Towards Comprehensible Explanations of Phenomena in Home Automation Systems

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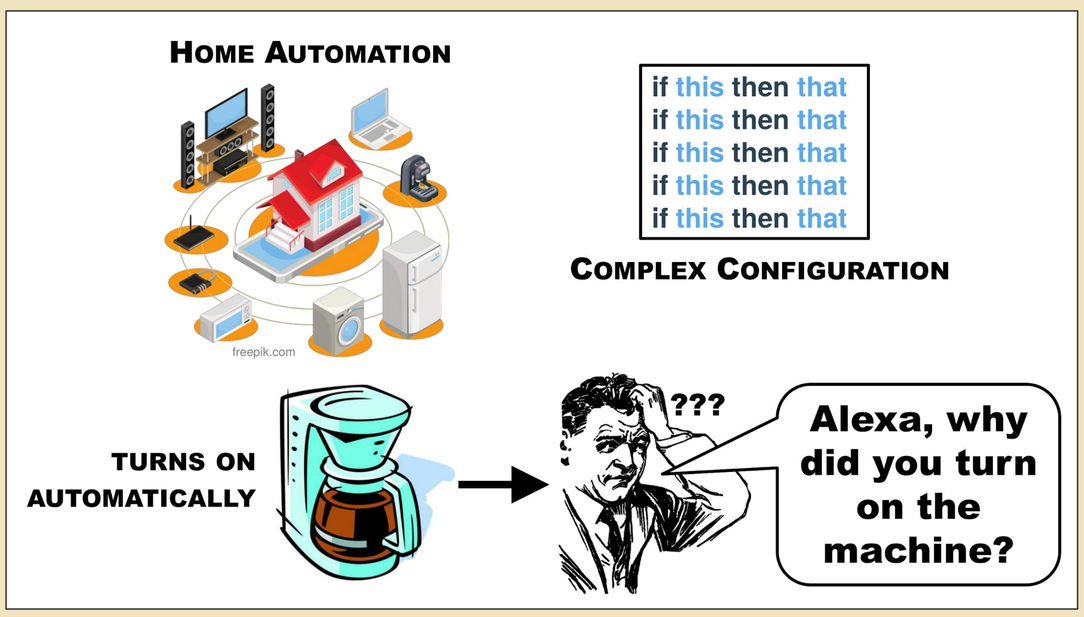
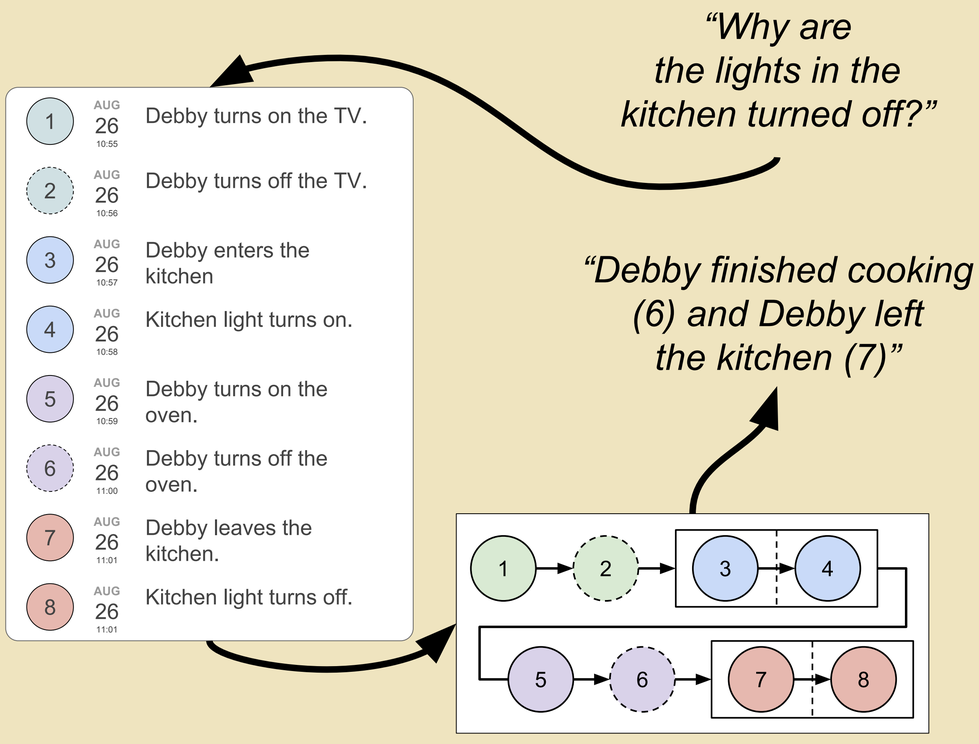
The Problem

