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Subjective and Objective Descriptions of Driving Scenes in Support of Driver-Automation Interactions

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Introduction

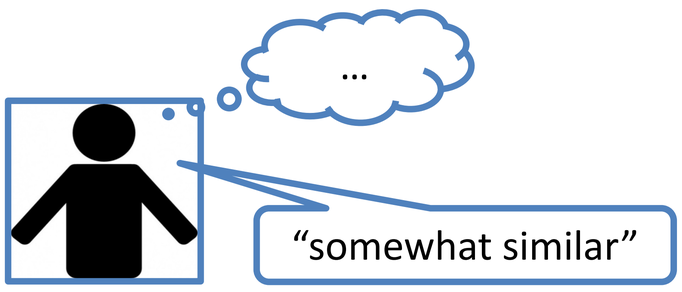
Background. Recent advances in the growing domain of automated driving suggest the need for thoughtful design of human-computer interaction strategies. For example, human drivers can process scene variability on implicit levels, but automated systems require explicit rule-based judgments of similarity and difference. What level of abstraction an automation uses in its visual perception may mean the difference between effective human-automation communication, or "uncanny valley"-like conflicts leading to problems of automation disuse, misuse, or abuse.

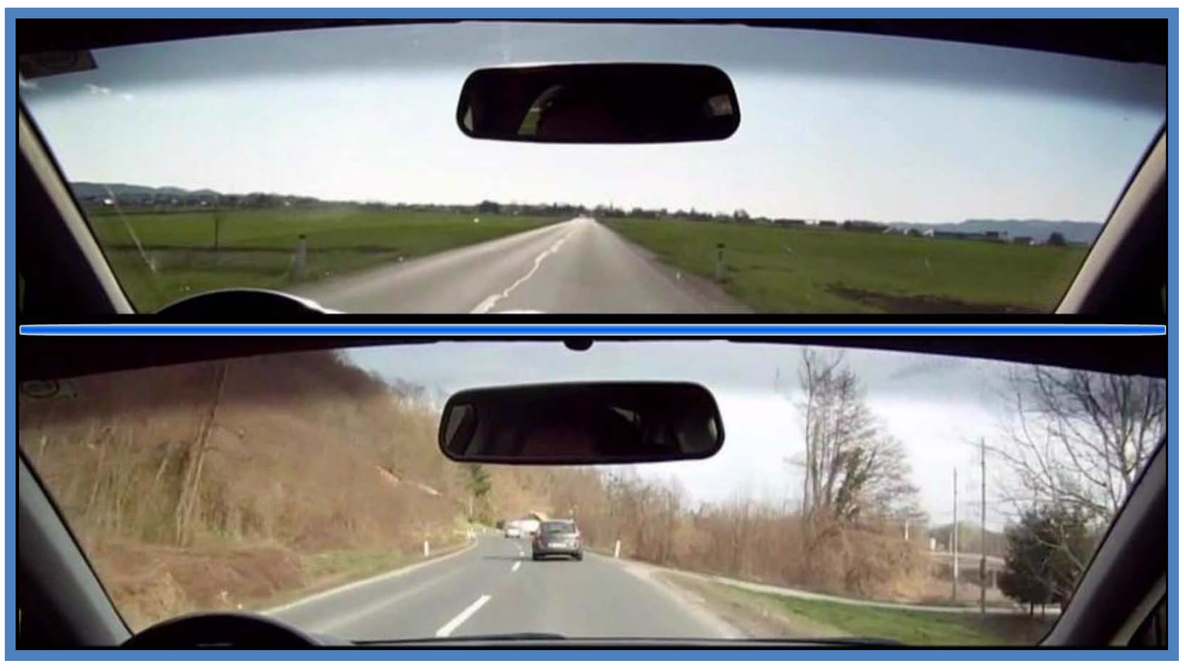
Purpose of study. In the present research, different quantifications (semantic coding vs. computer vision features) of driving scene-to-scene similarity and difference were compared against intuitive human judgments as a reference point for future human-automation interactions.

