**CS 438– Introduction to Artificial Intelligence**

**System Design Project**

##### Introduction

In this project, you will work in groups of two or three to design and implement a *fully functional* computer system that accomplish one of the tasks list below. Three person team are recommended due to the number of people in the class. Your project will also involve a **written report** ~~and possibly a short (~10 minute)~~ **~~class presentation~~****~~and demo~~**~~.~~

**Possible Tasks**

1. GUI Game Interface

You will create a GUI interface for a two-person board game similar to Reversi game – it could be any board game except connect 4. The interface should be similar to that of ReversiInterface.exe both in term of GUI design and functionality. Specifically, your game interface should have the following functionalities:

* Support game playing between two parties, either one or both could be a computer program. In other words, the interface will have mechanisms to get a move either from a human player (via clicking) or from computer program (via input file, function call, etc).
* Update board after each move and recognize and signal illegal move.
* Allow the user to set different time limit.
* Provide some kind basic debugging mechanism (ex., provide a console window for the user to view I/O).

1. Prototype Expert System

You will create a prototype **expert system** (in the domain of your choice) using the expert system shell **of your choice. Possibilities include** [Exsys system by Corvid](http://www.exsys.com/exsyscorvid.html) **(not the virus), which has 30 free version with limited node count, and TMYCIN, which is a free shell written in lisp. Other shell are also OK as long as it fits your budget.**

**Domain Choice -** Optimally, there should be some **``depth''** to the domain you choose for this project; that is, some chains of reasoning should be necessary to solve the problem you have chosen. This means that you should focus tightly on a particular problem in depth, instead of a broad but simple solution to a large problem -- for example, diagnosing a particular type of car trouble (instead of car trouble in general), or raising a particular type of flower (instead of flowers in general). It should also be primarily a **heuristic** domain, for which no simple formulaic rules exist. It should probably also be one for which you have an easily **accessible source** (preferably human) for your expertise. Pick a topic that you have an interest in or have some knowledge about. Examples of past project include *troubleshooting of cars*, *dog selection, determination of snake bites*, and *ER support caring for pulse less patients*.

Size of system - As a small prototype expert system, your system should contain at least 25 rules covering a number of cases and sub-cases. Be sure to focus on a specific problem, rather than a very general one. The following is my very rough estimation of time required for each stage of the project:

1. Genetic Algorithm or Neural Network

You will create a system to solve a non-trial problem of your choice using genetic algorithm or neural network. Details to follow.

##### Class Presentation

Each group may be asked to make a 10-15 minute presentation and demonstration of your project sometime during the last weeks of class. There will also be a very short (3 minute) Q and A after the demo. Your demonstration should include the following:

* Introduce the problem domain, game, puzzle, etc.
* Explain your approach and your sources of information.
* Discuss key component your system, examples include:
  + Rules, AND/OR graph for expert system
  + Fitness function, encoding method for GA system
  + Graphic design for Interface System
* Demonstrate your system.
* Discussion – retrospective thoughts, any future work
* Be prepared to answer questions from the class about your system.

## Project Report

Your report should follow the same basic form as your demonstration, briefly introducing the **Problem** and explaining your **approach**. It should describe the sources and/or resources that you acquired your knowledge from (these should also be listed as references in the bibliography). Describe and discuss key component of your system.

You report should also include a Discussion/Future Work section that describes any problems that you encountered and observations that you made in this process. Be sure that you mention anything that is ``extra'' or ``interesting'' about the system you have created (particularly if you think it might get you extra credit!). Also feel free to include copies of any interesting ``reference material'' you used, including summaries of interviews or relevant sections of books or manuals. This report should cover the material listed above and 4 or more pages long (excluding figures and reference materials) using standard format (12 pt font, Times New Roman, single spacing, etc.)

## Tentative Schedule

1. **March 24:** Complete your team organization
2. **March 26:** Register your application and domain.
3. **April 31 and May 2**: Project demo – each group will sign up for a 15-20 minute slot for project demo in my office **via zoom** on those two days.
4. **May 7**: Turn in your **written report by 10:00 PM.** Zip all of your files (program, report, etc.) to one file and place it in the web drop box on Moodle.

## Project Grade

System functionality – 70%

Report/demo – 30%