Deep learning for conversational QA systems
- [IXA group](#), [CHISTERA](#)

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Description

Conversational agents are gaining attention very fast in the past few years. Nowadays, there exist many commercial systems that are able to talk with humans with the aim of helping them to fulfill a specific goal (e.g. Amazon Echo, Google Home, Microsoft Cortana, Apple HomePod, etc). The aim of this software agents is to converse with humans as coherently and engagingly as possible. One of the main applications of conversational agents is to help users finding answers to the questions they may pose, by means of a dialogue where the user expects the system to reply to inter-connected questions with short, up-to-the-point answers. However, building such open-domain conversational agents remains a major unsolved challenge in natural language processing. In this project the student will apply deep learning to develop chatbots that are able to interact with the user using natural language sentences, and that help them finding the information by querying a large knowledge base.

In an educational scenario, this kind of knowledge is useful to produce feedback to students. How to produce human-like feedback is the question to be solved in this project.

The student will acquire
- deep learning applied to text and textual inferences
- how to build a chatbot based on deep learning

This project is defined in the context of the 3-year CHISTERA project http://www.chistera.eu/projects/lihlith involving four universities (Switzerland, France) and one French company (IP Eneko Agirre).

Goals
The student will apply deep learning in order to build an open conversational Artificial Intelligent agent able to generate human-like verbalizations or feedback using iSTS knowledge. The key objectives are the following:

1. Analysis of the state of the art techniques for developing conversational AI agents
2. Design of an AI agent that provides human-like feedback
3. Implementation and evaluation of the model

Requirements

English. Machine learning. Good programming skills, basic math skills.

Although it is not a requirement, taking the course "**Seminar on language technologies. Deep Learning**" (see below) will allow the student to accomplish more ambitious goals. Contact us for further details.

The dissertation can be written in Basque, English or Spanish.

Framework

Python, pytorch, parlAI (Miller et al. 2017).

Tasks and plan

Dec-Janunary: Study literature, select tasks, install and run ParlAI agents

February: Attend course "Seminar on language technologies. Deep Learning", familiarise with Pytorch (see below)

Mar-May: Development and experiments

June: Write down and presentation

References

Adams, T. (2017). AI-Powered Social Bots. *arXiv:1706.05143*. Retrieved from http://arxiv.org/abs/1706.05143

Krause, B., Damonte, M., Dobre, M., Duma, D., Fainberg, J., Fancellu, F., … Webber, B. (2017). Edina: Building an Open Domain Socialbot with Self-dialogues. *arXiv:1709.09816*. Retrieved from http://arxiv.org/abs/1709.09816

Miller, A.H., Feng, W., Fisch, A., Lu, J., Batra, D., Bordes, A., Parikh, D. and Weston, J., 2017. ParlAI: A Dialog Research Software Platform. *arXiv preprint arXiv:1705.06476*. Retrieved from http://arxiv.org/abs/*1705.06476*

Serban, I. V., Sankar, C., Germain, M., Zhang, S., Lin, Z., Subramanian, S., … Bengio, Y. (2017). A Deep Reinforcement Learning Chatbot. *arXiv:1709.02349*. Retrieved from http://arxiv.org/abs/1709.02349

Seminar on Language Technologies. Deep learning. (LAP18)

Deep Learning neural network models have been successfully applied to natural language processing. These models are able to infer a continuous representation for words and sentences, instead of using hand-engineered features as in other machine learning approaches. The seminar will introduce the main deep learning models used in natural language processing, allowing the students to gain hands-on understanding and implementation of them in Tensorflow .

Topics

    Introduction to machine learning and NLP with Tensorflow
    Deep learning
    Word embeddings
    Language modeling and recurrent neural networks
    Convolutional neural networks
    Attention mechanisms

Prerequisite. Basic programming experience, a university-level course in computer science and experience in Python. Basic math skills (algebra or pre-calculus) are also needed.