NLP Bachelor project notes:

Contents

[Parsing natural language sentences into robot actions 2](#_Toc119494683)

[Learning to Parse Natural Language Commands to a Robot Control System 2](#_Toc119494684)

[Inducing Probabilistic CCG Grammars from Logical Form with Higher-Order Unification 3](#_Toc119494685)

[Commanding mobile robot movement based on natural language processing with RNN encoderdecoder 4](#_Toc119494686)

[Facehugging dataset 4](#_Toc119494687)

[Natural Spoken Instructions Understanding for Rescue Robot Navigation Based on Cascaded Conditional Random Fields\* 4](#_Toc119494688)

[Interactive Multi-Robot Command and Control with Quasi-Natural Command Language 5](#_Toc119494689)

# Parsing natural language sentences into robot actions

[paper24.pdf (ceur-ws.org)](https://ceur-ws.org/Vol-2456/paper24.pdf)

Using a humanoid robot.

Output from there NLP engine is base form of words and part of speech tagging in which they use a grammatical parser to transform the words into actions.

The NLP engine used is called a standford core nlp ([Overview - CoreNLP (stanfordnlp.github.io)](https://stanfordnlp.github.io/CoreNLP/)). They did not use their own nlp engine, and they did not have any data that could be of use, as the project used a pretrained model for there project.

# Learning to Parse Natural Language Commands to a Robot Control System

[MatuszekISER2012.pdf (mdsoar.org)](https://mdsoar.org/bitstream/handle/11603/14363/MatuszekISER2012.pdf?sequence=1&isAllowed=y)

Seems to have an interesting robot parser system and looks like they are using their own natural language model.

Using NL and command parsing to navigate a robot through an unknown environment

Diagram

Description automatically generated

Using high level RCL (Robot control language) to map speech onto, to have as little complexion difference between the robot language and the natural language

Table

Description automatically generated

Parsing is performed using an extended version of **Unification Based learner (UBL)**,

# Inducing Probabilistic CCG Grammars from Logical Form with Higher-Order Unification

[Inducing Probabilistic CCG Grammars from Logical Form with Higher-Order Unification (aclanthology.org)](https://aclanthology.org/D10-1119.pdf)

Seems to be a technique used to parse language into formal representations in the language of lambda-calculus. Very hard to read a lot of shit.

Hardcore language parsing paper, used to create the natural language parsing part of the robot navigation using NL paper, ”Learning to Parse Natural Language Commands to a Robot Control System ”

Proposes a technique called **Probabilistic combinatory categorial grammar (PCCG)** To map language to its formal representation.

# Commanding mobile robot movement based on natural language processing with RNN encoder­decoder

[Commanding mobile robot movement based on natural language processing with RNN encoder­decoder | IEEE Conference Publication | IEEE Xplore (sdu.dk)](https://ieeexplore-ieee-org.proxy1-bib.sdu.dk/document/8391185)

Introduces a method called the NMT method (Neural machine translation). Which takes a full sentence as input and translates it to an output message.

Recurrent neural networks are a well-known NMT method for example.

Uses 1600 datasets which cannot be found to train a RNN to classify Natural language commands to simple robot actions.

# Facehugging dataset

Opensource NLP datasets for both speech, audio and images.

[GitHub - huggingface/datasets: 🤗 The largest hub of ready-to-use datasets for ML models with fast, easy-to-use and efficient data manipulation tools](https://github.com/huggingface/datasets)

Could be very cool.

# Natural Spoken Instructions Understanding for Rescue Robot Navigation Based on Cascaded Conditional Random Fields\*

[Natural spoken instructions understanding for rescue robot navigation based on cascaded Conditional Random Fields | IEEE Conference Publication | IEEE Xplore (sdu.dk)](https://ieeexplore-ieee-org.proxy1-bib.sdu.dk/document/7529634)

Is a paper on Chinese language processing for robot navigation in disastrous environments.

The language parsing problem is seen as a sequence labelling problem, which could be solves using a **Hidden Markov model, Maximum entropy Markov model** or **Conditional Random fields (CRF’s)**

CRF’s are used with the grounding, that it is more efficient based on their small dataset.

An advantage to using three layers (or layers in general) of CRF’s is that it both serves the purpose of each having there individual task, which the layers can be designed towards, and that each layers filters the data, such that the next layers has less unimportant data to look through.

**Note:** Understood very little of the technical part of the paper.

# Interactive Multi-Robot Command and Control with Quasi-Natural Command Language

[Interactive multi-robot command and control with quasi-natural command language | IEEE Conference Publication | IEEE Xplore (sdu.dk)](https://ieeexplore-ieee-org.proxy1-bib.sdu.dk/document/6973952/authors#authors)

“Skim read”

Basic idea of the paper is to extend an already present language parser called a *Battle management Language (*BML*)*, such to enable low level multi robot control.

The authors of the paper are communication, information processing and ergonomic students, which combined with the lack of NLP methods in their paper leads me to believe, that there is a distinct lack of AI methodology behind their work.

TL:DR -> They use premade NLP with no regard.

# Integrating Computer vision and natural language instruction for collaborative robot human-robot interaction

Use a build in API for voice to text for python.

*“In our system, we use the python suite "SpeechRecognition". It will upload user’s voice to Google and return the text back the local system after the voice conversion is complete.”*

Might be absurdly useful.