Adjusting to User's Style in Dialogue Systems

Margus Treumuth
Margus Ojanurme

Outline

- Basics

- Previous Work

- Current Experiment

- Conclusion

Basics

- **A dialogue system (DS)** - a type of user interface (UI) where linguistic features act as UI controls for selecting data in software applications.

- The DS is intended to converse with a human, with a coherent structure:
  - turn-taking
  - initiative
  - significant silence
  - manners

Text-Based DS

- User input is a **written** request to the dialogue system in a natural language and the output of the system is a **written** answer to the user in the same language.
- Incl. optional speech synthesis.
- No speech recognition.

| Speech Recognition | →text→ | Dialogue Management Engine | →text→ | Speech Synthesis |

Previous work

- Web based DS framework to build dialogue systems for Estonian language
- Framework features:
  - automated spell check of user input
  - morph. analysis – stems in rules
  - solution to the word-order problem
  - human-assisted chat
  - sms notification
  - speech synthesis integrated
  - asynchronous model

A sample conversation with a DS

| 16:12.41	User	mul on alalõuas eemaldatud hammas, juba 20 aastat tagasi
		I have a tooth removed from the lower jaw 20 years ago
16:12.57	User	kas on võimalik sinna **implanaati** panna
		is it possible to get a dental implant
16:13.00	System	põhjalikum info on siin: [loe implantaatidest]
		more information can be found here [read about dental implants]
16:13.10	System	üks hetk, kohe räägin teile lühidalt implantaadi paigaldusest
		just a moment, I'll tell you about the installation of dental implants

DEMO – www.dialoogid.ee
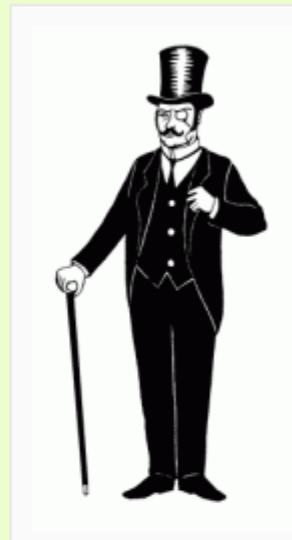
The Asynchronous Communication (1)

- *"Stuck in input phase"* problem.
- Both parties can:
  - provide input at any given moment,
  - take any number of sequential turns without waiting for the other party to acknowledge each turn.
- Real-time user-initiated (or system initiated) interruptions.

The Asynchronous Communication (2)
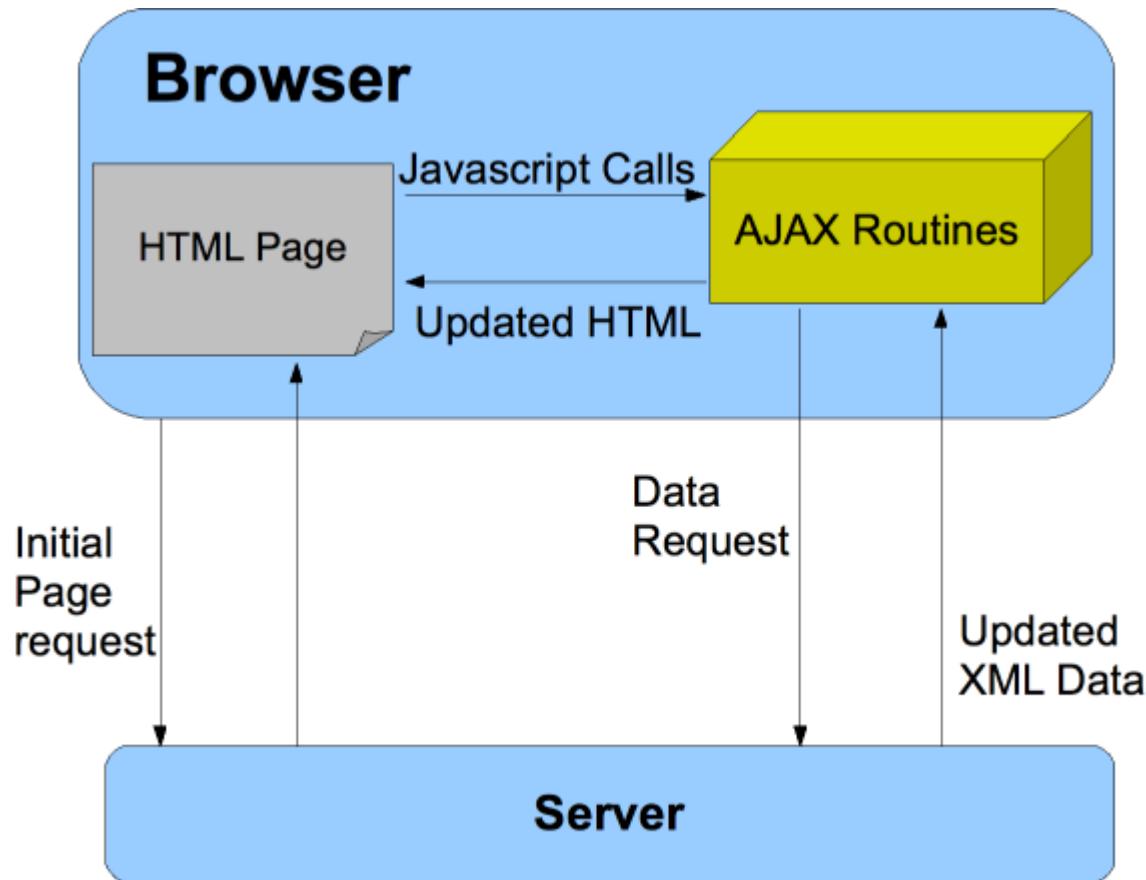
Spell-Checking and Error Correction