- Complex home automation setup
- Unclear cause of observable phenomena (*"why did that happen?"*)
- Showing the trigger rule (*"if this, then that"*) is not the appropriate level of detail
- Fill information gap of an inquirer about an observed phenomena



Approach

- Create causal event graph from event log
- Assign probability of causality to events based on:
  - time and location dependence
  - activity and theme (*"cooking"*)
  - regular routines (*"morning routine"*)
- Extract relevant causes based on probability of causality from event graph
- Enrich answer with person and location

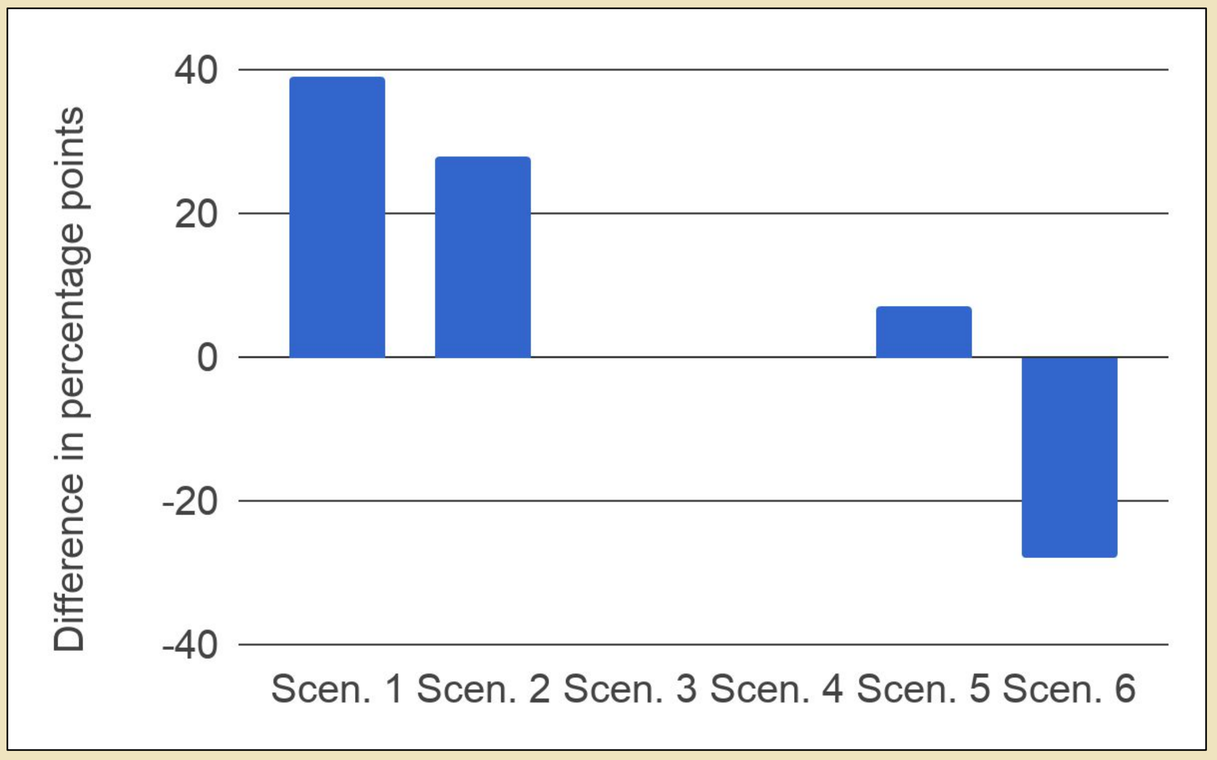


Preliminary Study

- We conducted a Turing Test whether the approach gives human-like answers
- Six scenarios modelled (S_1 to S_6)
- Compared computer-generated answers with actual human answers
- Test persons on Amazon Mechanical Turk rate which response is human-like

Result

- 70 crowd-workers completed the tests
- Turing Test passed in 4 out of 6 scenarios
- Failed due to missing intent conjecture (S_1) and unnecessary information (S_2)
- In S_3 and S_4 both computer-generated and human answers were identical
- In S_6 computer-generated answer partly outperformed human answer due to naming of the person involved



Conclusion and Future Work

- Results show humans prefer brief answers
- Convey information that the inquirer lacks, omit information known or irrelevant
- Deduce user intention if possible
- How to answer "Why not?" questions
- Automatic routine detection/learning