CSE 352 Artificial Intelligence
Fall 2016
Professor Anita Wasilewska
http://www.cs.sunysb.edu/~cse352

Meets  Monday, Wednesday  2:30 - 3:50pm

Place  JAVITS 111

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Office Hours  Monday, Wednesday  12:30 pm - 2:00 pm and by appointment.

Textbook
This is a short condensed book (not expensive!) and not very technical
We will cover in detail first 3 chapters (plus my lecture notes for technical details) and chapter 7.
It is your responsibility to read all of the book and refer to its proper chapters in your presentations.

Lecture Notes  posted on the course webpage EXTEND the material from the book providing TECHNI-CAL details and are the major source for the course.

Additional Textbook
DATA MINING - Concepts and Techniques
Jiawei Han and Michelle Kamber, Morgan, Kauffman Publishers, 2006, 2010, 2013

Here is the author webpage:  www.cs.uiuc.edu/~hanj

You can download text and slides for CHAPTER 6: Classification and Prediction at
http://web.engr.illinois.edu/~hanj/bk2/slidesindex.htm

Our Lecture Notes cover almost all of this chapter.

Class attendance is the most important, as the Lecture Notes serve as an extra textbook for the course and students presentations are integral and as important part of the course design as Professor’s lecture.

I will check class attendance by giving and collecting answers (almost each class) to small questions connected with the lecture; you will get 1-2 extra credit points for your answers.

Grading
During the semester you have to complete the following.

Homeworks - 4 assignments each 20pts - total 80pts
You work on and submit Homeworks as the same Team as you formed for the Research Presentations
Midterm/Final test (100pts) covering material covered in class, homeworks and taken from reading assignments; it is given in class

Research Presentation (60pts); - see Presentation description

Presentations Evaluation Reports (20pts);

Project (see project description) and project presentation (40pts);
You work on and present the Project as the same Team as you formed for the Research Presentations

Extra Credit work; I will give during the class small questions for extra credit and assign some extra credit work. You can earn up to 20 extra points during the semester.

None of the grades will be curved.

Final grade computation During the semester you can earn 300pts plus extra credit.
The grade will be determined in the following way: # of earned points divided by 3 = % grade.
The % grade is translated into a letter grade in a standard way i.e.
100 – 94 % is A,
93 – 90 is A–,
89 – 86% is B+,
85 – 83 % is B,
82 – 80 % is B–,
79 – 76 % is C+,
75 – 73 % is C,
72 – 70 % is C–,
69 – 60 % is D range and F is below 60%.

Homeworks and Test Schedule
This is a preliminary tentative schedule dates may change- I will post changes on the course webpage

Homework 1 due Wednesday, September 21
Homework 2 due Wednesday, October 26
Homework 3 due Wednesday, November 16

Thanksgiving Break: November 23-27

Homework 4 due Wednesday, December 5

PROJECT DATA = Project Homework - 10 extra points due Monday, November 28

MIDTERM/FINAL will be given in class on Monday, November 21

PRESENTATIONS SCHEDULE

Presentation Proposal is due via e-mail Monday SEPTEMBER 21
Send it to TA and Professor
You can discuss it with Professor earlier before you submit the final version.
It must contain a TITLE and a one short paragraph long description.
You can change your subject later - but I need your preliminary proposal of the subject by September 21.

RESERVE the presentation DATE as soon as you get your Team Number - by e-mailing TA your Team Number and presentation date. We schedule 3 presentations per P-DAY.

**DAY 1**  Monday, October 3
**DAY 2**  Monday, October 10
**DAY 3**  Monday, October 24
**DAY 4**  Monday, October 31
**DAY 5**  Monday, November 7
**DAY 6**  Monday, November 14
**DAY 7**  Monday, December

**MIDTERM/FINAL**  Monday, November 21

**Thanksgiving Break**  November 23-27

**PROJECT PRESENTATION**  December 5

**RESEARCH PRESENTATION DESCRIPTION**

Presentations Teams

Each student has to deliver a 20 minutes long presentation on a chosen topic of AI as a member of a chosen Presentation Team of three or four students.

It is students responsibility to form the Presentation Teams.

You use the same Team for your Research Project.

Each team has to have a designated Team Leader in order to communicate with Professor and course TA.

Please e-mail TA as soon as possible, and the latest by September 21 the following:

1. list names and e-mails of your Team members denoting who is the Team Leader.

2. TITLE and a one short paragraph long description of your team presentation. This is a PRELIMINARY proposal and can be changed later.

TA will assign a Team Number to each team and e-mail it to each TEAM LEADER to be used for future correspondence.

You have to use your Team Number when reserving the presentation date.

You use the same Team for your Research Project.

Students are free to choose their own subjects.
It can be a presentation of a software involving AI techniques, of a product that uses an AI techniques, of a research paper, or an overview of an AI subject not covered in the class.

It also can be a AI related science fiction book or a movie that are using AI themes and techniques.

**Search** the WEB, look in for the papers, books- anything goes!

It has to be YOUR own vision of what you think is interesting in or about AI TODAY!

**Bring what you find interesting and share with us**

Students presentations are a VERY IMPORTANT part of the whole course design. You will bring us up date with AI technology, research, implementations, and trends!

**GENERAL PRINCIPLES OF THE PRESENTATIONS**

**First slide** must contain: the title (subject) of your presentation, your GROUP NUMBER, Team members names, student ID, professor name, course number and the title.

**Second slide** must contain ALL sources you used for the your presentation. The course book, or lecture notes is included. In the case of the book the reference you have to put are title of the chapter, sections and pages numbers.

