Predicting the Intention to Interact with a Service Robot: the Role of Gaze Cues

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ICRA2024 YOKOHAMA | JAPAN

Socially Acceptable Service Robots

Social robots can assist people in the everyday life

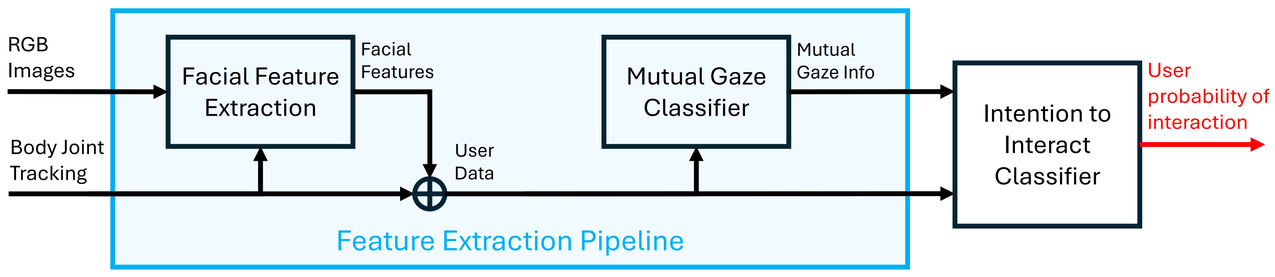
Multiple objectives:
- Completing an assigned task
- Ensuring people perceive them as socially acceptable

Need to interpret *social cues* from *non-verbal communication*

This work aims to predict the users' *intention to interact*

Our Method

Binary classifier:
- Input: 3D *body joint tracking* and *facial features*
- Output: user *probability of interaction* with the robot



Experimental Setup and Data Collection

A robot offers chocolate treats to interested people passing by

An *RGB-D sensor* is placed directly in front of the robot to mimic its field of view

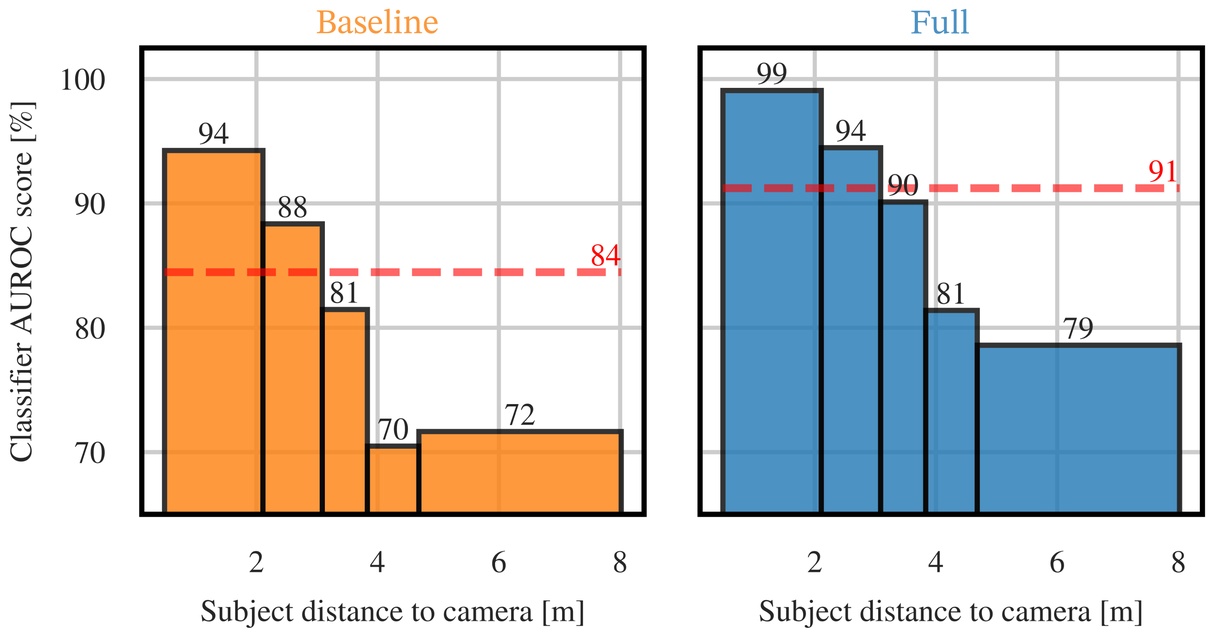
The entire dataset contains *189 sequences* (84 positive, 105 negative) collected in *3 different scenarios*:
- *Lab*, controlled scene with adult participants, 92 sequences
- *Office*, office corridor with adult participants, 42 sequences
- *Kids*, office break area with teenager participants, 55 sequences

