#### Towards a Social Robot as Interface for Tourism Recommendations

Berardina De Carolis, Cataldo Musto, Pasquale Lops, Gianni Semeraro

Department of Computer Science University of Bari, Italy



## Information Services and Tourism

Web-based interfaces, App, and Interactive Displays represent the most commonly used way to access to tourism information and recommendations

Social Robots are being used as social interfaces to various services

**Research Question:** 

How effective are social robot in a tourism recommendation scenario?

A User Study aiming at evaluating whether social robots can replace web-based interfaces in providing recommendations for tourism:

- Recommender System: based on neural networks, identifies the characteristics of hotels, restaurants and point-of-interests that are suitable for a specific user
- Social Interface: Pepper Robot, simple speech based interaction + touch on the robot tablet, soft biometrics for age and gender estimation
- Web-based interface accessible on a interactive display



- The Social Interface:
  - Intent recognition: hotels, restaurants and points of interest in the city
  - Social Behavior: gestures, eye colors and smalltalks
  - Soft biometrics: age and gender estimation



TouRES (Tourism REcommender System):

- 3 different recommenders (one for each intent) based on a feedforward neural network.
- The input layer of each network is devoted to the representation of the user and encodes 11neurons, one for each feature describing the person. In particular, as user features (age, gender, mood, physical activities, level of rest, overall physical state and the 5 Personality Traits.
- Estimated age and gender are obtained using the softbiometric module
- The remaining features are gathered through a platform for Holistic UserModeling (in case of registered user), otherwise they are obtained during the dialog with the robot
- The output layer of the network encodes the available characteristics of the recommended item,1 means that the item should match this chracteristic, 0 not.



Filtering Module:

- Starting from the characteristics this module identifies the items that match them
- Ranking module: raking all the items that were returned by the filtering module in order to identify the top-K recommendations
- Combination of factors: i.e. popularityof the place, number of features returned by the neural network that are matched by the place, etc.





## Pepper vs. Web-based Interaction

- Evaluation of the User eXperience
  - UEQ questionnaire: Attractiveness, Perspicuity, Efficiency, Controllability, Stimulation, Novelty.
  - Perceived Efficacy of Recommendation
  - Time to get the recommendation

### The Experimen t

#### **Participants:**

- 52people (30 males and 22 females)
- 18≤age ≤ 55 y.o
- 70% used regularly technology and 90% of them used TripAdvisor or Google when travelling

## The Experimen t

#### **Design and Procedure:**

- Tourist Information Scenario in Apulia
- 2 groups (A and B) of 26 people equally distributed in number, gender and age
- People in R interacted with the robot, those in W with the web application
- Both groups interacted with the same configuration of the Recommendation Module.
- Pre and Post Test questionnaires

# The Experimen

#### Results

UX (UEQ)

Group A - Pepper



T-test (p<0.01)-> Differences significant for attractiveness, stimulation and novelty.

**Recommendation quality**: the overall satisfaction for the received recommendation was significantly higher for Group A(mean=3.3) than for Group B(mean=2.3) (T-test p<0.02)



## Conclusions and Future Work

- Social Robots are appropriate in the tourism domain
  - More attactive than displays
  - Better UX and perceived satisfaction of the recommendation quality
- Improvement of the conversational capability of the robot
- Analysis of the user behavior for reasoning on feedback