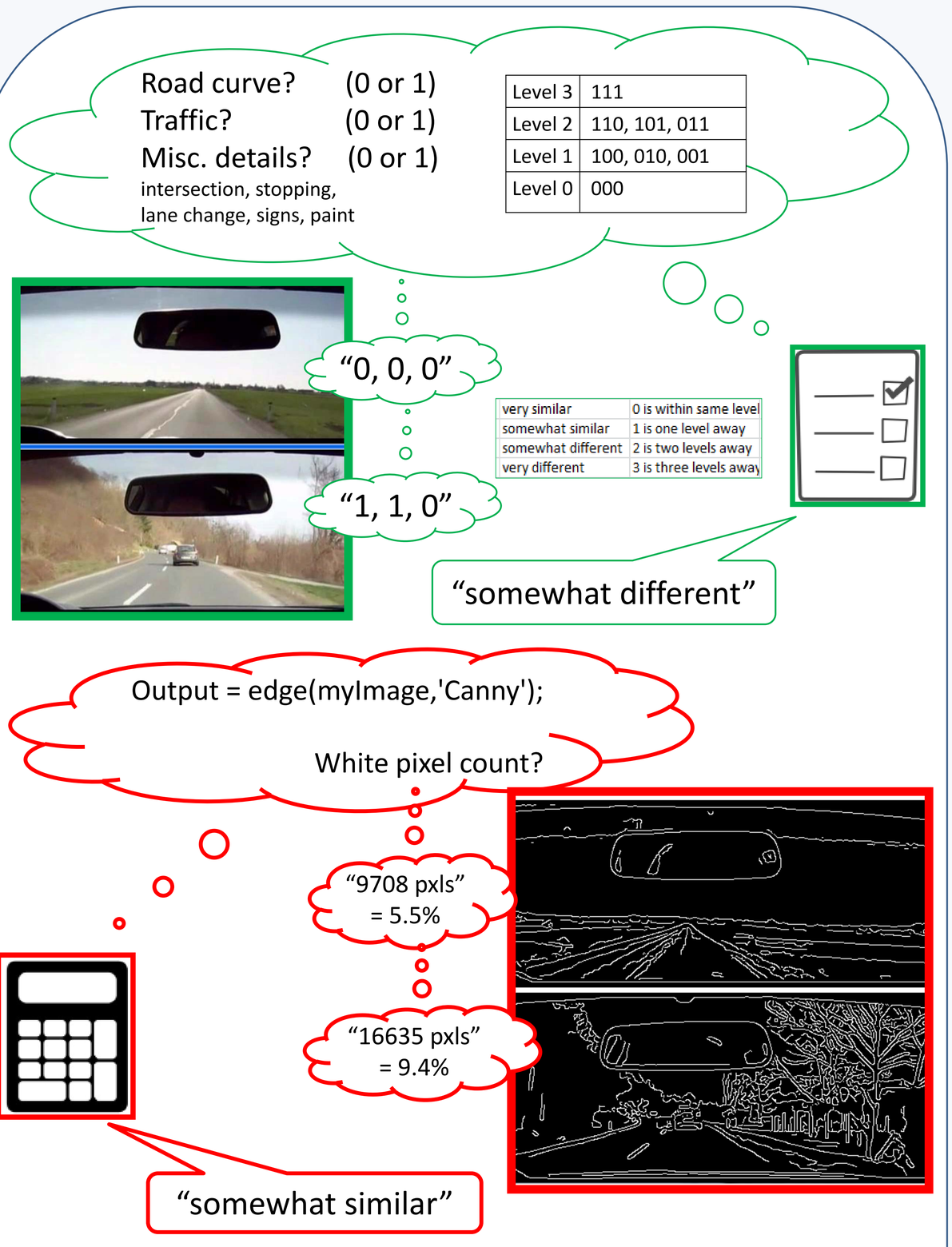
Methods

Participants. 12 MSc students (11 male : 1 female)
Mean age = 22.9 yrs old (SD = 1.4)
Mean driving license = 4.8 yrs (SD = 1.9)

Procedure. Each participant rated the same 100 randomly paired driving video clips (i.e., 3 seconds long) on a scale from "0 – Very Different" to "9 – Very Similar"

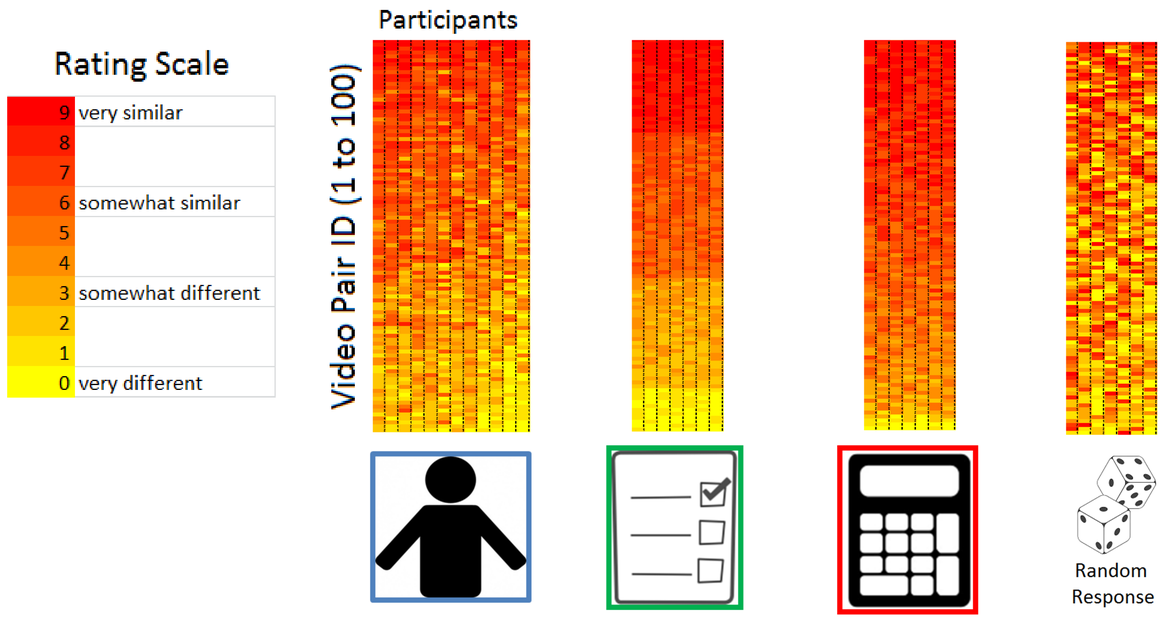






Results/Conclusions

Scene similarity/difference ratings from semantic coding quantification showed **closer matches** to human participant judgments than those generated from computer vision.



Humans evidence apparent non-random individual differences in judging various driving scenes. Both 'meaning' and particularly 'feature' level descriptions require improvements to coordinate common ground with human intuition of driving scene similarity/difference.

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