Homework 5 (Psych186B, Winter 2012)
Federation Intelligence Exercise (30 points)

Posted on Feb 4, Due 1159pm, Feb 20, 2012

As intelligence officer on the *Enterprise* it is your job to incorporate the latest intelligence information into the shipboard neurocomputer. Assume that a sudden ionic storm off Delta Scuti, where the *Enterprise* has been patrolling, has destroyed the main neurocomputer.

All that is left that can be used for intelligence estimates is the archaic Dell PC in the ship's museum plus some antique early 21st century neurocomputing software apparently written for class assignments at Brown University, an institution coated with Ivory that later became a module in the East Coast Advanced Information Content Provision Complex. This material had been inadvertently left on the disk drive when the PC was decommissioned in 2006.

It is essential that you be able to tentatively identify ships based on sensor scans so that the Enterprise will be able to take appropriate action when another ship approaches.

Though recent political changes in the **Klingon** Empire make Klingons less of an immediate danger than in the past it is still necessary to be wary, because of the presence of Klingon extremist factions that may attack Federation ships without warning. Detection of a Klingon ship in the current political climate, therefore, requires the Enterprise to ready the photon torpedos and the phasors in the expectation of hostile actions.

Romulans are tricky to deal with. They are touchy, deceitful and arrogant. Their presence requires that the Enterprise enter a state of heightened alertness but not engage in active preparations for hostility.

Federation starships are, of course, friendly.

Antareans are usually friendly, but if they detect that the Enterprise has entered a warlike mode, for example by arming the photon torpedoes, an act that can be detected by their sensors, they take this as a grievous insult, a reflection on their honor, and will immediately commence hostilities.

It is unlikely that a previously identified ship will be encountered. However, some accurate information about a small number of ships escaped the ion storm.

Your job is to train the old neurocomputer program (or a modern system, if you own it) so it can make the correct decision most of the time when a new ship is sighted. You probably could use simpler pattern recognition techniques for this problem, but Capt. Picard and Science Officer Data insist that you use the neurocomputer so they can compare it with the analysis provided by the main computer on the *Enterprise*.

It need hardly be mentioned that an incoming ship, particularly when far away, may be generating noisy sensor readings that sometimes give misleading or

partial information. You should be able to take this partial, noisy information and (in descending order of importance) tell:

(1) Whether the incoming ship is liable to be hostile or peaceful.
(2) Whether the Enterprise should enter a state of heightened alertness.
(3) The tentative identification of the ship's system of origin.

In summary, there are four systems represented Klingon, Romulan, Antarean, and Federation. The Enterprise has to be prepared to take appropriate action when the system of origin is identified. Klingons are to be treated as hostile. Romulans require Alert status. Antareans and the Federation must be considered friendly.

Data from previous encounters provides enough information to characterize new ships, even in corrupted form.

Archival Intelligence Data Table

Name	Planet of origin	Warp Drive Vibration Index (Murds)	Hailing Transponder Freq. (gigaHz)	Surface Reflect. (color)	Ratio of long to short axis	Req. action
Grotz	Klingon	6.9	1006.4	Black	3.5	Hostile
Tlarr	Klingon	7.0	994.3	Black	2.3	Hostile
Tribok	Klingon	7.3	978.1	Dark Gray	2.8	Hostile
Brogut	Klingon	7.1	1005.4	Dark Gray	3.0	Hostile
Glorek	Klingon	7.1	1001.8	Light Gray	1.0	Hostile
Lorif	Romulan	7.3	980.4	Dark Blue	1.6	Alert
Rallev	Romulan	7.4	977.2	Dark Green	1.8	Alert
Willosh	Romulan	7.3	947.9	Light Gray	1.9	Alert
Loshar	Romulan	7.2	955.8	Light Blue	2.1	Alert
Sarash	Romulan	7.4	960.7	Light Gray	2.3	Alert
A2231	Antarean	6.7	1010.9	Pink	1.2	Friendly
E7763	Antarean	6.8	1033.2	Orange	1.2	Friendly
E9091	Antarean	6.5	1025.4	Light Blue	1.1	Friendly
A0199	Antarean	6.8	1066.2	Yellow	1.3	Friendly
A1091	Antarean	6.7	1015.0	Light Blue	1.0	Friendly
Daisy	Federation	6.7	1050.0	White	1.9	Friendly
Rosehip	Federation	6.8	1055.0	Light Gray	2.0	Friendly
Gardenia	Federation	6.5	1045.0	White	2.1	Friendly
Herb	Federation	6.4	1065.0	Light Gray	2.6	Friendly
Cinnamon	Federation	6.5	1055.0	Light Gray	1.7	Friendly

