Action tree construction

TreeStage

Manages **TreeWorkers**. When a goal condition is met, it freezes the workers for future use by other stages.

Implementations:

TreeStage_FixedGames
Builds until a certain number of games have been played.

TreeStage_MaxDepth
Builds until any branch reaches a specified depth.

TreeStage_MinDepth
Builds until all unfailed branches reach at least a specified depth.

TreeStage_SearchForever
Build forever. No termination condition.

WorkerFactory

Makes new **TreeWorker**s within the Pool system. Workers can be returned to the pool and reassigned to different **TreeStages**.

GameLoader

QWOP game implementation using the JBox2D library. Each instance runs on its own class loader so many copies can be used without collisions.Can send commands to the game, and receive state information back.

TreeWorker

TreeWorkers tell the game simulation what to do, the ask the **ISampler** goal nodes to reach, and report information to an **IDataSaver**. Many **TreeWorker** instances can operate on the same tree simulatneously

State

72-number runner state. 3-DOF for 12 links, plus velocities.Usually obtained from a **GameLoader.** The state is divided up into **StateVariable**s for each body (6 numbers each).

Node

Base unit of the tree. Each node represents a **State** and the **Action** it took to get from the parent node's state to this node's state.

Most users of Node keep track of the root node, and traverse the tree from there.

IDataSaver

Receives tree/game information on a per timestep, per game, and per stage basis. Not all of these are used by every **IDataSaver** implementation.

Implementations:

DataSaver_Dense
Full state and action information saved at every timestep...
DataSaver_DenseJava
... as serialized Java objects.
DataSaver_DenseTFRecord
... as binary Protobuf files in TFRecord form.

DataSaver_Null
A placeholder which does nothing.

DataSaver_Sparse
Saves per-run information, enough to re-create games, but not info at every timestep.

DataSaver_StageSelected
Saves only information sent by the tree stage upon its completion.

ISampler

Rules that each **TreeWorker** follows for traversing the existing game tree and adding nodes. It is split into *tree policy, expansion policy,* and *rollout policy.* Not every sampler uses all of these.

Implementations:

Sampler_Deterministic
Depth-first search with no random selection.

Sampler_Distribution
Sample purely according to the distribution rules in the **ActionSet** assigned to the nodes.

Sampler_FixedDepth
Sampler only makes workers build to a certain depth before instructing them to start over.

Sampler_Greedy
Singles out promising areas of the tree and only builds those. Similar to the old sampler from the early days.

Sampler_Random
All choices are random.

Sampler_UCB
Upper confidence bound for trees. Best overall sampler with adjustable weighting on exploration/exploitation.

Action

Keys and durations which take the runner from the **State** at the parent node to the state at thiss node.

ActionSet

Sets of actions and a **Distribution** on which to choose them.

Distribution

Rules for choosing from an **ActionSet**.

Implementations:

Distribution_Equal
Even chance of picking any **Action** from the set.

Distribution_Normal
Normal distribution set around some duration mean and standard deviation.

IActionGenerator

Picks "potential actions," which could be used from a node, These are **ActionSet**s. when it is created. These are used when expanding from a node, or determining if all options have been exhausted at a node.

Implementations:

ActionGenerator_FixedSequence
This can provide sets of actions which rotate with depth in the tree. There may be exceptions specified at whatever depths.

TFRecordWriter

Handles turning the Protobuf objects into binaries that TensorFlow will like.

SavableFileIO

Serializes and writes Java objects to file. Can also load and manipulate these files.

Graphical user interface

IUserInterface

All graphing, tree visualization, etc. managed here.

Implementations:

UI_Full
All plot panels, tree visualization, etc. TreePane is built in. Should break it out.

UI_Headless
Placeholder for when UI is not needed (e.g. running from command line).

TabbedPaneActivator

UI elements which can be turned on/off/updated.

MORE TODO

PanelTimeSeries

Scrolling time-series plots. Nice for real-time monitoring of search status, etc. Uses JFreeChart.

PanelTimeSeries_WorkerLoad
Monitors the productivity of **TreeWorker**s. Plots timesteps simulated per second.

PanelPlot

Scatterplot abstract class. Uses JFreeChart.

PanelPlot_Controls
Various plots of controls.

PanelPlot_SingleRun
States along a single run.

PanelPlot_States
Plots of states vs. any other.

PanelPlot_Transformed
Plotting states which have been transformed.

PanelRunner

Stick-figure runner posed to display states.

PanelRunner_SimpleState
Display the runner posed in a specific state, selected from a **Node**.

PanelRunner_Snapshot
Display the runner, and its past/future during a run sequence. Possibly all potential futures.

PanelRunner_Comparison
Find and display states similar to the selected one.

INodeFilter

Trims down a list of **Nodes** based on some criteria.

NodeFilter_Downsample
Evenly reduces the number of nodes. Good for when plotting 100k points is too slow.

NodeFilter_Identity
Placeholder which does not alter the list of nodes..

NodeFilter_MissingInfo
Filter out nodes which are missing state or action information.

NodeFilter_SurvivalHorizon
Keep only nodes which have at least a certain depth of nodes

ITransform

Transform states to a set of numbers and potentially back again. Mostly state reduction.

Transform_Autoencoder
TensorFlow-trained autoencoder.

Transform_Identity
Placeholder which does not alter the state.

Transform_PCA
Principal component analysis of a bunch of states, turned into a transform for others.

PanelRunner_Animated

Stick-figure runner animated. This base version can re-simulate from a sequence of actions in order to animate the runner.

PanelRunner_AnimatedFromStates
Animate from an existing set of states. Don't need to resimulate.

PanelRunner_AnimatedTransformed
Animate the runner based on states which have been compressed and then decompressed from an **ITransform**.