Dynamic Control in Path-Planning with Real-Time Heuristic Search

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Problem Formulation
- Heuristic search for planning
  - ASP, HSP, FF, SHERPA, LDFS
- Real-time heuristic search
  - Constant time per move
- Real-time path-planning
  - 1-3 ms for all units in games

Dynamic LRTA*
- Dynamic selection at each step:
  - Look-a-head depth and sub-goal
- Pattern-database approach
  - Pre-compute for each state: intractable
  - Pre-compute for each abstract state
  - optimal action? No
  - depth and next goal? Yes

Decision-tree approach
- Use local search-space attributes to predict best look-a-head depth
  - heuristic estimates
  - n-step progress
  - error estimates

Pros of each approach
- Pattern-databases: optimal depths stored and sub-goals.
- Decision trees: use on unseen maps

Results
- Empirical Evaluation
  - 3 RTS maps × 100 problems each
  - Dynamic LRTA* vs. LRTA*

- Dynamic LRTA* vs. state-of-the-art

Conclusions
- State-of-the-art in real-time path-planning (both with and without abstractions).

Future work
- Integrate with PR-LRTS
- Applicability to general planning

Learning Real-time A* (LRTA*)
- Constant look-a-head depth
- Heuristic w.r.t. a fixed goal