

1 Research interests

The section is devoted to the author’s interests, which are developed in the course of research conducted as part of his development at the university and his professional duties in his paid work.

1.1 The process of creating conversational agents

The author’s interest is to work on **dialogue systems** and to develop software that will serve a group of users as daily aids within various areas of their lives. As part of his professional experience and research conducted during his graduate study, the author has faced the challenges of producing modern dialog systems. AMUseBot is a system developed as part of a research and development project during the study period. The agent is the user’s helper in the process of cooking. The emphasis was placed on the **multimodality** of the system, in addition to the chat interface, the steps of the recipe are presented in an interface, based on a graph, so that the user, can easily follow the steps of the recipe and the agent has a voice interface (Christop et al., 2023).

1.2 The NLU part of the conversational agents

The complexity of today’s dialogue agents opens the door to many possible studies of individual modules. The author focuses his attention on the NLU module, which is a key component of any dialog system. The responsibility of this module is to understand the current utterances of the user. This task consists of two subtasks, speech act classification, and slot value extraction. The challenges posed are non-trivial, from the fact that the system creators cannot predict what words the user will try to convey information with. There are many techniques used to improve the quality of these modules (Bayer et al., 2021). One of the techniques explored more extensively by the author in his thesis is **data augmentation**. In the thesis, the author focuses on comparing the performance of existing augmentation methods and extending the existing augmentation technique using translation chains within back translation methods.

Aiming to push the boundaries in NLU research, the author announces his work on the challenge announced

with the **DSTC11 Track 2** with the title: "Intent Induction from Conversations for Task-Oriented Dialogue". The author tests the impact of the augmentation techniques studied on the final result of the generated solution. The task consists of two subtasks: **“intent clustering**, which requires participants to assign labels to turns in the dialogues where customers express intents **open intent induction**, in which participants must induce a set of intents from dialogues, with each intent defined by a list of sample utterances to be used as training data for an intent classifier.” (Gung et al., 2022).

1.3 Approach

The adopted solution is to modify only the given datasets, not the clustering algorithm. The text augmentation method is back-translation en->de->en, with the utilization of Opus-MT (Tiedemann and Thottingal, 2020). The particular models are chosen due to the high similarity of the output translations to source data and are being chosen by other authors in similar problems (Ido et al., 2020). The size of the generated set takes values in the range <0.0; 1.0> of the size of the source data.

1.4 Results

The results showed an improvement in the performance of the clustering (see 1.4). The induction methods with an accuracy improvement of 4,67% will result in 8th place (among 20 registrations). Achieved results indicate that data augmentation is beneficial to use in unsupervised techniques like in the supervised methods.

RunID	experiment_id	dataset	F1	F1_diff
glove-840	dstc11-0.1-s42-a0.4	test-banking	37.6549	+3.4245
all-mpnet	dstc11-0.25-s42-a0.2	test-banking	67.9049	+1.8634
all-mpnet	dstc11-0.5-s42-a0.1	test-banking	68.1526	+0.8859
all-mpnet	dstc11-1.0-s42-a0.075	test-banking	68.63	+2.7782
glove-840	dstc11-0.1-s42-a0.5	test-finance	42.5698	+12.973
all-mpnet	dstc11-0.25-s42-a0.15	test-finance	59.2003	+5.0649
all-mpnet	dstc11-0.5-s42-a0.5	test-finance	59.6556	+4.527
all-mpnet	dstc11-1.0-s42-a0.1	test-finance	59.7538	-0.9146
all-mpnet	dstc11-0.1-s42-a0.05	development	59.7586	+1.1949
glove-840	dstc11-0.25-s42-a0.2	development	35.7971	+3.1706
all-mpnet	dstc11-0.5-s42-a0.025	development	60.7944	+7.759
all-mpnet	dstc11-1.0-s42-a0.3	development	56.478	+1.5472

experiment_id* - dstc11-<data_size>-s<seed>-a<augmented_size>

Figure 1: Result in f1 metric for augmentation experiments in intent clustering.

2 Spoken dialogue system (SDS) research

Thanks to the recent success and development of LLM and technologies such as ChatGPT (Radford et al., 2019), users are very keen on dialogue systems, and interest in the subject matter and work will bring a number of improvements and enhancements to the technologies we currently know. Although predicting the future of technology for a period of time greater than 5 to 10 years gives the impression of being impossible, there are some fields that are likely to be explored in future works.

- Regarding the growing popularity of virtual agents they will become more accessible and help in more areas of our lives, they will provide legal assistance, health care, and technical assistance.
- The responses of the assistants will be more personalized and will take into account the different contexts of the user, the context of the conversations, the profile of the user, and his mood and emotions.
- More and more optimized solutions will be created, and the computational complexity of the modules used to build the systems will decrease, enabling software developers to start using more and more advanced models to create dialogue assistants (Peng et al., 2023).

3 Suggested topics for discussion

Regarding the participation in the DSTC11 challenge and the author's topic of research work, the suggestions for the discussion subjects are:

- The results of the work on the challenge with the DSTC11 in particular: the applied strategy to solve the problem, the results of the used techniques, and the use of augmentation.
- Improvements for the topic of unsupervised augmentation methods, exploration of the subject of back translation, and further directions of research.

The expectations for the dialogue are constantly growing along with the quality of each submodule. The topics presented are particularly important as they relate to improving the quality of the cutting-edge modern NLU module.

References

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Biographical sketch



The author's experience with Computer Science began in October 2018 with B.S. studies at Adam Mickiewicz University in Poznań, which ended with the highest grade. The M.Sc. studies in the field of Artificial Intelligence began in February of 2022. The topic of the author's thesis is "Data augmentation methods for dialogue system". Where the results of various data augmentation techniques are being compared and the extensions of existing methods are being presented. During studies, the author had a great possibility to attend numerous multinational conferences and workshops to further explore his knowledge and passion in the domain of NLP. Along with the studies, the author started his professional work as a programmer in November 2021. The author is working on the development of skills for the virtual assistants.