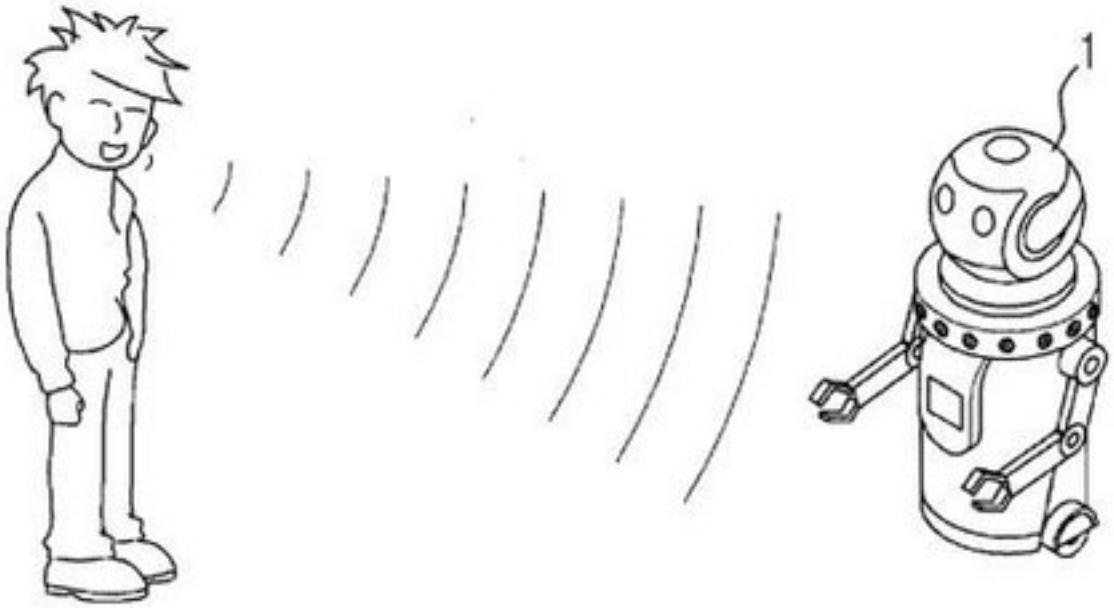
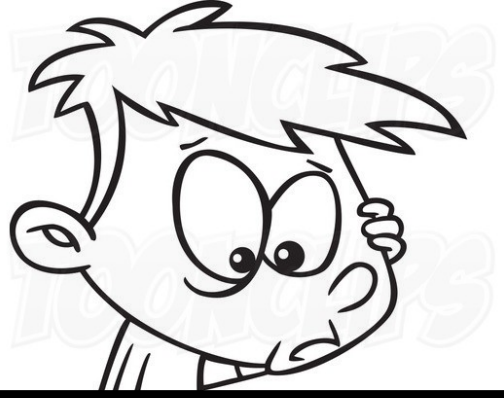
Learning to parse Natural Language Commands to a Robot control System

Praveen Dhinwa
10526
Advisor : Dr. Amitabh



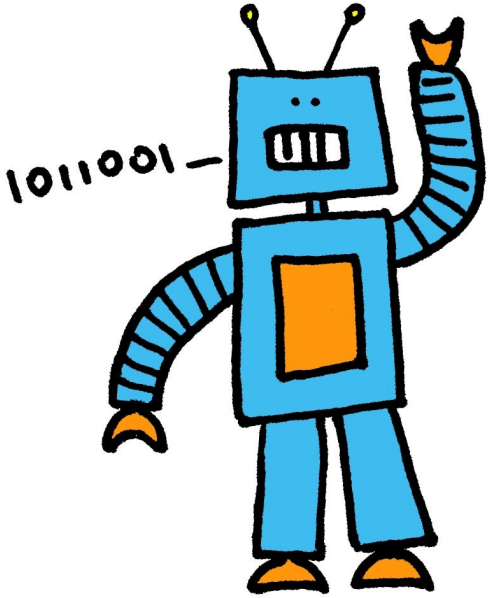
→ As robots are becoming more advanced and capable of performing of complex tasks , the importance of enabling untrained users to interact with them has increased.
→ In Robot Navigation System
→ Can also be employed in Cars for driving in real life traffic system
→ for simulating games

