Using JSHOP External Calls to Compute Geometric Predicates in a Hierarchical Task Network Planning Domain

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Introduction

- Symbolic planners solve very complex problems.
- Lack of correlation between symbolic predicates and the real world limit the usage of symbolic planners in robotics.
- Geometric planners work with physical environment constraints, but the space states are too big, resulting in prohibitive planning time.
- An Approach that use the advantages of both methods is desired.

Related Work

AsyMov

- Use of PDDL2.1
- Predefined minimal symbolic predicates to connect symbolic and geometric layers
- 3 layers of planning: complete symbolic, complete geometric and the linking layer that consist of symbolic predicates that are updated with geometric information.
- Discrete symbolic and continuous geometric planners run in parallel.
- Hanoy like domain.

Related Work

Srivastava

- Manipulation of objects with many movable obstructions in the middle.
- Each High-level action correspond to a low-level continuous implementation.
- Focus on developing these.
- Represents predicates and actions with first-order logic.
- Just facts required by the execution need to be precomputed.

Technical Approach

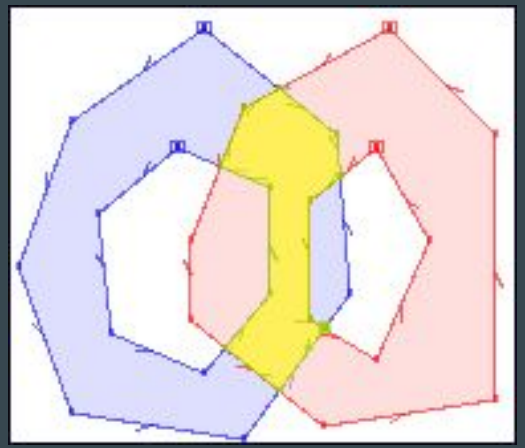
JSHOP external calls

- Implements Calculate.java
- Receives a list of Terms
- Return int, boolean, TermNumber...
- (call + ?x ?y) sum the values of ?x and ?y
- (call > 0 (call - ?x ?y)) return true if x-y>0

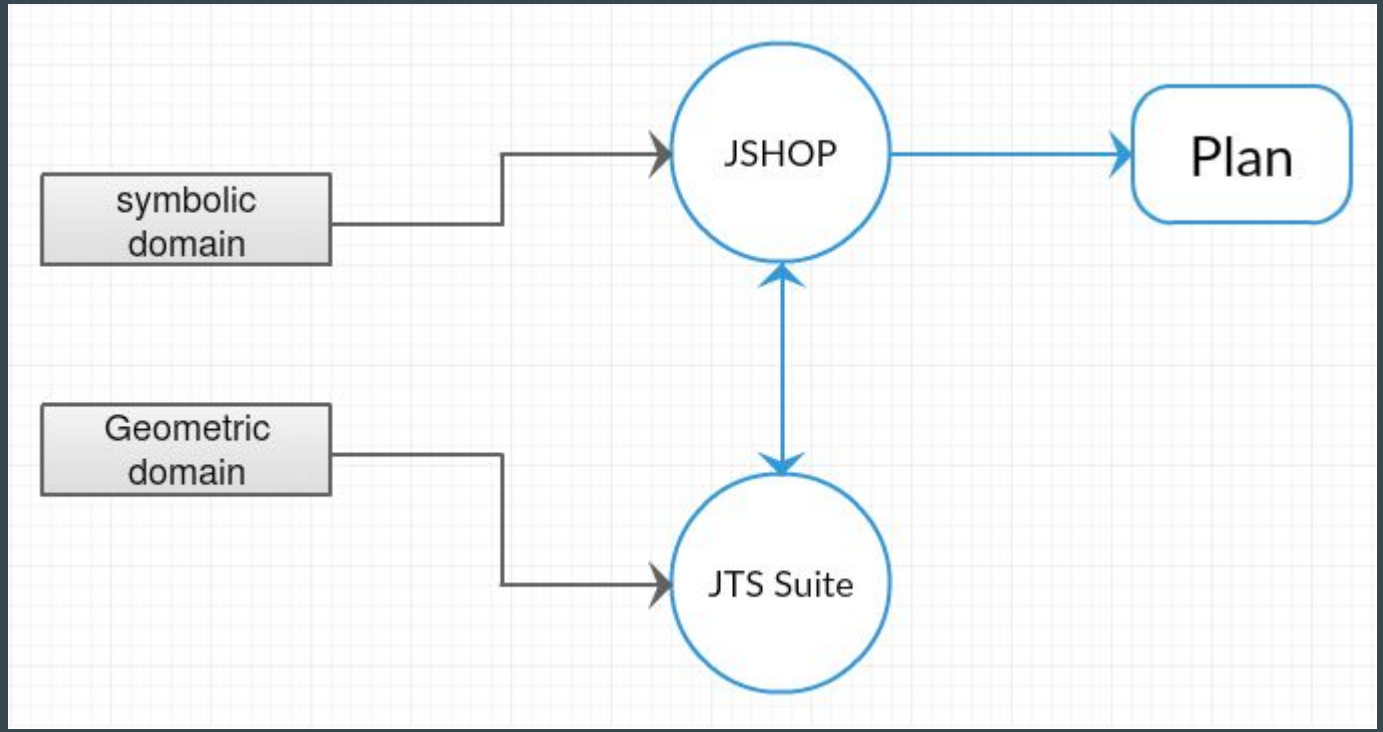
Technical Approach

JTS Topology Suite

- Geometric predicates
  - Intersect, Joints, Crosses, Within, Overlaps, Touches, Contains...
- Geometric operations
  - Union, Simplify, Distance, Intersection, Area, Difference



Technical Approach



Schedule

- Study of JTS suite - week 1
- Study of JSHOP external calls - weeks 2 and 3
- Develop the connection between the geometric suite and the HTN planner - weeks 3 and 4
- Describe the domain and evaluate the results - week 5
- Write the report and the presentation - week 6