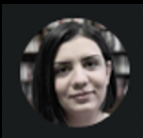


AI PLANNING: THEORY AND PRACTICE



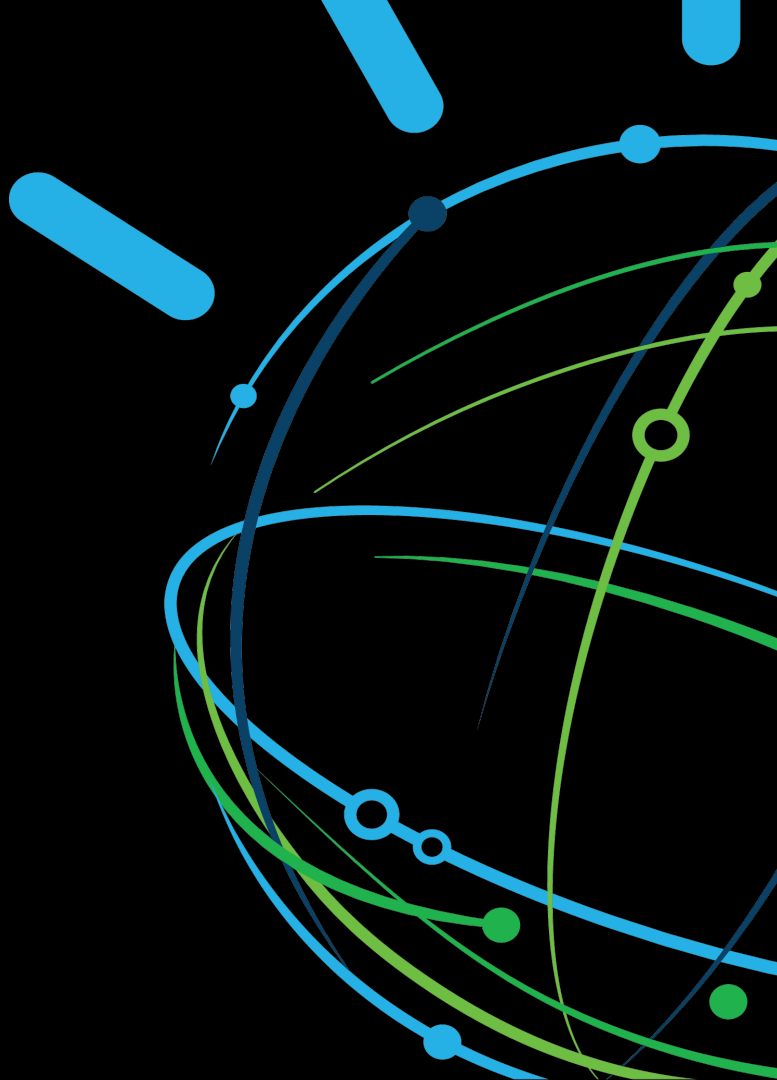
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What is AI Planning...

Task of finding a procedural course of action
for a declaratively described system
to reach its goals
while optimizing overall performance measures



Brief introduction to AI planning

Basic Planning Problem

Given descriptions of

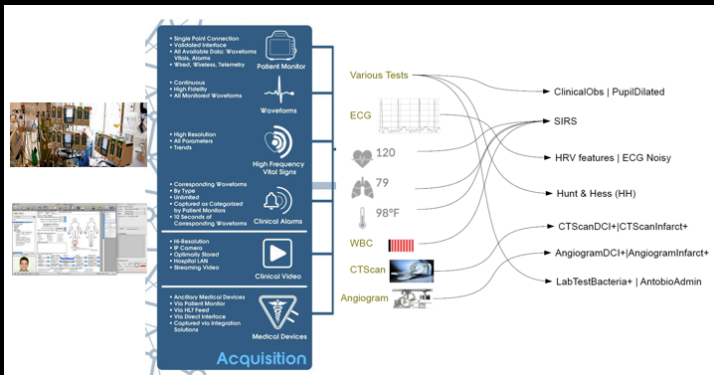
- possible initial states of the world
- desired goals
- a set of possible actions

Synthesize a plan that is guaranteed to generate a state which contains the desired goals.

