

A Deep Chatbot for QA and Chitchat

Tema kaIb:

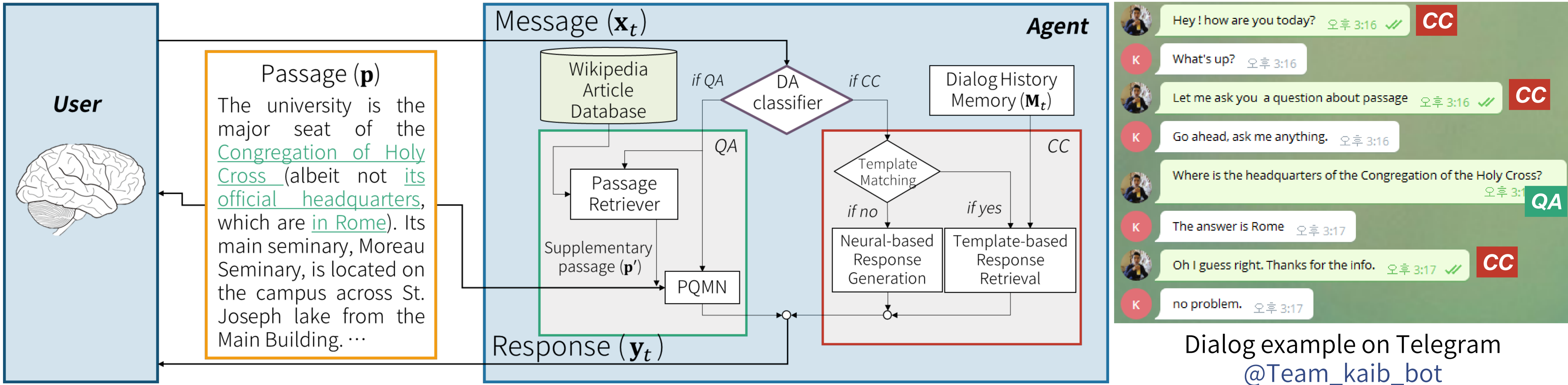
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Overall Framework

