CPSC-57200 Artificial Intelligence
Lewis University

Course Project Description

1. Introduction

As part of this course, you will work on a term long group project. The goal is to produce a proposal for a research project in the field of Artificial Intelligence (AI). This project will be done in groups. I will be choosing your groups and you will be able to see them using BlackBoard's Project Groups link. This facility will provide you with collaboration tools you can use for your project.

To get started, you will first need to communicate with your group members – use discussion boards, email, phone, or video conferencing (e.g. Collaborate, Skype, Zoom, etc.). You will then need to pick a general topic – some area of AI that is considered state-of-the-art. Do some research on this topic and try to identify some open problems in the area. It doesn't need to be some unsolved major problem; an improvement on existing solutions is sufficient. In week 3, you will submit a short proposal outlining your project topic and the motivation for researching it. Then, you will continue research on your project and submit a survey of related scientific work. This should allow you to pinpoint a specific problem or improvement on existing solution that you can attempt to solve. For the next two weeks, you will formulate a methodology for obtaining a solution and write this in the form of a formal proposal. You will submit the written proposal in week 7 and then present the work in the last week of class. You will be required to watch the presentations of other groups and discuss it. Remember that the goal is not to implement a solution, but to propose one. However, you may do a proof-of-concept if you wish. This might increase your feasibility scoring in the rubric.

2. Specific Requirements

The project will involve the following steps:
Step 1: Communicate with your group members, once groups are assigned.
Step 2: Pick a topic (see section 3 for ideas) and do some research on it. Try to identify an open problem. Submit a short proposal outlining your ideas and research. [DUE WEEK 3]
Step 3: Do research and submit a survey of related literature. This means look for scholarly papers (see section V for some good sources) and find out what has already been done and what has not been done for this topic (be sure to cite these in your proposal and list the references). [DUE WEEK 5]
Step 4: Submit the full proposal – must include: title, abstract, introduction (which states your hypothesis or goals), specific objectives, background (review of related literature), preliminary results (could be small scale experiments), proposed methodology (what are your ideas for solving the proposed problem), proposed evaluation of results (how will you know if the ideas are successful), conclusion, and a list of references. [DUE WEEK 7]

Step 5: Produce a presentation (e.g. PPT slides) and present your work in class (the exact date and time limit will be given later). [DUE WEEK 8]
NOTE: The proposal needs to be written using IEEE format. You can do this easily just by using the following template (either for Word or LaTeX):
http://www.ieee.org/conferences_events/conferences/publishing/templates.html
The template describes how an IEEE paper should look like. Read it, then replace the parts with your own writing. However, use a **SINGLE COLUMN layout**.

3. Topic Ideas

Here is a list of some topic ideas you may want research for your project:

1. Learning Bayesian network structures.
2. Efficient inference in Dynamic Bayesian Networks.
3. Modeling of human decision making.
4. Efficient inference in Partially Observable Markov Decision Processes.
5. Computing optimal strategies in sequential games.
6. Reinforcement learning in partially observable environments.
7. Optimal tradeoff of exploration and exploitation.
8. Regularization in artificial neural networks.

4. Grading

The grading of the project will be based on the following:

Short Proposal	10%
Literature Review Report	30%
Formal Proposal	30%
Oral Presentation	30%

All submissions must adhere to length limitations. **Any submission with more pages than the stated limit will automatically receive a zero grade.**

Short Proposal – 10% (see proposal rubric)
Length limit = 2 pages

- Correct format/organization – 5 points
- Spelling/grammar/clarity of writing – 5 points
- Research – 5 points
- Idea creativity and complexity – 5 points
- Idea feasibility – 5 points

Review of Related Work Report - 30% (see literature review rubric)

Length limit = 5 pages

- Correct format/organization – 5 points
- Spelling/grammar/clarity of writing – 5 points
- Research Depth and Breadth – 5 points
- Quality of sources – 5 points

Written Full Proposal - 30% (see proposal rubric)

Length limit = 15 pages

- Correct format/organization – 5 points
- Spelling/grammar/clarity of writing – 5 points
- Research – 5 points
- Idea creativity and complexity – 5 points
- Idea feasibility – 5 points

Oral Presentation - 30% (see presentation rubric)

- Preparation of materials (PPT slides, etc.) – 5 points
- Clarity of presentation – 5 points
- Timeliness – 5 points
- Correctness and ability to answer questions – 5 points