- String Similarity: Jaro-Winkler

- Domain Lexicon
  - contains the words from the patterns
  - compare lexicon with input
  - language independent

- Why not Levenshtein? Jaro-Winkler gives more favorable ratings to strings that match from the beginning.

Need to improve the spell checker

- add all forms to lexicon (not just lemmas)
- "valutama" generates:
  - valutab
  - valutas
  - ...
- this gives us a better lexicon and similarity to input can be higher

Word order (1)

- ❑ Need to be able to match both of these:
    - ▪ hammas valutama
    - ▪ valutama hammas
- ❑ Pattern would be:
    - ▪ (hammas valutama) | (valutama hammas)

$$P_3 = 6 \quad (w_1 w_2 w_3) \,|\, (w_1 w_3 w_2) \,|\, (w_2 w_1 w_3) \,|\, (w_2 w_3 w_1) \,|\, (w_3 w_1 w_2) \,|\, (w_3 w_2 w_1)$$

w_i can be a regular sub-expression

$$P_4 = 24 \quad \text{.................}$$
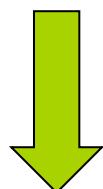
solution: use
permutations of input
if set so in the pattern

Pattern: hammas valutama
IGNORE_WORD_ORDER: YES

Word order (2)

SUBJECT = hammas
VERB = valutama

Claim: The word order problem can be solved without complete syntactic analysis.