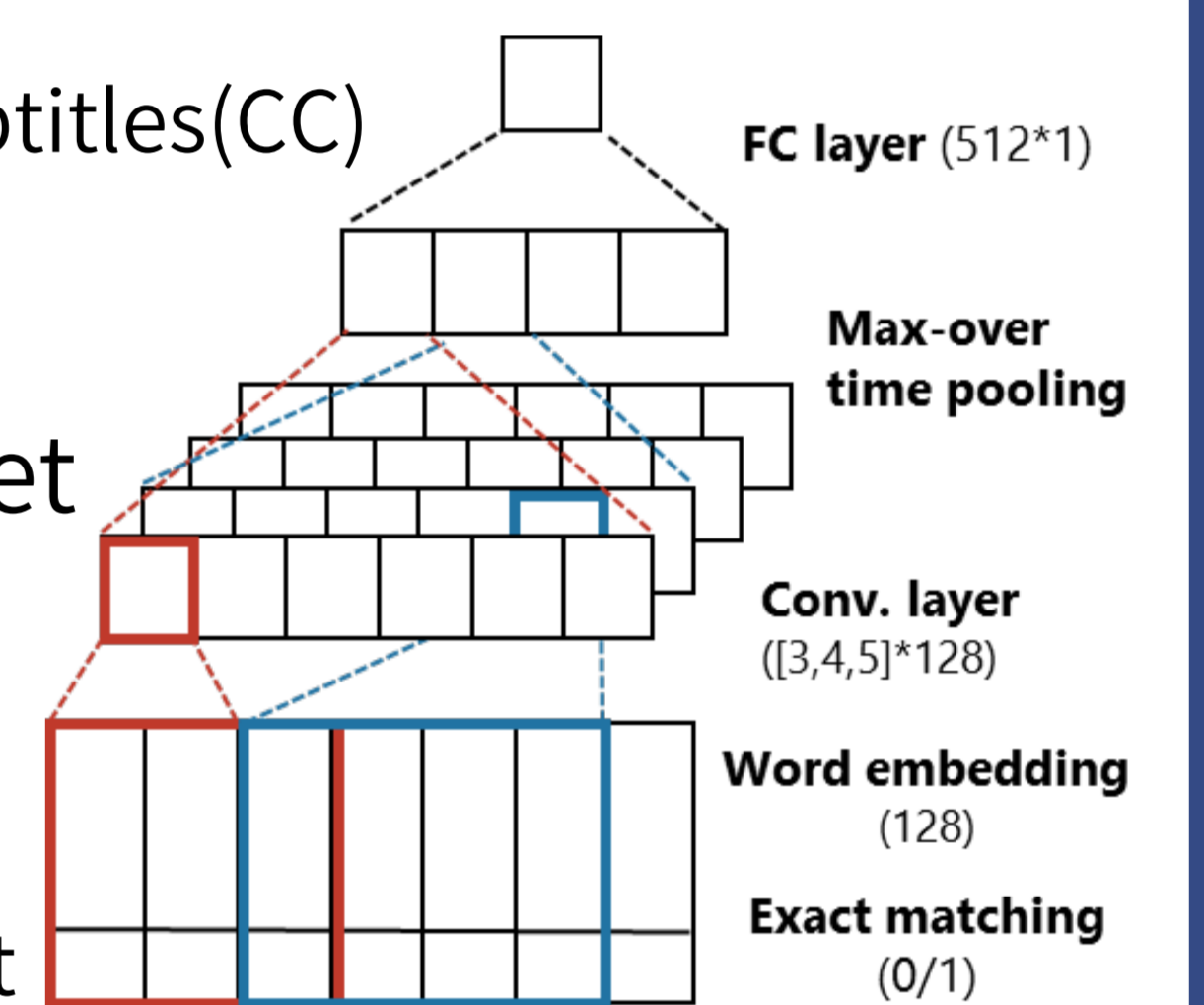


I. Introduction

- Goal: Design an **intelligent** and **natural** conversational article-based agents
- Approaches
 - Coarsely assume users have two dialog acts
 - Developing a modular chatbot consisting of **Dialog-act classifier(DA)**, **Question-answering(QA)** and **Chitchat(CC)**

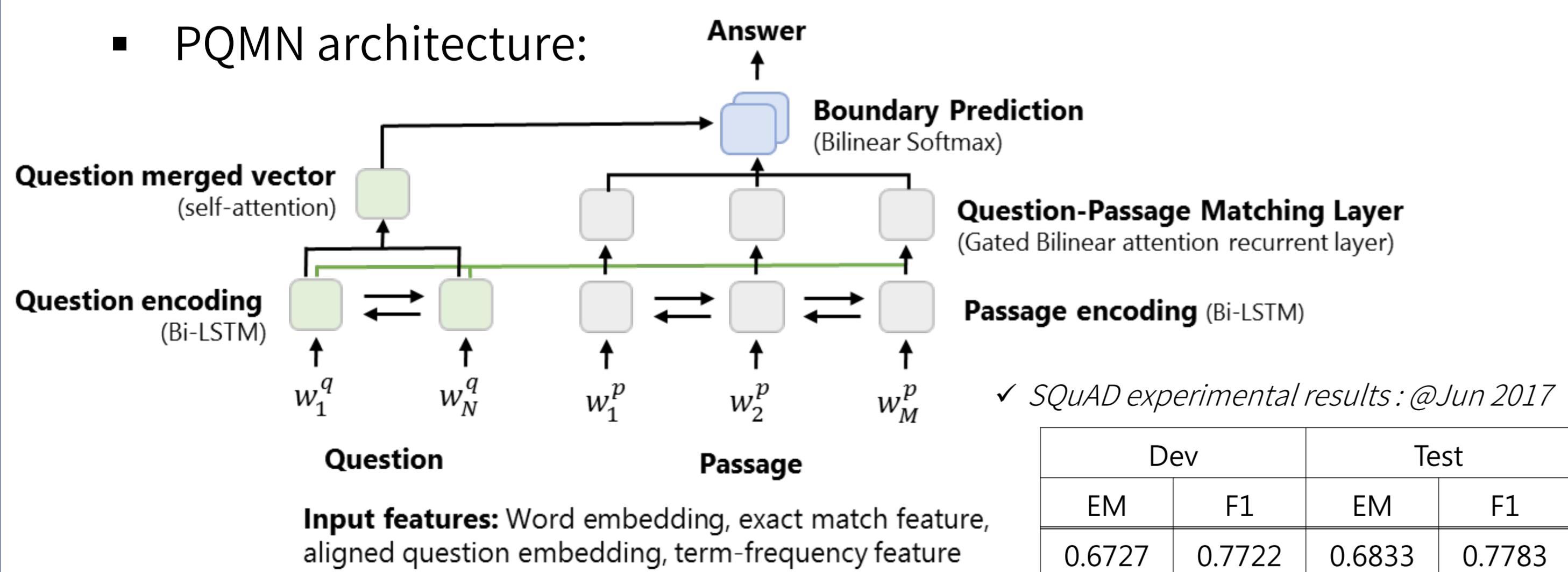
II. Dialog-act classifier

- **QA/CC Classification using CNN** [1]
 - Trained on SQuAD(QA) and OpenSubtitles(CC)
 - Achieving the accuracy of 98.7%
- **Manually labeled ConvAI dataset**
 - 8k utterances, resulting in **8.6% of QA** and **91.4% of CC**
 - Additional training and achieving 91% test accuracy on ConvAI dataset



