Intelligent (Task-Oriented) Conversation Assistant for Course Selection

Progress Report



Information Technology Capstone Project

COMP5703/5707/5708

Group Members

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# Progress Status

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| **Project Name** | CS17 Intelligence(Task-Oriented) Conversation assistant for course selection |
| **Project Start Date** | 6/ 3/ 2019 |
| **Project Manager** | Biying Wang |

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| Project Description | The project focuses on using NLP and other technologies to build a dialog system to analyse and answer the questions that students ask in terms of course units on University of Sydney education system |

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| Project Status Report | # | Date: 12/ 4/ 2019 |

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| **Status Item** | **Status up to last week** | **Planned for this week** |
| **Major deliverables** | A dialog management demo. | A natural language generator demo |
| **Planned delivery date** | 5/ 4/ 2019 | 12/ 4/2019 |
| **Major issues** | The dialog management design is a intrgation with dialog tracker, information structure, and database and rule based.  We also need identify some condition to test the sysem. | Last week, our design is template based NLG,  And I review somw method, then use the open source code to design a structural NLG. |
| **Major risks** | 1, intent design need to consider to detail, in the system, if the intent design too general, we need design other method for the right question, if the intent too much it require too much training data.  2, for each rule, it require the a query sentence for seek answer from database.  3, the design of rule base, do we need key word or entity ? | 1, the NLG require some difficult method , mostly require a language model to support.  2, the machine learning method require the data set to support the training process. |
| **External dependencies** | Slack, github, zoom | Slack, github |
| **Estimated effort (hr)** | 40hr | 40hr |
| **Recorded effort (hr)** | 45hr | 40hr |
| **Status (R, Y, G)** | yellow | yellow |

# Roles & Responsibilities

Shengyuan Sun

Role: developer

Responsibility:

* Review the natural language generation method
* Demo a generator

Rui Chen

Roles: Analyser and Developer

Responsibility:

* WBiying Wang

Role:

Responsibility:

* Cheak weekly deliverables

Quan Chen

Role: Developer

Responsibility:

* Back-end database system building and data collecting
* Help to design the whole process of system (such as slot and intent)

# Individual Achievements

reviewed six method

The first one is the most simple one, this method is the template-based method, it requires pre-define a lot dialog template and rules, then mapping the rule and template and information to the natural language

The second method is the plan-based method, this method contains three phases, the first phase is sentence plan generator, at this phase the system will generate a sentence planning tree, each node of the tree represents a dialog action. Following the sentence plan ranker phase, To ensure that the output trees/strings correspond semantically to the input DA, we implemented a classifier to rerank outputs and penalize that missing required information and/or adding irrelevant one

Finally, surface realizer phase, it will transform the sentence plan tree to the sentence, the transform process integrates all the child node to the parent node

The third method is the class-based method, this method generates the sentence based on the language model generally an n-gram language model, the requirement of the class-based method is you need defined the different class and separately compute the probability of each class, and Finally take the maximum probability of class

The phrase-based method also used a language model generally an n-gram language model, the benefit is it more efficiency and more accuracy, the disadvantage is it requires more semantic alignment and semantic stack

The fourth one is RNN-based language model method a neural network based NLG system that can be fully trained from dia1og action to utterance pairs without any semantic alignments between the two.

The next one is structural NLG this method uses the syntax tree plus neural network，encode trees as sequences，then apply seq2seq to generate the sentence. The encoder is an Lstm and decoder is an Lstm with softmax and implemented a simple beam search for decoding It proceeds left-to-right and keeps track of log probabilities of top n possible output sequences, expanding them one token at a time.

Finally implemented a classifier to rerank outputs and penalize that missing required information and/or adding irrelevant one.

The last one is contextual NLG, this method also a seq2seq model，improve structural NLG with a context-aware part，The advantage is that the generated response will consider the context and is more suitable for multiple rounds of dialogue

Seq2seq2 model design

The seq2seq generator starts with the encoder stage, which uses an RNN to encode an input sequence into a sequence of encoder outputs and hidden states, a non-linear function represented by the long-short-term memory (LSTM) Cell

The decoder stage then uses the hidden states to generate a sequence with a second LSTM-based RNN. The probability of each

output token is defined with softmax.

the decoder is initialized by the last hidden state and uses the previous output token at each step.

# Group Collaboration

Slack

图片包含 屏幕截图

描述已自动生成

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# 图片包含 屏幕截图 描述已自动生成