CS/ISAT 344 Intelligent Systems
Term Project Assignment

Objectives

1. Develop skills for building an intelligent systems application
2. Learn about one intelligent systems technology in detail
3. Practice writing technical reports

Specifications

The goal of this project is to design and build a machine learning system that will solve a practical problem, using real world data. You will select an application area and a dataset to work with, then choose an appropriate machine learning technology, and build an intelligent system using that technology.

You may use any of the machine learning technologies that we have studied:

- Decision tree induction (ID3) (to build a rule-based expert system)
- Simple linear regression
- Artificial neural network
- K-means clustering (to build a classifier)

This project may be done in teams of two students, or individually. The deliverables are the same in either case.

The application should involve some form of decision making, prediction, pattern recognition, or classification. Any application realm is acceptable, provided the application is of practical use to people, and that adequate training data are available.

Building the application will entail the following:

1. Find a suitable data set. To support learning you must find a real-world data set containing at least 150 cases. There are various academic and commercial websites that provide machine learning data.
2. Prepare the data by cleaning it of any outliers, and then normalizing all inputs and outputs. Set aside a portion of the data (10-20%) for testing.
3. Apply the machine learning technique using the training data (not the test data) and document your results clearly.
4. Test the results using the test data. Document the test results.

The project will include three deliverables:

1. Proposal (25%): ~ two pages (single spaced)
   The proposal should include the following components:
   - Introduction: Describe the purpose of the application, the practical value, the likely users, the problem it will solve. Write thorough and clear descriptions.
   - The data: Describe the form and content of the data and provide a specific reference to the web site or document where it can be viewed. Include a small sample of the data.
   - The process: Describe your project process in detail, in particular the steps that you will go through to obtain the data, clean it, apply the machine learning algorithm, and test the application. Describe the tools that you will use at each step. The descriptions must be detailed enough so that another person could read them and complete your project, Leave no questions unanswered.

2. Report (50%): 4-6 pages (single-spaced)
   - Executive summary: Write a one-page (exactly!) summary of the entire project. Include every aspect, with as much detail that can be fit into one page. Use one complete page, but no more!
   - Process recap: Summarize the process that you went through to develop the application.
   - Results: Show the final results of your development (decision tree, ann model, etc.) and explain it clearly. Provide all relevant model parameters.
   - Testing results: Explain your testing process and show the results of testing, including the mean squared error of applying the test cases.
   - Project summary: How good were the overall results? What was the total effort required? What problems did you encounter; how did you solve them? What lessons were learned for future projects? Explain thoroughly and clearly.

3. Presentation (25%)
    - You'll have 5-10 minutes to present your work to the entire class. Include everything that was in the final report, condensed to fit the available time.

      (If you're using PowerPoint, try not to present lots of text and bulleted lists, and do not read from the slides. Build your presentation around a few graphics instead, and explain them to the audience. Demonstrate the practical value of your application.)

When writing a technical report, it is important to keep in mind your intended reader. The reports should be written for someone who understands what you are doing in general, but does not share your level of technical expertise. Your report must provide adequate context and background information for managers to make decisions about the project and about your performance. Place yourself in the position of someone who is not participating in your project and make sure that the report contains enough information for that person to completely understand it. Reports should be written in third-person voice, using a purely technical style.

Submission:
Reports should be submitted in PDF via Canvas. Each report should have a cover page including the project title, class number, date, and the names of all team members.

Presentations will be given in class during finals week. All project team members are required to be present for the entire period.