Exploring Privacy in Socially Intelligent Personal Agents

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Norms and Sanctions

• Social norms provide robust means to regulate interactions
  • Our everyday actions are governed by one or more norms
    • E.g., not answering a phone call during a meeting

• Certain situations demand deviations
  • Deviations necessary for autonomy
  • Sanctions
    • Negative sanctions on deviation are means to establish a norm
Socially Intelligent Personal Agents

• Socially intelligent personal agents cater to multiple stakeholders
  • Primary stakeholder, the user that interacts directly with the agent; and
  • Secondary stakeholders, the users who are affected by the agent’s actions

• Recent works employ norms in personal agents
  • Personal agents learn applicable norms in a context through sanctions for deviations
    • Improved user experience
    • Help users protect privacy
Ringer Manager: A Socially Intelligent Personal Agent

- Privacy problems
  - Intrusion
  - Disapprobation
  - Information sharing
Deviations and Explanations

• Understanding deviations and related explanations are important

• Do explanations offer insight into contextually relevant or fine-grained norm?
Claims

• Personal agents can better learn contextually relevant norms if they
  • share explanations for deviation, and
  • reason shared explanations

• Personal agents acting according to contextually relevant norms provide a better social experience than agents that do not reason explanations
Information Sharing and User Attitude Survey

• Demographic survey and privacy attitude survey

• Immersive study
  • Phase 1
    • Turkers assume roles of callee, caller and neighbor
    • Exposed to various ringer manager scenarios (54 combinations)
      • Caller-callee-neighbor social relationships
      • Places, e.g., meeting, party, and cafeteria
      • Call urgency, e.g., casual or urgent
    • As a callee, answer whether or not you will answer the call
    • As a neighbor or a caller, provide feedback (positive or negative) for a certain callee action
  • Phase 2
    • Explanations added to the scenarios
      • Social relationship
      • Call urgency
Simulation

• Seed from data obtained from the surveys

• Contextual attributes
  • Social relationship
    • Caller-callee
    • Callee-neighbor
    • Caller-callee’s neighbor
  • Place

• Privacy attitudes
  • Fundamentalist
  • Pragmatist
  • Unconcerned
Evaluation

• Baseline:
  • Agents act according to defined norms

• Learning with experience:
  • Agents learn norms from previous experience (positive or negative sanctions)

• Reasoning with explanations:
  • Agents offer explanations for deviations, and reason about others’ explanations
Hypotheses

$[H_{\text{baseline}}]$ Agents that can reason explanations provide better social experience than the baseline simulation

$[H_{\text{experience}}]$ Agents that can reason explanations provide better social experience than the agents who learn only through sanctions
Anticipated Difficulties

- Capturing realism in surveys is difficult
  - Immersive scenarios
  - Participants assume first-person roles
Recommender

• Identify important factors that affect decisions
  • Analyze survey data

• Bootstrap from survey data
  • Recommend policy to primary user?
  • Recommend primary user whether or not to offer explanation?