We are assured by Starfleet Command that this is a fair and representative set of ships. We can use them to faithfully represent the navies of their planets of origin. Note though, that the *Glorek* is atypical in some respects. For one thing, it is nearly spherical, much more typical of the peaceful Antareans, who like round or nearly round ships because they remind them of the Original Egg, progenitor of the Antarean species, laid in the primeval mud of Antares by the ovipositor of the Goddess. In fact the *Glorek* actually is a captured Antarean ship, the *E3120*. The *E3120* was captured by the Klingons during the Xenoclone wars, repainted, refitted with a Klingon warp drive, and renamed the *Glorek*, after one of the legendary battle chieftains of Klingon prehistory. Re-use of the spoils of war is common in the Klingon space force since it displays an appealing combination of dominance and fiscal economy.

The testing set provided for the exercise consists of 20 sets of partial information, which the main Enterprise computer has provided for you, to correspond to the kind of noisy data that would be seen in reality.

Your job is to determine:

1. Whether the incoming ship is liable to be hostile or peaceful.
2. Whether the Enterprise should enter a state of heightened alertness.
3. The tentative identification of the ship's system of origin.

Sometimes only a few letters of the name of the ship can be retrieved from the automatic transponder, or the hailing transmitter is not readable, or the color of the ship or its shape can be only crudely discerned.

The main computer would like to observe that use of the regularities in the data from the 20 known ships lead to correct identification of response and planet of origin of all 20 ships the first time the programs were run. However, it is possible that as few as 18 completely correct answers might be obtained with a good coding and proper programming because of the statistical nature of the samples.

Naturally, the intelligence officer will provide the output data from the programs to the exercise adjudicators and write a report in proper Federation format.

Intelligence Table: Noisy Data for Classification

Name	Planet of origin	Warp Drive Vibration Index (Murds)	Hailing Transponder Freq. (gigaHz)	Surface Reflect. (color)	Ratio of long to short axis	Req. Action
_____	?	7.3	_____	Light Gray	2.1	?
_____	?	6.6	1065.0	White	2.1	?
Lil___	?	6.7	1045.0	White	___	?
_____	?	___	1065.0	Light Color	___	?
Pl__ik	?	7.0	1006.3	Dark Color	___	?
_____	?	7.3	951.4	Green	1.9	?
Krotork	?	7.0	1001.8	Light Gray	1.0	?
Woshif	?	___	971.7	Blue	1.7	?
Kritop	?	7.2	_____	Dark Gray	2.9	?
C06__	?	6.7	_____	Orange	___	?
_____	?	___	_____	Black	2.6	?
G__rk	?	6.9	>1000	Black or Dk Blue	3.2	?
_9e__	?	6.6	_____	Light Blue	1.2	?
_6___	?	6.6	_____	Orange	___	?
Rash__	?	___	955.8	Light Blue	___	?
Sor___	?	7.4	<1000	_____	___	?
A____	?	6.8	1013.3	Light Color	1.0	?
E4511	?	___	_____	_____	___	?
_____	?	___	>1000	Light Color	1.7	?
Mor___	?	6.4	1055.0	_____	___	?

Intelligence Table: Noisy Data for Classification

Name	Planet of origin	Warp Drive Vibration Index (Murds)	Hailing Transponder Freq. (gigaHz)	Surface Reflect. (color)	Ratio of long to short axis	Req. Action
R _____	?	7.3	_____	Light Gray	2.1	?
F _____	?	6.6	1065.0	White	2.1	?
F Lil___	?	6.7	1045.0	White	___	?
F _____	?	___	1065.0	Light Color	___	?
K Pl__ik	?	7.0	1006.3	Dark Color	___	?
R _____	?	7.3	951.4	Green	1.9	?
K Krotork	?	7.0	1001.8	Light Gray	1.0	?
R Woshif	?	___	971.7	Blue	1.7	?
K Kritop	?	7.2	_____	Dark Gray	2.9	?
A C06__	?	6.7	_____	Orange	___	?
K _____	?	___	_____	Black	2.6	?
K G__rk	?	6.9	>1000	Black or Dk Blue	3.2	?
A _9e__	?	6.6	_____	Light Blue	1.2	?
A _6___	?	6.6	_____	Orange	___	?
R Rash__	?	___	955.8	Light Blue	___	?
R Sor___	?	7.4	<1000	_____	___	?
A A____	?	6.8	1013.3	Light Color	1.0	?
A E4511	?	___	_____	_____	___	?
F _____	?	___	>1000	Light Color	1.7	?
F Mor___	?	6.4	1055.0	_____	___	?