Using Verbal Communication to Improve Adaptation in Human-Robot Teams

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Motivation

Humans can form inaccurate expectations of robot capabilities which leads them to form suboptimal strategies to solve a joint task.

Key Idea

A combination of verbal and nonverbal communication will encourage the human to switch to the optimal strategy while maintaining their trust, compared to nonverbal communication alone.

Adaptability

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<thead>
<tr>
<th>Task A</th>
<th>Task B</th>
<th>Task C</th>
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<tbody>
<tr>
<td>✔️</td>
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Compliance

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<tr>
<th>Task A</th>
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MOMDP Formulation

\[
 X: X_{world} \times M^k \times M^k \\
 Y: A, a \in A \\
 A^*: A^*_T^{world} \\
\]

Nonverbal Action

Stable transition function

Verbal Command

\[
 Y: A \times C, a \in A, c \in C \\
 A^*: A^*_T^{world} \times A^*_T^{C} \\
\]

State Conveyance

Dynamic transition function

Method

Predicting Human Actions

Policy

Evaluation

H1: Users are more compliant than adaptive.

H2: Verbal commands and nonverbal actions combined encourage more users to switch strategies while maintaining similar levels of trust.