Language Understanding Systems

Final Project

E.A. Stepanov, A. Cervone, G. Tortoreto

SISL, DISI, UniTN & VUI, Inc.
evgeny.stepanov@unitn.it
alessandra.cervone@unitn.it
gtr@vui.com

Project Types

- **NLU**
  - Conditional Random Fields
  - Neural Networks
- **Conversational Agent**
  - `rasa` bot
  - `Alexa` Skill

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NLU: Conditional Random Fields

- **Experiment with different feature sets**
  - Tokens
  - Lemmas
  - Part-of-speech tags
  - Ngrams
- **Experiment with different training parameters**
  - Window size
  - Cut-off parameter
- **Feature Engineering**: Design features to improve performance
  - Numbers
  - Character prefixes and suffixes
  - Etc.

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NLU: Neural Networks

- **Experiment with different network types**
  - LSTM, GRU, etc.
- **Experiment with different embeddings**
  - GloVe
  - word2vec
  - etc.
- **Experiment with different training parameters**
  - window
  - learning rate
  - hidden layer size
  - embedding dimension
  - etc. (see lab slides)
- **Minimum requirement: add new features (e.g. POS tags).**

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To Submit

REPORT (≈4 pages) that includes:

- Data Analysis
- Evaluation (with Baseline)
- Comparison of performances to FST-based SLU (project 1)
- Comparison of different training parameters and settings
- Error Analysis
- Discussion

CODE with readme (e.g. GitHub link)

- `https://github.com/esrel/LUS/` (extras)

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Conversational Agent: `rasa`

Develop a conversational agent using `rasa` framework.

- define an application domain (e.g. Pizza Ordering, Restaurant Booking)
- identify service/DB/KB for the domain to use
- write stories for policy training
- find or write utterances for NLU training
- define system actions
- configure, train & evaluate different policy ensembles
- configure, train & evaluate different NLU pipelines

Explore:

- Form Actions & Interactive learning (for evaluation)
- `rasa X`: `http://www.rasa.com/docs/rasa-x/`

Conversational Agent: `Alexa`

Develop a conversational agent using `Alexa`.

- define an application domain (e.g. Pizza Ordering, Restaurant Booking)
- find or write utterances for NLU training
- define system actions
- define Dialogue Manager class and structure

Explore:

- Form Policy (slot-filling)
- NLG, Directives and Amazon Presentation Language
- Test on Amazon Echo

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To Submit

REPORT (≈4 pages) that includes:

- Description of the system (what works and what not)
- Comparative evaluation of system components
- Discussion

CODE with readme (e.g. GitHub link)
VIDEO of the interactions with the system to demonstrate functionalities

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