Importance and possible uses



Problem Statement:

→ grounding natural language / human language into a semantically informed structure in the context of robot simulation on a grid type navigation system.
→ Given a start position and natural language input by the user, parse the input into a RCL structure. Then executed the parsed RCL structure output on the



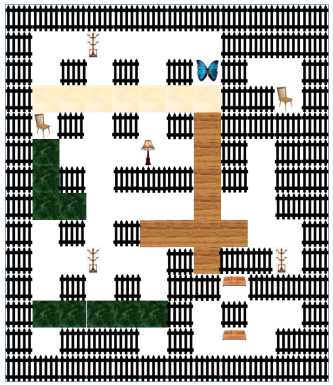
Prior Work

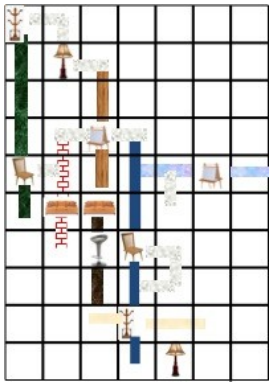
By [1] , their grid navigation system does not make use of landmarks

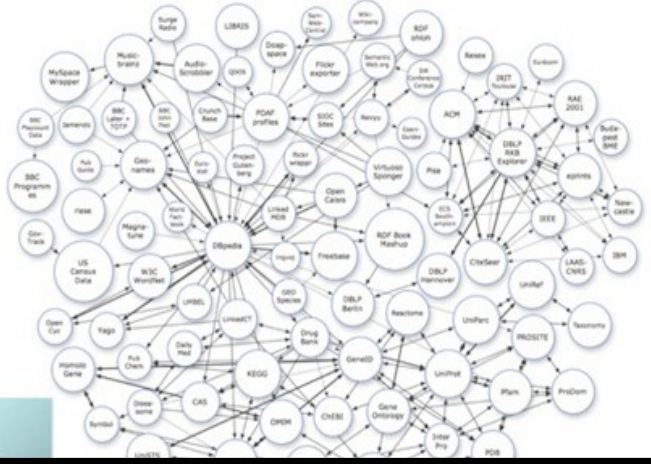
By[2] , they have taken into account information about landmarks and attributes of grid elements.

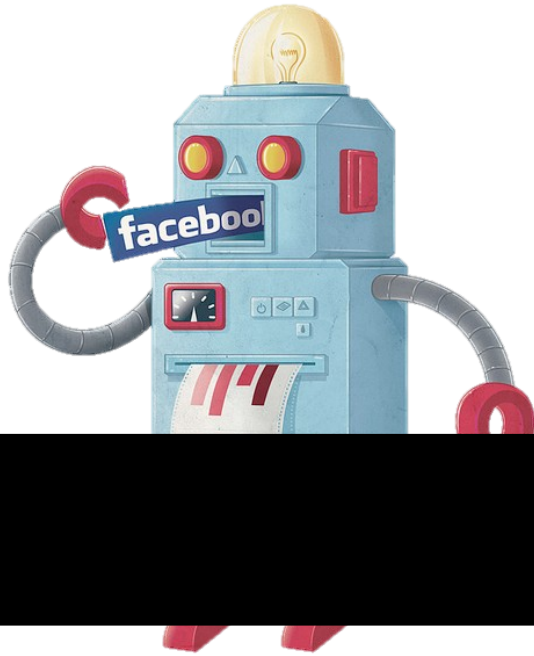
My Work

- My work is a combination of 1 and 2. Data set for training and testing the system is taken from [4].
- The grid map Set is taken from [2]. It contains three kind of map structures.
- Sample robot simulation system is also MARCO is also by [4].
- The algorithm for learning the features of a map is taken from Chen and Mooney Paper and
- implemented by me on the MARCO system. Then parse structure of route instructions is also learnt by implementing it on the grid data sets. Algorithm for this is PCFG(probabilistic CFG) whose implementation is taken from KRISP.[6]
- Finally a simulation over the image of grid is shown to users. Users can interact with it and



