

# Advanced Human-Machine Interactions

## Interaction Data Analysis

### ASI5/M2SID - Exam

Durée : 3 hours

All documents

#### Résumé

All along this exam, the various exercises focus on designing a personal assistant agent such as Siri or Alexa. In the following the agent is called Qwerty. Qwerty is able to move from a device to another to interact with the different members of a family (smartphones, computers, robots, ...). As part of a fully equipped smart home, Qwerty has access to various sensors to collect data about temperature, presence, electricity consumption, ... Qwerty also include a parental supervision functionality to take care of children.

### Exercise 1

Qwerty can execute *recipes*, i.e. series of action, that can be viewed as a plan. A recipe can include alternatives according to a user input. Let  $A = \{a_1, \dots, a_n\}$  be the set of  $n$  actions that Qwerty can perform and let  $I = \{i_1, \dots, i_m\}$  the set of  $m$  possible inputs from users.

For example, a recipe that corresponds to a personalised research on internet would be *Open a web browser - Ask for keywords - Collect a list of keywords one by one (user inputs) - Search - Display results*.

1. If recipes are considered as predetermined, propose a representation for this recipes.
2. Propose an algorithm that could construct a recipe according to a given set of executions recorded by a user.

### Exercise 2

Qwerty can supervise children at home. The parental supervision functionality can detect if a web page contains an appropriate content for children and also translate textual content into the family's native language.

1. Formalise the problem of web page filtering, funded on the textual content. Propose a solution to this problem.
2. Qwerty can blur inappropriate images. Formalise the problem of image filtering and propose a solution.
3. Formalise the problem of web page translation. Propose a solution to solve this problem.

### Exercise 3

Qwerty has access to sound, images and electrical consumption.

1. Formalise the problem of gender and age identification of a given person and propose a solution.
2. Formalise the problem of user identification in a room, knowing that some foreigners can visit. Taking into account that each family is different, propose a solution to this problem.
3. Formalise the problem that consists in identifying the electrical consumption of the family (by person, by room, by period of time). Propose a solution to optimise it.

### Exercise 4

Qwerty manages the social networks of the users. We here focus on their activity on something which is a mix between Facebook and Twitter (sending public messages, sending personal message, like a public message)

1. Propose a representation of the social network.
2. If Qwerty can access to both connections and message content of a user, formalise the problem that consists in filtering the messages that can be read by child, avoiding any bad influence. Propose a solution.