**Third slide** is an OVERVIEW of your presentation.

**Remember** to include a source of any picture, of slides copied from a source or any DIRECT citation on the bottom of each of your slides where it appears. REFERENCES are very important. You must be clear about the distinction between the information from a source and your own statements.

A **hard copy** in slide spread format of the presentation slides is to be delivered the Professor **before the presentation** starts. I need to keep it for the records.

**Presentation slides** have to be e-mailed to the Professor and TA before the presentation.

You can also e-mail a working copy of you want to have Professor’s feed back before you deliver a final version.

You **receive** 0-10pts for the organization of your presentation.

**It is a presenter** responsibility to STRUCTURE the presentation to fit the time framework.

**Remember** to leave some time for students (and professor) questions and discussion.

**Practice** and time your presentation before you present it in the class.

The **FINAL Power Point** file of the presentation has to be send to the Professor, within 3 days of the presentation in case when some improvements are needed after the class presentation.

**Chosen Presentations** will be available on the web for other students to learn the material.

**Students must** attend the presentations to learn the material, but by having access to already delivered (and if needed, improved) presentations they will be able to to comprehend better the material and improve their own presentation skills.

**PROJECT PRESENTATION DESCRIPTION**
You work on the Project in the same Team as you formed for the Research Presentations.

Each Team will have to deliver a formal, power point presentation of the project. This is a short 5 minutes presentation. The organization of the presentation and submitted materials are the same as in the case of research presentation.

**PROJECT PRESENTATIONS**  
December 5

**PROJECT DESCRIPTION**

You work on the Project in the same Teams as you formed for the Research Presentations.

**BAKARY DATA** - posted on the course web page.

This is a classification data with TYPE DE ROCHE (Rock Type) as a CLASS attribute. There are 98 records with 48 attributes and 6 classes.

**Classes are:**

- **C1**: R. Carbonatees AND R. Carbonatees impures
- **C2**: Pyrate
- **C3**: Charcopyrite
- **C4**: Galene
- **C5**: Spahlerite
- **C6**: Sediments terrigenes

**Most important attributes** (as determined by the expert) are: S, Zn, Pb, Cu, CaO+MgO, CaO, MgO, Fe2O3

This is a real life experimental data and it contains a lot of missing data (no value).

**THE PROJECT GOAL** is to use an Internet based CLASSIFICATION TOOL (choose one you like) to build a descriptive classifier that generates a sets of DISCRIMINANT RULES describing the content of the data.

You can search the web for the tools you want to use but here are some suggestions for Decision Trees tools:

- **WEKA**  

- **RAPID MINER**  
  [https://rapidminer.com/](https://rapidminer.com/)

**The project** has to follow all steps of Learning Process:

**Data Preparation** that includes attributes selection, cleaning the data, filling the missing values, etc...

**Data preprocessing**: must use at least 2 methods of data discretization, and compare the final results obtained after each of them.

**Learning Proper**: for each experiment described below use a classification tool for rules generation applied to the TWO sets of preprocessed data and compare the results.

**Discriminant Rules Generation Experiments**
You have to perform 3 experiments (all on the same preprocessed data)

**Experiment 1**: use all records to find rules for the full classification; i.e. rules describing all classes C1- C6 simultaneously.

**Experiment 2** (contrast classification): use all records to find rules contrasting class C1 with all others

**Experiment 3**: repeat Experiment 1 for all records with the most important attributes only

Write a short Project Description with methods, motivations, results and e-mail it to the TA and Professor on the day of your PROJECT PRESENTATION.

**Project Presentation**: each group will be given 5 minutes to present the project and results.

**Neural Networks**

You can also explore additionally Neural Network Learning and build a non descriptive NN Classifier

Here are some suggestions for Neural Network tools:


https://pypi.python.org/pypi/neurolab

RAPID MINER  https://rapidminer.com/

**Course Content**

The book is very thin. It is a short overview of major areas of AI. I supplement it with LECTURE NOTES for detailed information. In particular we will cover all or majority of the following book chapters and LECTURE NOTES subjects, **not always in the order they are listed**

**Chapter 1**  AI history and applications. Lecture Notes

**Chapter 2**  Knowledge Representation and Inference.

Propositional and Predicate Calculus is presented in detail in Lecture Notes are on the douse webpage

**Chapter 3**  Expert Systems. Overview of EXPERT SYSTEMS Design and Technology.

Lecture notes and EXTRA HANDOUT distributed in class.

**Chapter 2- Logic** Details for Chapter 2: Overview of Propositional and Predicate Logic; Predicate languages and basic Laws of Quantifiers; Predicate Logic Arguments in **Lecture Notes**

**Automated theorem proving** DETAILS for Chapter 2: Propositional Resolution. EXTRA HANDOUTS and Lecture notes.

**Chapter 5**  Natural Language Processing- reading assignment.

**Chapter 7**  Machine Learning - concentration on INDUCTIVE, or CLASSIFICATION Learning.

The book is not technical- we will use the extensive Lecture Notes

Lecture Notes : In particular we cover the following techniques.

**Decision Trees** - detailed algorithm on lecture slides posted on the web and intuitive introduction is in the book.
Neural Networks - detailed algorithm on lecture slides on the web and intuitive introduction in the book.


Chapter 8  Agent and Robots - readings.

New Advances  Students presentations.

ACADEMIC INTEGRITY STATEMENT  (Adopted by the Undergraduate Council September 12, 2006)

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person’s work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

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Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: http://www.sunysb.edu/ehs/fire/disabilities.shtml