

Learning Action Preconditions from Step-by-step Instructions in Planning Domains

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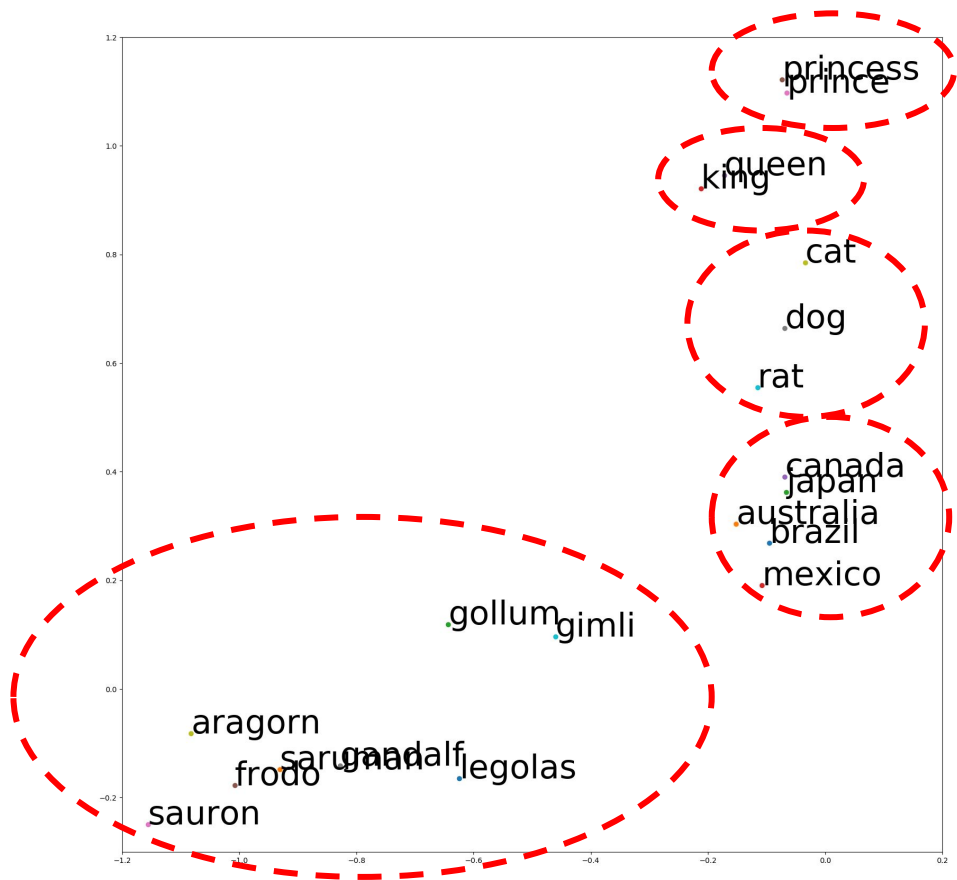
Porto Alegre, Brazil

INTRODUCTION

- Planning domains are usually described by formal languages like PDDL
- Alternative data formats to describe planning domains
 - Images
 - LatPlan (symbolic/latent space representation)
 - Text (Natural Language)
 - Framer, StoryFramer (Named Entity Recognition)
- In our case, we are going to work with text
 - Extract actions within sentences using word embeddings
 - Evaluate if a set of step-by-step instructions sounds coherent

TECHNICAL APPROACH

- Word Embeddings



TECHNICAL APPROACH

- Extract actions within sentences using word embeddings
 - Compute the vector distance between common keywords and words within sentences

TECHNICAL APPROACH

- Identify action preconditions based on ordered sentences
 - $\text{pre}(a_n) = \{a_1, a_2, \dots, a_{n-1}\}$
- Train a Neural Network that evaluates if a set of step-by-step instructions sounds coherent

TECHNICAL APPROACH

- Identify action preconditions based on ordered sentences

WikiHow - How to Cook Pasta (Part 1)

1. Fill a large pot about 2/3 full of water.
2. Cover the pot and bring the water to a boil.
3. Add salt and 1 pound (450 g) of pasta to the boiling water.
4. Set a timer for 3 to 8 minutes.
5. Stir the noodles occasionally as they boil.
6. Bite into a noodle to see if it's cooked enough for you.



PROJECT MANAGEMENT

- Week 1
 - Train a word embedding dictionary over Wikipedia dumps
 - Develop a program to identify verbs based on similarity between embeddings
 - Preprocess data from WikiHow
- Week 2-4
 - Implement and train a Neural Network to evaluate if a set of step-by-step instructions sounds coherent
- Week 5
 - Evaluate results, consolidate findings and write final report

CONCLUSION

- Objectives
 - Using word embeddings to identify verbs within sentences
 - Investigate possible relationships between ordered step-by-step instructions
- New possibilities for further research in translating NL into planning domains
 - Interactive Storytelling
- Get a better understanding of the problem at hand