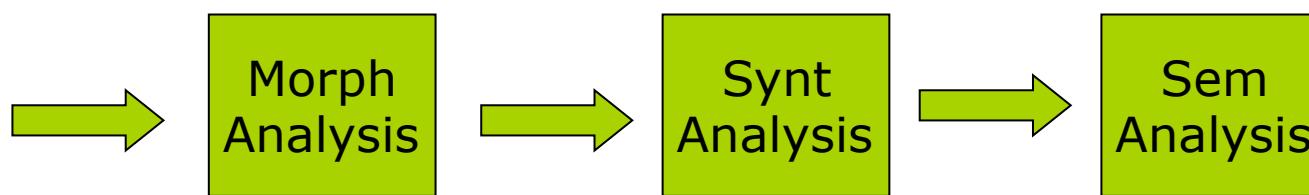
The client-server model of the ADS framework
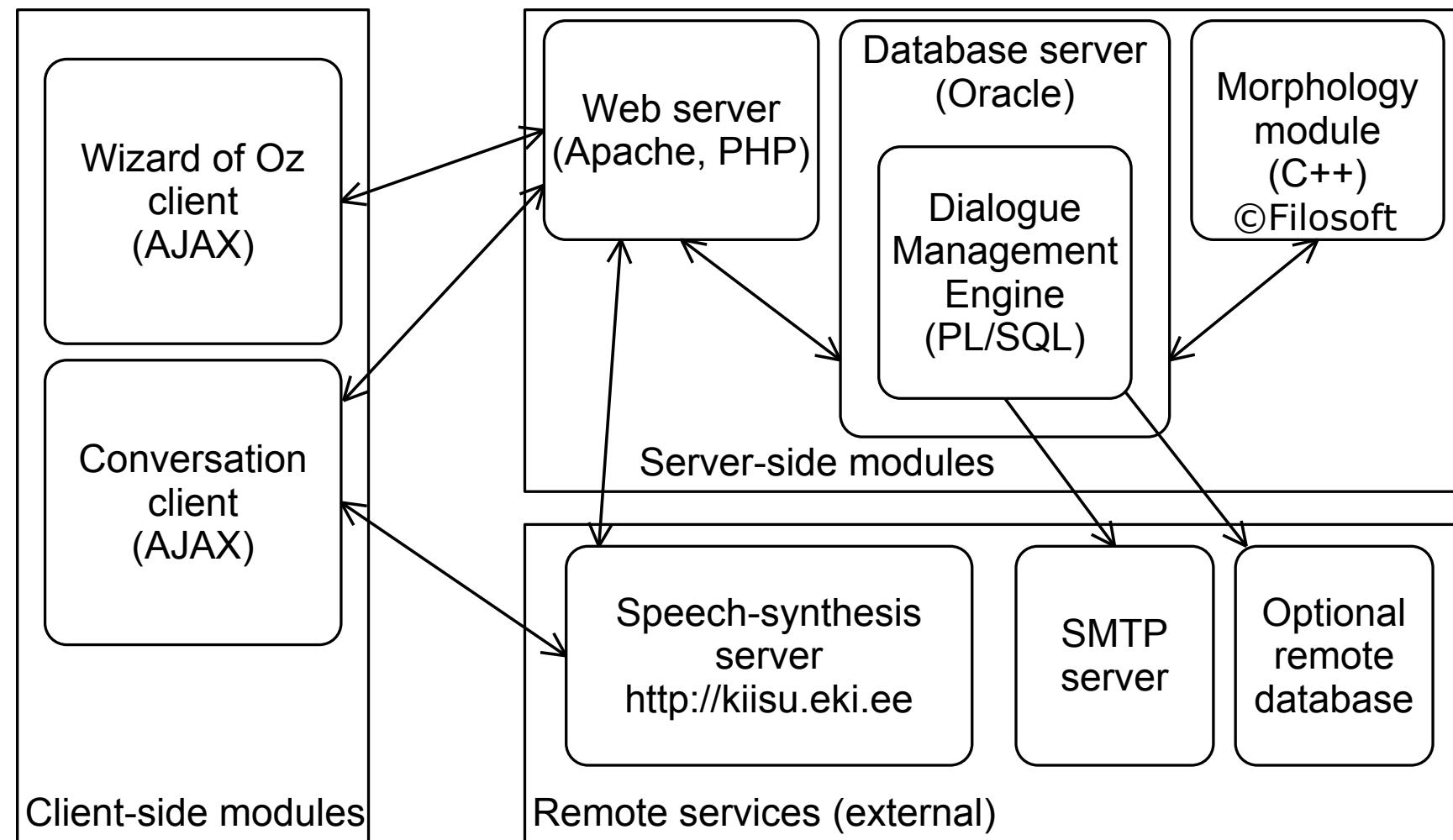
Goal of the new experiment

- Can we adjust to user's style?
  - capitalization
  - typing speed
  - slang
- Would it make a difference in user experience?

Motivation

- The users seemed to complain about it.
  - too slow
  - too fast
  - don't like capitalization
  - do like capitalization

Implementation

- We implemented the new features.
  - speed module
  - capitalization module
- Then created a sample system.
- Tested it on 15 users.
- Finally, we had them fill out a form.

Results

- Users liked it when DS used their speed/style.
- Some users prefer faster response even if they are slow in typing.
- Some users prefer correct capitalization even if they don't use it.
- Surprisingly the users claim to use correct capitalization in CHAT, in reality 60% of the users don't.

Conclusion

- We decided to accept commands from the user:
  - "Please type faster",
  - "Slow down a bit".

- We could use correct capitalization always.