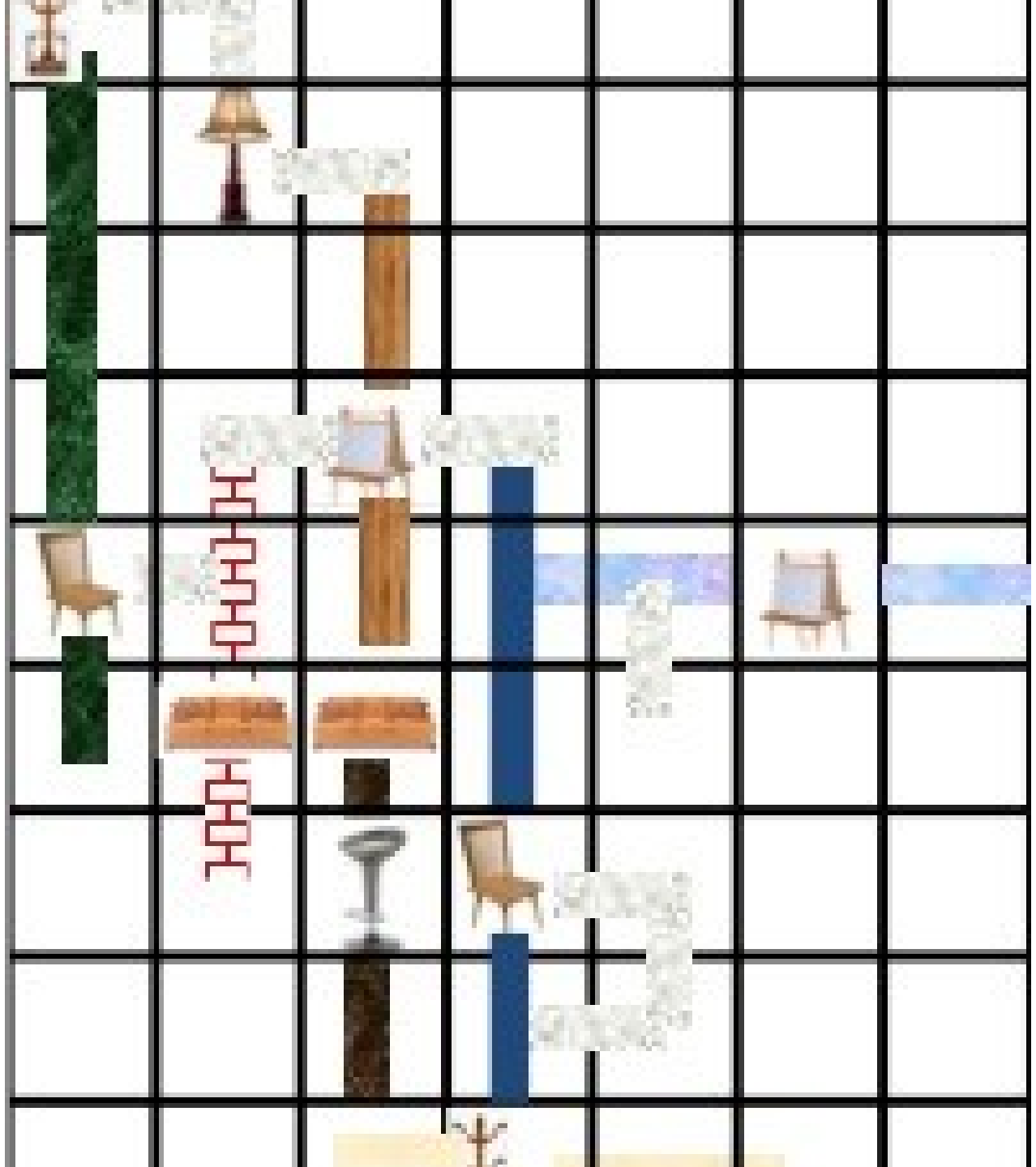






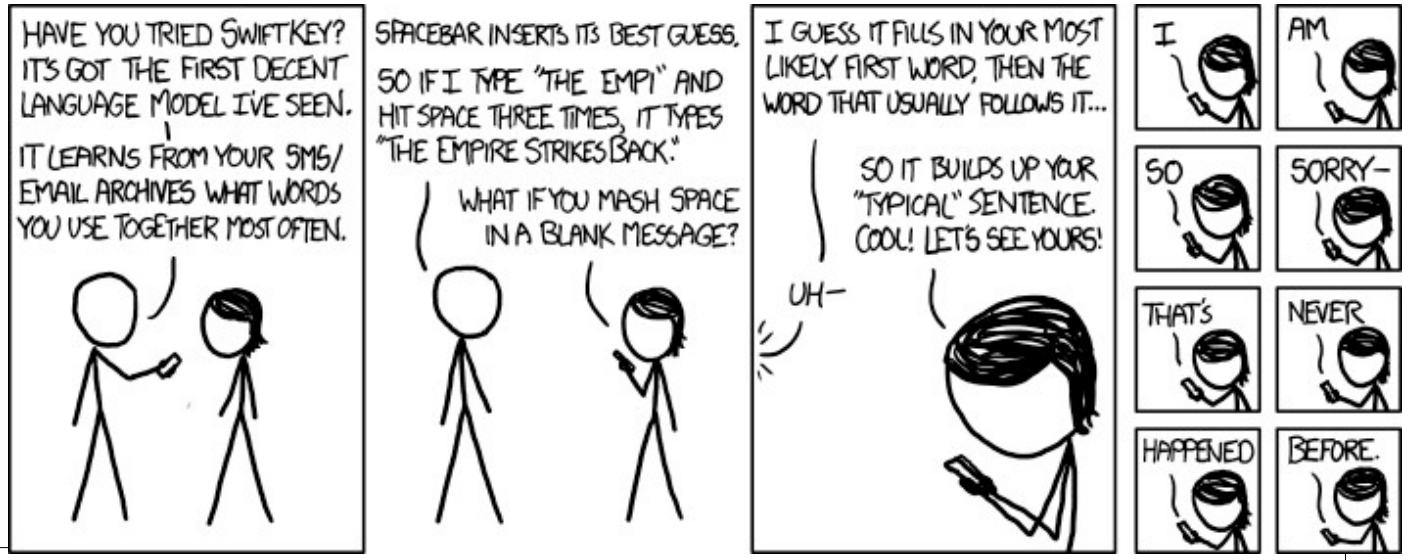
Data Sets

- Data set for training is taken from [4]. It contain corpus of english grammar system used for navigation in the general kind of system. It contains 706 both trivial and non trivial route instructions. Instructions also have their corresponding path with them for learning purpose.
- 3 grids as mentioned above are taken from [2].
- 600 of the data set from above 706 is used for



Result

For trivial sentences accuracy : 67 / 106 : 63 %.
sentences accuracy was checked as their path was already given in the corpus.



ognition of extensive landmarks can help to improve the system.

References

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3. Y. Artzi and L.S. Zettlemoyer. Bootstrapping semantic parsers from conversations. In Proc. of the Conf. on Empirical Methods in Natural Language Processing, 2011.

4. Marco Code written by Matt MacMahon (matt@macmahon.org). http://robotics.csres.utexas.edu/~adastra/papers/b2hd-macmahon-phd-07.h

5. . Kwiatkowski, L.S. Zettlemoyer, S. Goldwater, and M. Steedman. Inducing probabilistic CCG grammars from logical form with higher-order unification. In Proc. of the Conf. on Empirical Methods in Natural Language Processing, 2010.

6. KRISP (Kate and Mooney 2006)