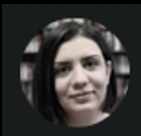


AI PLANNING: THEORY AND PRACTICE



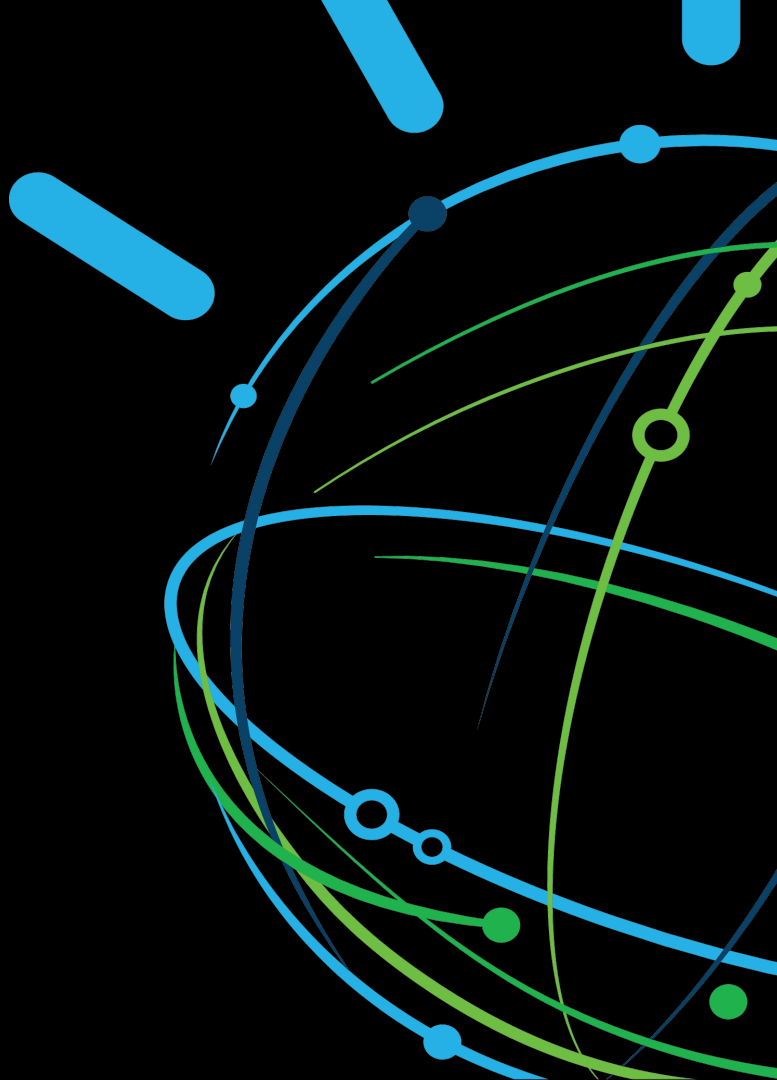
Shirin Sohrabi



Octavian Udrea



Michael Katz



Acknowledgements

Mark Feblowitz

Oktie Hassanzadeh

Kavitha Srinivas

Parikshit Ram

John Rofrano

Raju Pavuluri

Deepak Turaga

Anton Riabov

Daby Sow

Long Vu

Horst Samulowitz

Maja Vukovic

Jorge Baier

Patrick Ferber

Maayan Shvo

Sheila McIlraith

Silvan Sievers

Dominik Winterer

Alexander Tuisov

Ron Alford

Malte Helmert

Joerg Hoffmann

Anand Ranganathan

Tathagata Chakraborti

Kartik Talamadupula

Biplav Srivastava

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.

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](#).

Read our [terms and conditions](#) and the [3rd party licenses](#).

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.

Please read the [IBM privacy statement](#).

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

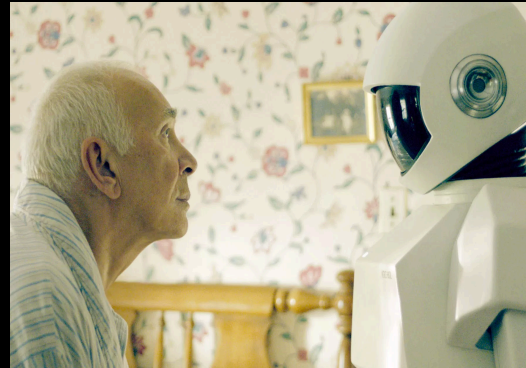
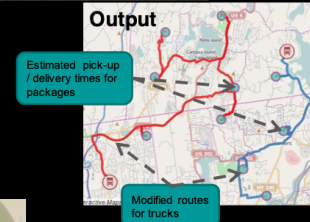
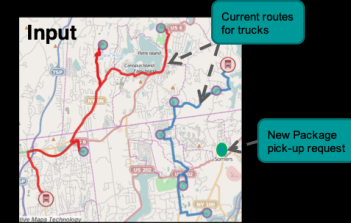
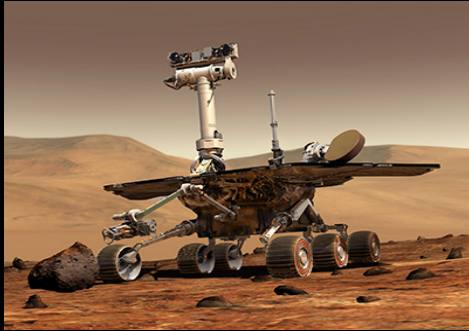
Benefits

