The Wumpus Environment

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This document discusses the actions and percepts provided by the Wumpus environment. The Wumpus environment is an EIS compatible environment [EIS] meaning that you can use it from all systems supporting EIS (e.g., [GOAL], [2APL]). The Wumpus environment can be in two modes: editing and run mode. These are discussed in the following sections. We also discuss the more technical issues related to using this environmentwith EIS.

For more details about the wumpus environment, please check out [Russell]. In short, your agent is in a 2-D gridlike dungeon, hoping to find the pile of gold that might be hidden there. Unfortunately there are pits and very likely there also is a monster called the Wumpus. Luckily the Wumpus is very lazy and never moves, and the pits spread cause some hefty air circulation, making it possible to navigate safely through the dungeon. The agent has also one arrow with which he may shoot the wumpus.

Editing, Loading, Saving Environments.

After you have started up the Wumpus environment, you end up in EDITING mode. In this mode you can load, edit, and save environments (Figure 1).
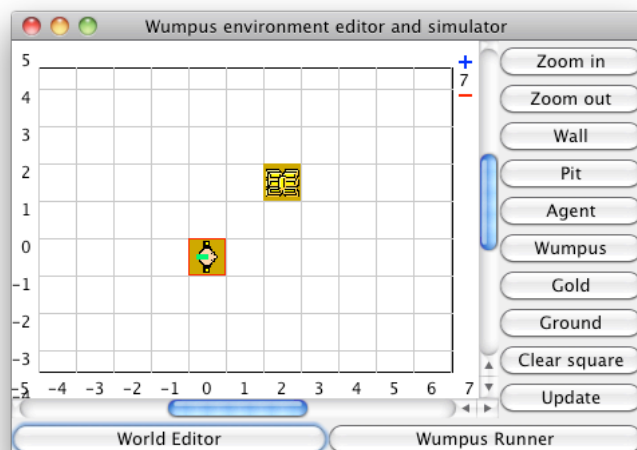

Figure 1. The Wumpus environment in Edit mode, just after loading.

Use the menu to choose between "Load World" and "Save World" and use the browser to locate a ".wld" file. Usually some worlds will be distributed with your download. Figure 2 shows the "wumpus.wld" file.
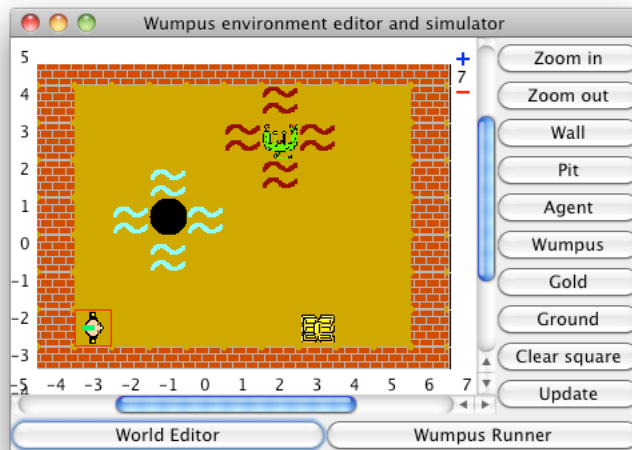
Figure 2. The "wumpus.wld".

You can edit your own worlds by selecting the object you want to place with the buttons on the right hand side (Wall, Pit, Agent, Wumpus, Gold, Ground, Clear square). Then you either click on the map to place the object, or you drag to fill an entire area on the map with this object.
Select the save menu to save your map.

Running

To switch to run mode, press "Wumpus Runner" (Figure 3). The environment will not accept actions when in edit mode. Switching to run mode can also be done using an environment command.
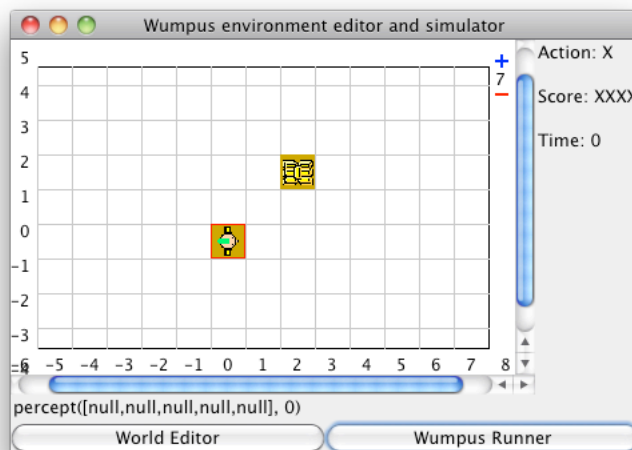

Figure 3. Press "Wumpus Runner" to switch to run mode.

Percepts

This section describes the percepts coming out of the Wumpus environment (using getAllPerceptsFromEntity(entity)). The "entity" parameter is actually ignored.
The plain percepts are EIS Identifiers. The time is an EIS Function with the time being an Integer Numeral.

Table 1 shows the available Percepts and their meaning.

Table 1. Available Percepts

percept	meaning
breeze	Breezes are perceived in the four grid points adjacent to a pit.
stench	Stench is perceived in the four grid points adjacent to the wumpus.
bump	A bump is perceived if a forward action is done while facing a wall.
scream	The scream is caused by a dying wumpus and the wumpus is dead after you perceived the scream.
glitter	Glitter is perceived when your agent is standing on top of the gold.
time(T)	T is time: 0,1,2,... Time is updated with every action.

Actions

This section describes the actions available through executeAction(). Actions are possible only when the environment is in Run mode. Every action will increase the time by 1 and will decrease the score by 1.
The following actions are available ():

Table 2. Available actions.

action	effect
forward	Agent steps forward. If the agent steps into the Wumpus or into a pit he will be killed instantly.
grab	lets the agent pick up the gold. Only works if he is standing on top of the gold.
shoot	lets the agent shoot his one and only arrow. He shoots straight forward up to the first wall, and will fly infinite distances if necessary (be careful, that might lock up the environment if there is no wall). If the wumpus is hit, it will be killed instantly, releasing a scream that will be heard everywhere in the cave. Shooting the arrow will cost the agent an additional 10 points and can be done only once.
climb	lets the agent climb out of the cave. Climb is possible only if the agent is at its initial position. If he collected the gold, he gains 1000 points and maybe he can now safely retire if he did not spend too much on the exploration of the cave. The agent may also climb out if he decided to not search further for the gold (he "wuzzes") limiting his exploration costs.
turn(left)	lets the agent make a 90° left turn.
turn(right)	lets the agent make a 90° right turn

Environment Management

The environment.isConnected() function will return false as long as the environment is in edit mode. You have to press "wumpus runner" to make the environment runnable. (Figure 3).
The following EnvironmentCommands are supported (Table 3):

Table 3. Available environment management actions

command	effect
START	Switches the environment to Run mode.
KILL	closes the environment
PAUSE	does not really do anything as there is no realtime clock in this environment
RESET	resets the environment
INIT	You can use the key "file" and as value a filename (within double quotes), e.g. `init [ file = "testje.wld" ]`. This will open the given file inside the directory where the environment is located and use that as the map.
	informs you the environment is PAUSEd

References

[2APL]   2APL. http://sourceforge.net/projects/apapl.

[EIS]   Environment Interface Standard. http://sourceforge.net/projects/apleis.

[GOAL]   The GOAL Agent Programming Language .
           http://mmi.tudelft.nl/~koen/goal.php.

[Russell] Russell, S., & Norvig, P. (2009). Artificial Intelligence: A Modern
           Approach, 3/E. Prentice Hall. ISBN: 0136042597