

Identifying Landmarks and Relations in grounded route descriptions of IITK

Mohit Gupta, Subham Modi

Instructor – Prof. Amitabha Mukerjee

Motivation

Google Maps uses source and destination and outputs the shortest path connecting them with a textual description of the turns and distances.

How is the response of an intelligent user different and more effective?

- uses landmark in the description
- doesn't always compute the shortest path as the preferred one

Why landmarks in description?

- easier to follow directions through a series of landmarks
- play a central role in human spatial cognition
- first level of spatial knowledge a person develops in a new environment
- widely used in human way finding and human communication about routes

Relevant Work Done

Routing By Landmarks

Developing a model for incorporating landmarks into routing instructions

- Including Landmarks in Routing Instructions [Prof. Matt Duckham and Prof. Stephan Winter, 2010]

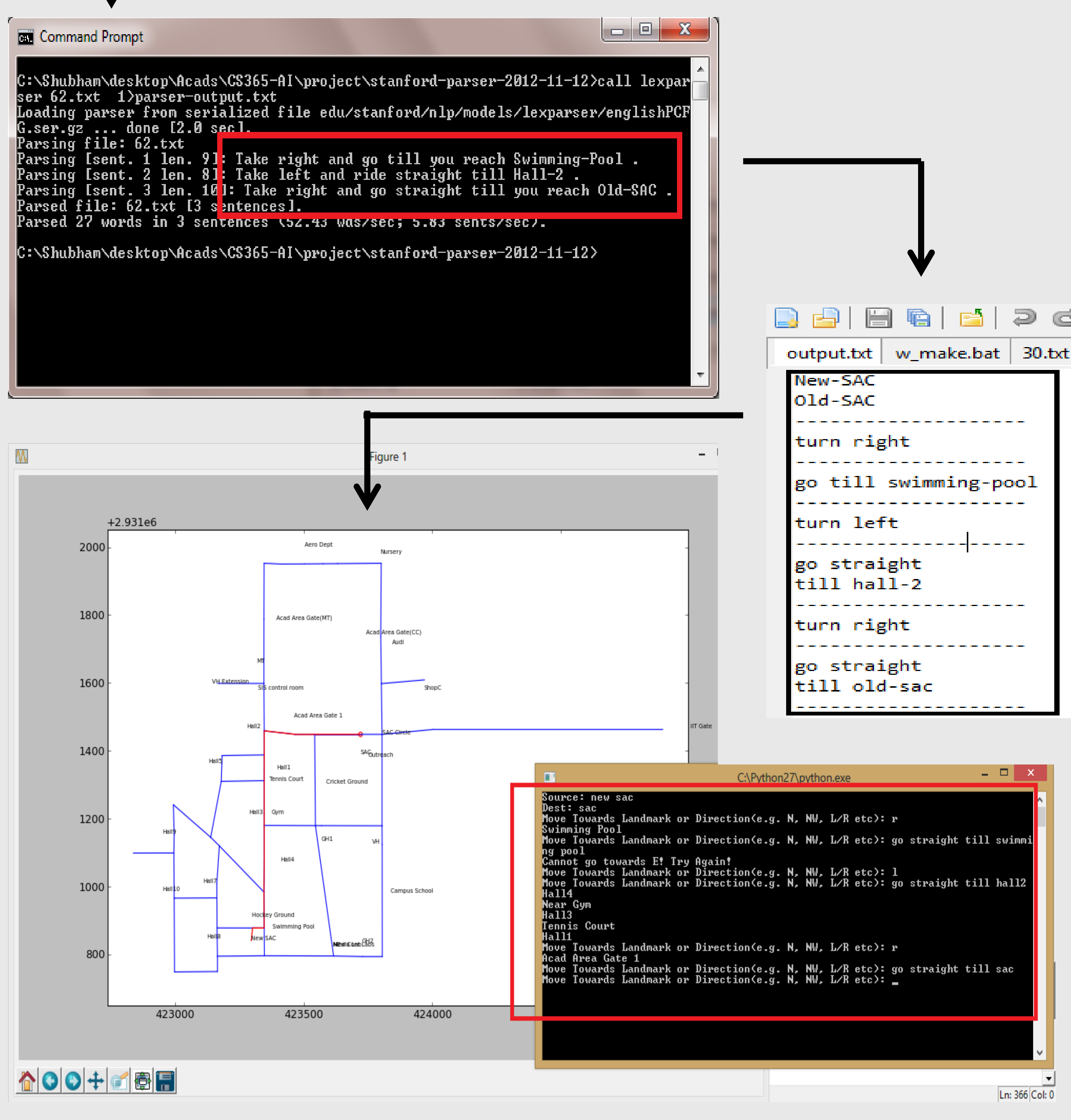
Path finding heuristics

Investigated three path finding heuristics for way finding in hierarchical maps.

- Towards a Cognitive Model for Human Wayfinding behavior in Regionalized Environments [Mishra V., Nayak S. and Prof. Amitabha Mukerjee, 2011]

Our Approach

Take right and go till you reach Swimming-Pool.
Take left and ride straight till Hall-2.
Take right and go straight till you reach Old-SAC.



Algorithm:

- Collecting corpus
- Output from Stanford Parser of each input
- Dependency parsing to extract landmarks, directions and major keywords
- Input to **Black Box**
- Intermediate landmarks as output to the user interface
- Map traversal of the inputted path displayed in a user friendly manner

Tools and Data Used

Tools and Software used

- Map of IITK(.shp), Prof. Bharat Lohani [CE, IITK]
- Stanford Dependency Parser, www.nlp.Stanford.edu

Data created and modified

- Training Data Set created through: home.iitk.ac.in/~smodi/cs365/project/input.php
- Modified Road Map of IITK by maintaining atomicity and removing irrelevant paths

Results and Conclusion

- Interactive GUI map which takes simple (left, right) and complex commands (like continue until location)
- facility to add landmarks and maintain a synonyms list for the same
- collected text corpus of route descriptions in natural language
- commands generated by parser almost always understandable by the GUI

Future Aspects

- learn to include landmarks and roads that are more popular in selecting paths
- include new landmarks from route descriptions in the map
- output path in natural language-text is more convenient than carrying a map

References

- [1] Nayak, S.; Mishra, V.; and Mukerjee A., **Towards a Cognitive Model for Human Wayfinding Behavior in Regionalized Environments**[2011]
- [2] Winter, S.; Duckham, M. and Robinson M., **Including Landmarks in Routing Instructions**[2010]
- [3] www.geom.unimelb.edu.au