- 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

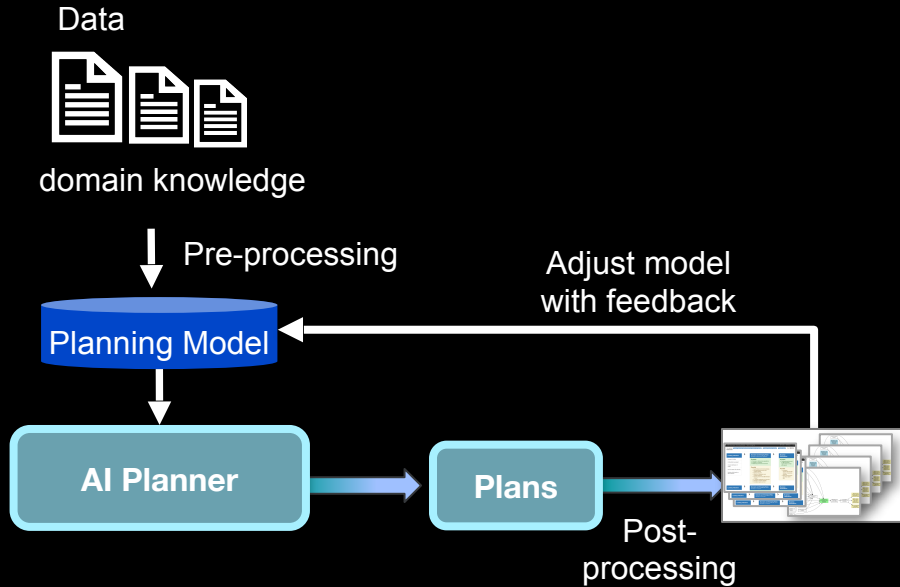
Why AI Planning is Important?



How to Spot a Planning Problem

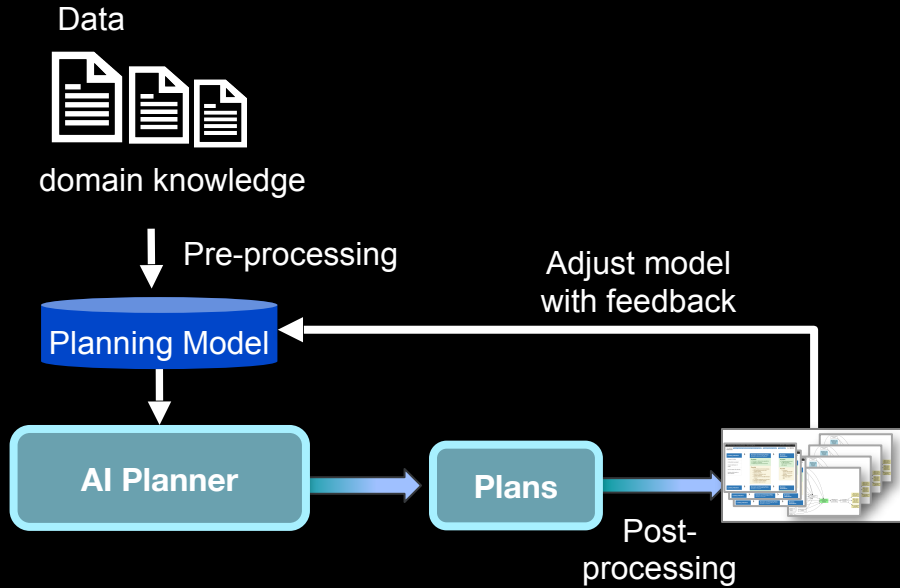
- 1) Your problem can be described in a declarative way
- 2) You have domain knowledge that should not be ignored
- 3) Pure learning techniques are difficult to use either because there is a structure of the problem that cannot be learned by training or that there is little to no available training data
- 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 11:45 AM EST
2. Modeling 1:30 PM EST
3. Practice 2:30 PM EST