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

The Essence of ARTIFICIAL INTELLIGENCE,   Alison Cawsey, Prentice Hall, 1998.

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 TECH-NICAL 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.

1. Team Homeworks - 4 assignments each 10pts - total 40pts

You work on and submit Homeworks as the same **Team** as you formed for the Research Presentations

2. There will be two in class individual tests.

Midtem 1 - (80pts), and

Midterm 2 - (80pts) covering material covered in class, homeworks and taken from reading assignments;

3. Team Research Presentation - (40pts); - see Presentation description

4. Presentations Evaluation Reports - (20pts);

5. 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

6. Extra Credit I will give during the class small questions for extra credit and assign some extra credit work

You can earn up to **15 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**

Attention: dates may **change** - please check course webpage for updates

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

Homework 1 due Wednesday, September 25

Homework 2 due Wednesday, October 18

MIDTERM 1   Wednesday, October 25   in class

Homework 3 due Wednesday, November 16

Thanksgiving Break: November 22 - 26

Homework 4 due Monday, November 27

PROJECT DATA = Project Homework - **10 extra points** due Monday, November 27

MIDTERM 2   Wednesday, November 29 in class

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**

Attention: dates may **change** - please check course webpage for updates

DAY 1 Monday, October 2

DAY 2 Monday, October 9

DAY 3 Monday, October 23

MIDTERM 1 Wednesday, October 25 in class

DAY 4 Monday, October 30

DAY 5 Monday, November 6

DAY 6 Monday, November 13

Thanksgiving Break November 23- 27

MIDTERM 2 Wednesday, November 29 in class

PROJECT PRESENTATION December 4, 5

RESEARCH PRESENTATION DESCRIPTION

Presentations Teams

Each student has to deliver a 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 PRELIMI-NARY 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 TEAM 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 4, 6

PROJECT DESCRIPTION

You work on the Project in the same **Teams** as you formed for the Research Pr esentations

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 built 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 http://www.cs.waikato.ac.nz/ ml/weka/index.html

RAPID MINER 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 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:

http://www.mathworks.com/products/neural-network/index.html

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**

The course will to cover in depth the majority of the following subjects.

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 HAND-OUTS and Lecture notes.

Automated theorem proving 2   DETAILS for Chapter 2: Predicate Resolution. Lecture notes distributed in class.

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.

Genetic Algorithm - detailed algorithm on the 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/

Stony Brook University Syllabus Statement If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services at (631) 632-6748 or http://studentaffairs.stonybrook.edu/dss/. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

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