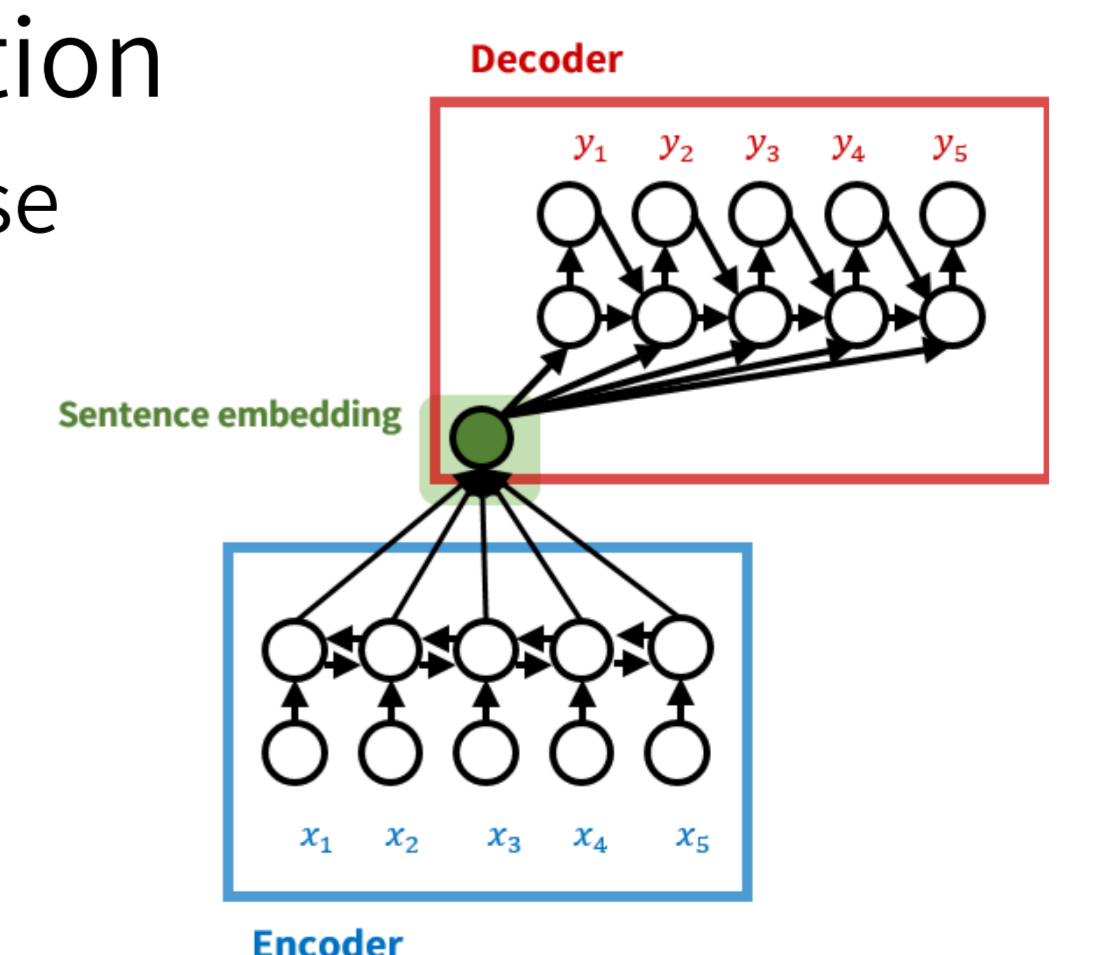
III. Question-Answering

- **Passage Retriever**
 - *Users often ask questions beyond the given passage*
 - ⇒ Find related **supplementary passages** from the collected Wikipedia database (top 10k articles by PageRank), using BM25F algorithm^[2]
 - The found relevant passages are also fed into the PQMN
- **Passage-Question Matching Network (PQMN)**
 - Find an answer span in the given passages according to the question by **matching(attention)** passage and question
 - Trained on SQuAD datasets
 - PQMN architecture:



IV. Chit-chat

- **Ensemble of Template-based and Neural-based models**
 - *Generic answer generation problems of the NN-based model*
 - ⇒ **Answer selection** between template- and neural-based answers based on the template matching result
 - About 57.5% and 42.5% responses from template-based and NN-based model respectively
- **Template-based response model**
 - **Retrieve** a response via template matching
 - Template sources: from ALICE [4] + manually designed 161 rules
 - Employing memories for predefined categories (name, job, etc.)
 - *Example*
 - (input) I am a policeman.
 - <pattern> I AM A * </pattern>
 - <template> I have a lot of respect for those who wear a badge.
 - <set name="job">POLICEMAN</set> </template>
- **Neural-based response generation**
 - **Generate** a natural language response given the message.
 - **RNN Encoder-Decoder** [5]
 - LSTM 2 layers with 2048 hidden units
 - Trained on Dailydialog datasets
 - 9.8k vocabularies
 - PPL of the validation set: 36.99



References

- [1] Y. Kim et al., "Convolutional Neural Networks for Sentence Classification", ACL, 2014
- [2] J. R. P. Aguera et al., "Using BM25F for Semantic Search", ISSW, 2010
- [3] D. Chen et al., Reading Wikipedia to Answer Open-Domain Questions. ACL, 2017.
- [4] R. S. Wallace, "The Anatomy of A.L.I.C.E. Parsing the Turing Test", 2009
- [5] O. Vinyals et al., "A Neural Conversational Model", ICML Deep Learning workshop, 2015

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