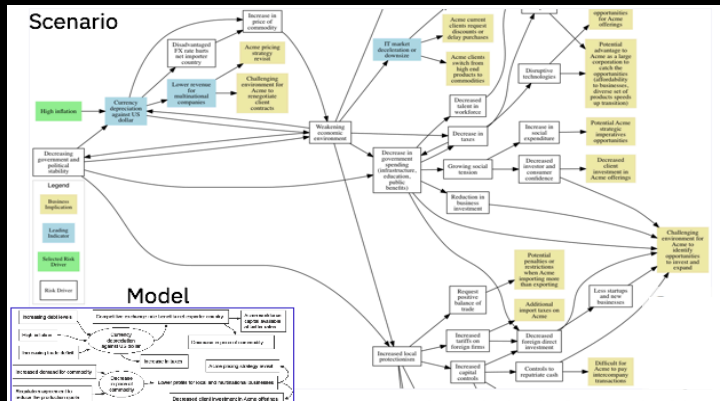
Brief introduction to AI planning



Motivation



[Automated large-scale data analysis, ICAPS 2015]



6 [Scenario planning for enterprise risk management, AAI 2018]

The screenshot shows the D3WA (Declarative Dialogue Design) interface. The top part is a 'Storyboarding area to specify foils' with a list of actions like 'Ready to record', 'Break past pass', 'Ok, brake past pass', and 'What's next?'. The bottom part is a 'Debugging area' showing a conversation log with actions and outcomes. A red box highlights a 'Gateway to minimal abstraction' error, and a blue box highlights a 'Diagnostics for failed execution' error. A yellow box at the bottom indicates an 'Unachievable subgoal or landmark' error.


[D3WA+: A Case Study of XAIP in a Model Acquisition Task, ICAPS 2020]



[Exploring Context-Free Languages via Planning: The Case for Automating Machine Learning, ICAPS 2020]

Scenario Planning Advisor

IBM Scenario Planning Advisor



The Scenario Planning Advisor (SPA) is a project developed by [IBM Research AI](#) and the office of IBM's Chief Risk Officer. SPA is a technology that automatically projects many different futures to provide insights for strategic decision making. To find out more about the technology and the research behind it, please [visit us here](#).

SPA is available for use on a trial basis by other organizations. [Get started now](#).

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Privacy notice

The IBM Scenario Planning Advisor service is used to derive insights from complex causal models between risk drivers. This service collects personal information you provide to sign up such as your name and email address. This information is used for two purposes only: (1) to allow you to login into the application and (2) show your name (if provided) or email address attached to artifacts you create such as scenarios and models; this is only displayed to your collaborators that you explicitly allowed to access models you created or that are members of models you explicitly requested to join. The name and email address you provide are securely stored on the IBM Cloud. You can immediately remove your name and email address from all artifacts associated with the IBM Scenario Planning Advisor by selecting the option *Delete My Data* from the *Manage my profile* menu. Your name may be retained by application logs for up to 90 days after your last login.

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Problem

Scenario Planning for risk mitigation is a mostly manual process

Only a few scenarios can be constructed manually and explored

High impact low likelihood events are overlooked

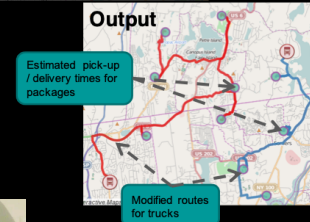
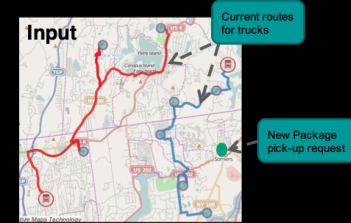
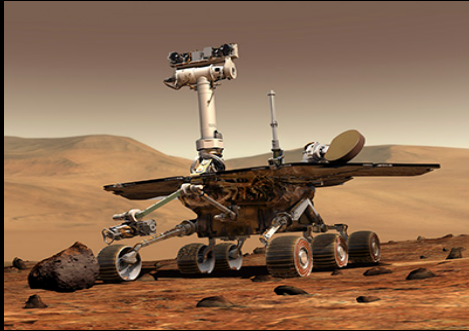
Benefits

- Reduction in time for building scenarios from months to hours
- Exploration of orders of magnitude more scenarios than possible if built manually

Solution

- Exploit NLU techniques to semi-automatically construct scenario planning models
- Automatically explore the space of possible scenarios with an AI Planner
- Choose scenarios of high relevance to a client at a particular time