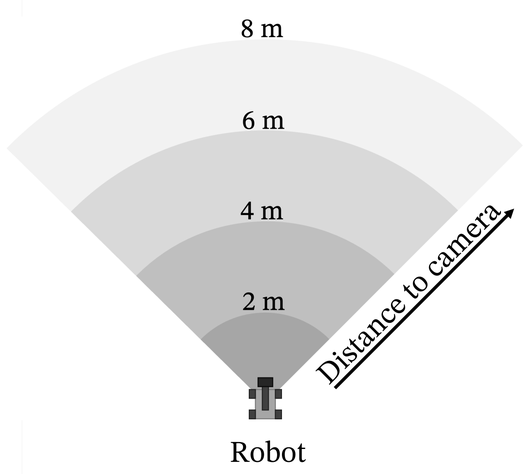
Results

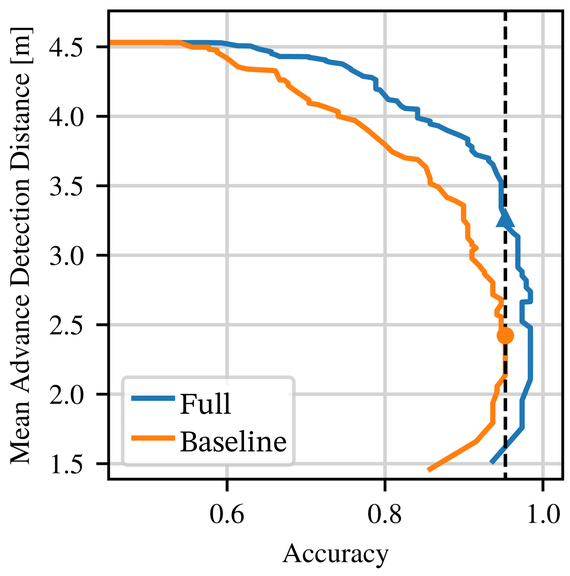
Facial feature and gaze cues greatly help in the intention detection process

The classifier using all sources of information (*Full*) outperforms the classifier only using body information (*Baseline*), i.e. increase Area Under the ROC Curve from 84% to 91%; *improvements* are *consistent across operating range*

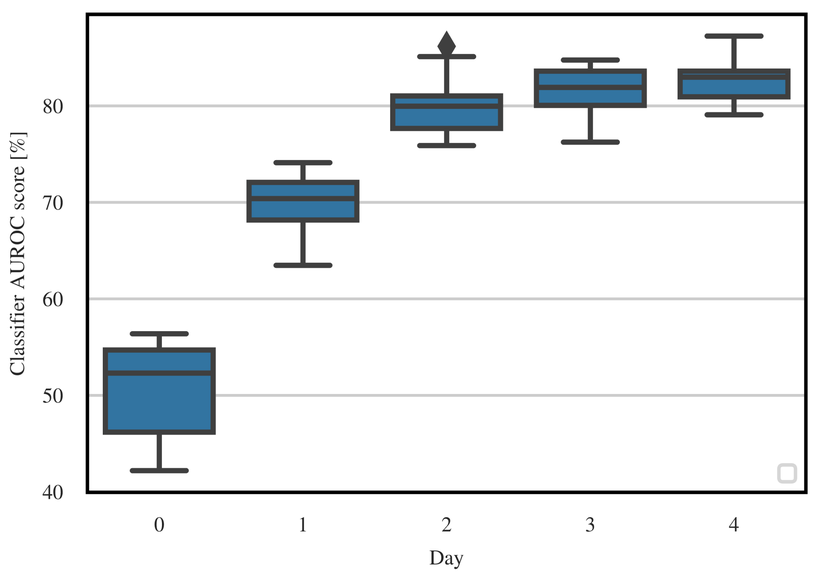
At the the maximum accuracy of the *Baseline*, the *Full* model achieve much *better mean advance detection distance* (+0.85 m)







Self-Supervision



Self data labelling allows the algorithm to *progressively adapt* to unseen environments

Future Work and Open Challenges

Deploy and *validate system in the wild*

Explore the *impact* of robot reactions *on users' perceptions*

Richness of data vs *privacy concerns* tradeoff for real world users

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Funded by the European Union

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