same material, same vintage, etc.).

The models in both approaches require similar amounts of effort to build but the first approach is easier to implement on an entire inventory of pipes because this inventory need not be partitioned into homogeneous groups. However, this ease of application comes at a price. The first approach involves two types of implicit assumptions: (a) it assumes covariate independence and ignores interactions between pipe-specific covariates (unless a covariate is explicitly created for a known interaction). (b) it implicitly assumes proportionality for quantitative covariates, for example, if pipe diameter is a covariate with a positive coefficient then the impact on breakage intensity of a 200 mm pipe-diameter is twice as large as a 100 mm diameter, and so forth.

The second approach of dealing with homogeneous groups relaxes these assumptions of covariate independence and proportionality. This, however, comes at a cost of smaller datasets where statistical significance may sometimes diminish to some degree.

As is explicitly stated in section 3.1, I-WARP in its current form is based on the second approach, hence the demonstration with homogeneous groups. It should be mentioned, however that the model represented in equation (1) is general enough to accommodate both approaches and it would take little effort to implement I-WARP with the first approach.

Yehuda Kleiner, on behalf of the authors.

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