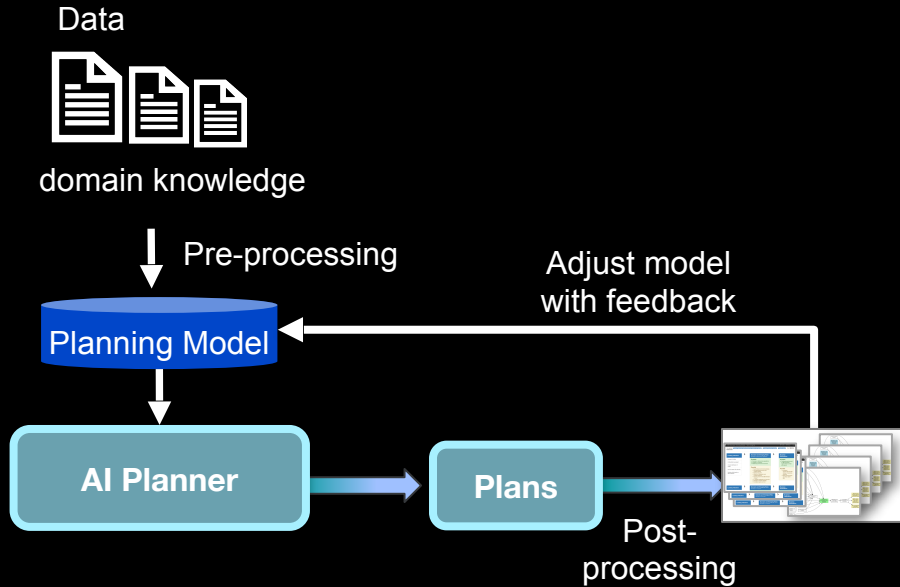
Why AI Planning is Important?



How to Spot a Planning Problem

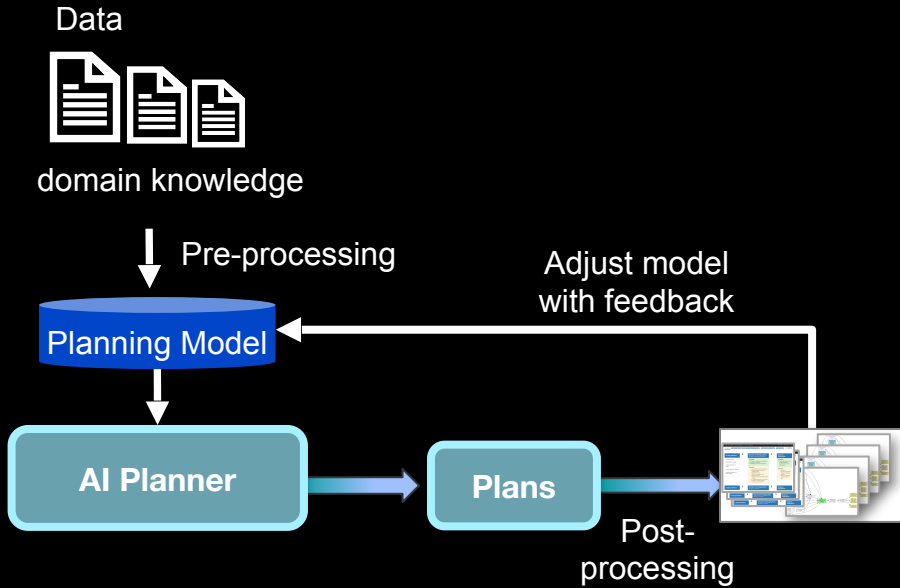
- 1) Your problem can be described in a declarative way
- 2) You have domain knowledge that should not be ignored
- 3) Pure learning techniques are difficult to use either because there is a structure of the problem that cannot be learned by training or that there is little to no available training data
- 4) You want to be able to explain a particular course of action the system took
- 5) You can leverage the existing relationship between a problem that is similar to yours to
AI Planning

AI Planning



1. Create an initial planning model for the problem domain of interest
2. Run an appropriate planner on the model to solve the model
3. Translate the solution for the model into a solution for the problem of interest and inspect the solution
4. Adjust the model, if needed and go to step 2

Plan



1. Theory 10:15 AM EST
2. Modeling 11:30 AM EST
3. Tools 1:00 PM EST