

DIALOGUE STATE TRACKING FOR LOW-RESOURCE LANGUAGES

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DECLARATION

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters thesis/Dissertation under my supervision.

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ABSTRACT

Dialogue State Tracking for Low-Resource Languages

Despite ground breaking work in the academia, current state-of-the-art work in goal-oriented conversational-agents has not been able to fulfil the demand of the industry for multi-domain multi-lingual, adaptable, dialogue systems. Data-intensive nature of deep learning models used in dialogue state tracking (DST) module, which is a core component of the goal-oriented dialogue architecture, and the lack of large labelled dialogue corpus for state tracking are two main factors which have hindered the progress.

We identified, modeling with separate natural language understanding (NLU) module and joint modeling of dialogue state tracker with NLU as the two main approaches for state tracking, and accordingly made two major contributions. First, we propose a novel meta-learning algorithm for intent detection and slot-filling tasks, focusing on models with separate NLU. Our work empirically demonstrates that the proposed meta-learning approach is capable of learning a meta-parameter(prior) from similar, but different tasks. Compared to the random initialization, which regular supervised learning algorithms rely on, proposed method significantly improves the accuracy in both intent detection and slot-filling tasks in few-shot (5-way 1-shot and 5-way 2-shot) settings. Further, our effective use of meta-learning for intent detection and slot-filling opens up new line of research for DST. Second, we systematically review the progression of joint NLU/DST models with special emphasis on their ability to generalize and adapt to new domains and languages.

Keywords: Dialogue State Tracking; Natural Language Understanding; Joint Intent Detection and Slot-Filling; Meta-Learning; Conversational-AI;

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
NLP	Natural Language Processing
NLU	Natural Language Understanding
DST	Dialogue State Tracking
DM	Dialogue Manager
NLG	Natural Language Generation
EQ	Emotional Quotient
IQ	Intelligence Quotient
RNN	Recurrent Neural Networks
CNN	Convolutional Neural Networks
LSTM	Long Short-Term Memory
NMT	Neural Machine Translation
NBT	Neural Belief Tracker

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