Explorations into use-cases of conversation systems in campus environment

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What is a conversation system?

- Google Assistant
- Siri
- Cortana
- Alexa
Why go for conversation UI

- **Good**
  - Speech is fast (large lists, dates, times)
  - Speech is natural and intuitive
  - Speech input device is small
  - Capturing emotional state
  - Determining speaker identity

- **Bad**
  - Speech is transient (no history on the screen)
  - Speech is “serial”
  - Limited short term memory of the user
  - Real time apps
  - Problems with noisy environment
  - Other modalities more effective in some cases
  - Privacy
Application areas

- Large list selections, dates and times
- Hands busy situations
- Embedded systems with no keyboard or screen
- Telephony
- Pervasive systems – Car, Home
- Accessibility
Architecture

ASR, NLU, DM, NLG, TTS
Architecture

- **ASR** (automatic speech recognition)
- **NLU** (natural language understanding)
- **DM** (dialog management)
- **NLG** (natural language generation)
- **TTS** (text to speech)
Architecture

Conversation system

- Automatic Speech Recognition
- Text To Speech
- Natural Language Understanding
- Natural Language Generation
- Dialog Management

Robot

Keyboard

Desktop Computer

User
Dialog control

- Finite-state based system
  - User is taken through a dialog consisting of sequence of pre-determined steps

- Frame based system
  - Dialog flow is not pre-determined but depends on the content of the user’s response

- Agent based system
  - User can take control of the dialogue and use spontaneous to interaction with the system
Conversation systems are trending

- Bots are here
  - Text based dialog systems
  - Big trend around 2000 and now again

- Facebook M
- Slackbot
- Penny
- Magic
- Nikabot
Campus

Use-cases & prototypes
Cooperation with IBM Research
Problems

- Complex processes
  - Applying for Erasmus exchange program
- Several complex buildings
  - Navigation of new students and students with special needs
Erasmus

Task analysis
3.7. System design

Figure 3.2: Use Case 01 - Kiosk as a static information provider

I have found out that our university allows us to study abroad. I wonder where I can learn more... I know! I'll try asking the info kiosk.

Peter wants to learn about the Erasmus programme

Figure 3.3: Use Case 02 - Dialogue continuation

Hi! How can I help you

Student asks the info kiosk.

Sure! To apply for the erasmus programme you must first...

I'd like to know more about applying for Erasmus programme.

The kiosk provides information.
3.7 System design

Figure 3.2: Use Case 01 - Kiosk as a static information provider

Figure 3.3: Use Case 02 - Dialogue continuation

Figure 3.4: Use Case 03 - Dialogue initiated by the kiosk or by giving the kiosk the ability to enhance the static data with information relevant to the current user.

John wants to submit his documents. Last time he was checking with the kiosk he forgot one of the documents.

John initiates the conversation with the kiosk about the documents.

The kiosk remembers where the conversation ended last time and continues from there.
6.4 Procedure

The experiment session had the following course:

1. We welcomed the participant and thanked them for their participation.

2. We asked the participant for their consent for taking a video recording of the session. We ensured them that:
   - all results of the experiment session would be anonymous
   - recordings would be used only for the purposes of this study
   - recording would not be made available after we have gathered all desired information from the recording they would be deleted

3. We have informed the participant that the session would take from 35 to 45 minutes.

Makarič, A., Interactive kiosk based on a dialog system, 2016
Navigation

- Several complex buildings
- No GPS and other sensors
Navigation | Location

Hi, I'm Watson! I would like to locate your position.

What floor are you on?

I'm on the first floor.

Ok, you are on the first floor.

Do you see a room number? If so, tell me just the number.

I don't see anything.

Do you see a label with the name of a department? If so, tell me the name.

I'm sorry I can't see anything.

That's ok, moving on.

Are you near any significant place in the building? Tell me what you see.

I'm standing next to canteen.

Great! You see canteen.

Now I know everything I need to locate you.

Navigation

- Natural language
- Landmarks
- Photos of places

Navigation | Students with special needs

- Visually impaired students need to travel between the campus buildings
  - Distances, leading lines, shapes of corners, traffic lights, directions of traffic, materials of sidewalk, what is around the sidewalk, slopes, points of interest…
  - Too many information to tell at once
Navigation | Conversation navigation

- Providing only essential information
  - Use can ask for more
  - Direction, material distance, shape, traffic,…

- Checking if the users is proceeding correctly
  - System asks for information about the environment
Demo
Conclusions

- Challenges
  - User input
  - Privacy
  - Social acceptance

- Opportunities
  - Guidance thought complex processes
  - On demand information retrieval

Thank you for the attention!

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