

CMSI 677 ARTIFICIAL INTELLIGENCE

Spring 2009

Assignment 1 Intro and Intelligent Agents

Assignment	Problems	Date Due
1a	Suppl. 1, 2, and 3 (below) R&N problems 1.4, 1.7 (we will assign subparts to various students in class), 1.9, 1.11, 1.12, 1.13	20 January 2009
1b	R&N problem 2.3 Agent-1 through Agent-5 (below) We will discuss the <i>Agent</i> problem in class, so I ask that you <i>not</i> this problem with your classmates before then.	
1c	Prepare to discuss in class: R&N 2.5, 2.6	

Suppl. 1. Visit the AI Topics website at www.aaai.org. Follow the link to "AI Topics website" on the left hand side of the AAAI home page. Answer the following questions:

- a. How is what we do in AI different from classical von Neumann algorithms?
- b. Who is Eric Horvitz? How does he view AI's current focus?
- c. What are some of the social and ethical concerns we face as computers are programmed to act more like people?
- d. What is natural language processing? How does it differ from natural language understanding?
- e. What do Elbot, Jabberwalky, Alice and Brian have in common?
- f. Describe two successful applications of artificial intelligence. Explain the way in which each is considered successful.

Suppl. 2. What is the Loebner Prize? How does it advance the state of the art in AI?

Suppl. 3. What is the Turing test? Why is it important?

Agent-1. Consider the following PEAS description of an agent that reports threat of tsunami activity:

Tsunami Activity Reporter¹	
Performance Measure:	Inform seismologists and coastal residents of the possibility and/or impending approach of a tsunami.
Environment:	Series of buoys (sea-level monitoring equipment) in the oceans of the world.
Actuators:	When readings match one of the recognized patterns of wave movement and related seismic activity has been detected, notify seismologists and residents of coastal areas which will most likely be affected by a possible significant event. Provide estimate of time it will take the tsunami to reach each potentially affected area, and estimate of wave height and intensity.
Sensors:	Continuous readings from sensors strategically placed throughout the world's oceans.

Determine what type of agent architecture is most appropriate (table lookup, simple reflex, goal-based, or utility-based). Give a detailed explanation and justification of your choice.

Agent-2. Describe the (internal) evaluation function that might be used by the Tsunami Activity Reporter. Is it a static or a dynamic evaluation function?

Agent-3. Assume that you designed a utility-based agent for the Tsunami Activity Reporter (whether or not the problem warrants it). Describe the utility function that it might use.

Agent-4. What (external) performance measures would you recommend for your Tsunami Activity Reporter?

Agent-5. Describe the properties of the environment of the Tsunami Activity Reporter in terms of the principal distinctions we can make (accessible vs. inaccessible, deterministic vs. nondeterministic, episodic vs. nonepisodic, static vs. dynamic vs. semidynamic, discrete vs. continuous). That is, identify in detail which properties are characteristic of the environment described, and give a justification for your description.

¹ Refer to attachment #1 for a more complete description.

Attachment #1. The Tsunami Warning System

An international effort to save lives and protect property

The following material is excerpted from [Tsunami! The Great Waves](#)

- [Overview of the Tsunami Warning System](#)
 - [Tsunami Warning Centers](#)
 - [Tsunami Watch and Warning Determination](#)
 - [Tsunami Warning Dissemination](#)
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Overview of the Tsunami Warning System

The Tsunami Warning System (TWS) in the Pacific, comprised of 26 participating international [Member States](#), has the functions of monitoring seismological and tidal stations throughout the Pacific Basin to evaluate potentially tsunamigenic earthquakes and disseminating tsunami warning information. The Pacific Tsunami Warning Center (PTWC) is the operational center of the Pacific TWS. Located near Honolulu, Hawaii, PTWC provides tsunami warning information to national authorities in the Pacific Basin.

Tsunami Warning Centers

As part of an international cooperative effort to save lives and protect property, the [National Oceanic and Atmospheric Administration's](#) (NOAA) [National Weather Service](#) operates two tsunami warning centers. The Alaska Tsunami Warning Center ([ATWC](#)) in Palmer, Alaska, serves as the regional Tsunami Warning Center for Alaska, British Columbia, Washington, Oregon, and California.

The Pacific Tsunami Warning Center in Ewa Beach, Hawaii, serves as the regional Tsunami Warning Center for Hawaii and as a national/international warning center for tsunamis that pose a Pacific-wide threat. This international warning effort became a formal arrangement in 1965 when PTWC assumed the international warning responsibilities of the Pacific Tsunami Warning System (PTWS). The PTWS is composed of 26 international [Member States](#) that are organized as the International Coordination Group for the Tsunami Warning System in the Pacific.

Tsunami Watch and Warning Determination

The objective of the PTWS is to detect, locate, and determine the magnitude of potentially tsunamigenic earthquakes occurring in the Pacific Basin or its immediate margins. Earthquake information is provided by seismic stations operated by PTWC, ATWC, the U.S. Geological Survey's [National Earthquake Information Center](#) and international sources. If the location and magnitude of an earthquake meet the known criteria for generation of a tsunami, a tsunami warning is issued to warn of an imminent tsunami hazard. The warning includes predicted tsunami arrival times at selected coastal communities within the geographic area defined by the maximum distance the tsunami could travel in a few hours. A tsunami watch with additional predicted tsunami arrival times is issued for a geographic area defined by the distance the tsunami could travel in a subsequent time period.

If a significant tsunami is detected by sea-level monitoring instrumentation, the tsunami warning is extended to the entire Pacific Basin. Sea-level (or tidal) information is provided by NOAA's [National Ocean Service](#), PTWC, ATWC, university monitoring networks and other participating nations of the PTWS. The [International Tsunami Information Center](#), part of the Intergovernmental Oceanographic Commission, monitors and evaluates the performance and effectiveness of the Pacific Tsunami Warning System. This effort encourages the most effective data collection, data analysis, tsunami impact assessment and warning dissemination to all TWS participants.

Tsunami Warning Dissemination

Tsunami watch, warning, and information bulletins are disseminated to appropriate emergency officials and the general public by a variety of communication methods.

- Tsunami watch, warning and information bulletins issued by PTWC and [ATWC](#) are disseminated to local, state, national and international users as well as the media. These users, in turn, disseminate the tsunami information to the public, generally over commercial radio and television channels.
- The NOAA Weather Radio System, based on a large number of VHF transmitter sites, provides direct broadcast of tsunami information to the public.
- The [US Coast Guard](#) also broadcasts urgent marine warnings and related tsunami information to coastal users equipped with medium frequency (MF) and very high frequency (VHF) marine radios.
- Local authorities and emergency managers are responsible for formulating and executing evacuation plans for areas under a tsunami warning. The public should stay-tuned to the local media for evacuation orders should a tsunami warning be issued. And, **the public should NOT RETURN to low-lying areas until the tsunami threat has passed** and the "all clear" is announced by the local authorities.

<http://www.geophys.washington.edu/tsunami/general/warning/warning.html> 16 FEB 2005