Proposal Rubric			
Category	Unsatisfactory (0-1 points)	Satisfactory (2-3 point)	Distinguished (4-5 points)
Formatting	• Report does not adhere to most IEEE guidelines • Contains mostly incorrect fonts, spacing, margins, or headings • Doesn't use figure, table, an equations when needed	• Report adheres to most IEEE formatting guidelines • Contains some text formatting issues • Inadequate use of figures or tables • Contains some figures, tables, or equations that are not properly numbered and labeled	• Report adheres to all rules of IEEE formatting guidelines • Correct font, spacing, margins, and text styles • Proper use of figures that are numbered, include labels, and are referenced and explained in the text • Proper use of tables that are numbered, include headings, are easy to read, and are referenced and explained in the text • Correctly formatted equations, which are numbered if appropriate
Writing	• Report is almost incoherent • Terms are not defined • Statements are misleading or completely inaccurate • Motivation for the problem is missing or inaccurate	• Some explanations are confusing or unclear • Problem is not sufficiently motivated • Some terms are not defined properly • Report lacks a coherent logical flow • May include some inaccuracies • Some sections missing or not in proper order	• Clear and thorough explanations • Properly motivates the problem and provides evidence for the need of solution • Properly defines all terms. New terms should be italicized when first used. • Sentences follow a logical flow and entail accurate statements • Includes all needed sections in proper order
Research	• Very few sources used • Poor quality sources that do not come from respected scientific articles • Very little or no details written about the ideas found in sources • No mention on how sources relate to your work	• Breadth of research is limited • Explanations of research is not sufficiently detailed • Some sources are not of great quality • Sources are explained independently, without any logical groupings of ideas • Inadequate explanation of how sources related to your work	• Sufficiently large number of sources • Great depth of research on the topic • Great quality of sources • Sources are explained with proper context • Explanations of ideas found in sources are properly organized and grouped together in an appropriate manner • Ideas in sources are properly related to your own work, including how your work is similar, different, or better
Idea creativity and complexity	• Ideas are trivial • Ideas are have been already implemented by others in the past • No explanations of ideas	• Ideas may be somewhat simplistic and may be easily attainable by others • Ideas are mostly original, but close to other work that has been already done	• Ideas are non-trivial and may require a considerable effort and research to implement • Ideas are completely novel and this is proved in the writing
Idea feasibility	• Ideas are intractable	• There are risks that the project ideas may not be implementable in reasonable time	• Project ideas should be easily implemented in a reasonable time period

Literature Review Rubric			
Category	Unsatisfactory (0-1 points)	Satisfactory (2-3 point)	Distinguished (4-5 points)
Formatting	• Report does not adhere to most IEEE guidelines • Contains mostly incorrect fonts, spacing, margins, or headings • Doesn't use figure, table, an equations when needed	• Report adheres to most IEEE formatting guidelines • Contains some text formatting issues • Inadequate use of figures or tables • Contains some figures, tables, or equations that are not properly numbered and labeled	• Report adheres to all rules of IEEE formatting guidelines • Correct font, spacing, margins, and text styles • Proper use of figures that are numbered, include labels, and are referenced and explained in the text • Proper use of tables that are numbered, include headings, are easy to read, and are referenced and explained in the text • Correctly formatted equations, which are numbered if appropriate
Writing	• Explanations of sources is missing or lacks detail • Sources are not organized or grouped in any way • Own work is not related to the sources	• Some explanations are confusing or unclear • Sources are not properly organized and ideas are not grouped • Source ideas are not described in sufficient detail to understand main ideas and results • Work in sources is not adequately related to own work	• Clear and thorough explanations • Sentences follow a logical flow and entail accurate statements • Source ideas are described in sufficient detail to understand the main ideas and results • Sources are grouped by ideas • Work in sources is related to proposed project: describes similarities and differences from your ideas and how your ideas are better or worse
Research Depth and Breadth	• Very few sources used • Sources and/or their explanations lack depth	• Breadth of research is limited • May have many sources, but of limited number within a particular area	• Sufficiently large number of sources to represent the current state of the work on the topic • Great depth of research on the topic that is explained in the paper
Quality of Sources	• Most sources do not come from high-quality journals or conference proceedings related to the chosen topic	• Only few sources come from high-quality journals or conference proceedings related to the chosen topic	• Most sources come from high-quality journals or conference proceedings related to the chosen topic

Presentation Rubric			
Category	Unsatisfactory (0-1 points)	Satisfactory (2-3 point)	Distinguished (4-5 points)
Preparation of Materials	• Slides contain a lot of text in paragraph form • Almost no figures, tables, or animations • Fonts and color choices make slides unreadable (e.g. small blue text on a black background)	• Slides contain a lot of text • Limited use of figures, tables, or animations • Text font is too small for easy reading • Colors have insufficient contrast and are pleasant to the eye	• Not too much text • Extensive use of figures, tables, or animations • Text is sufficiently big to read from afar • Colors have sufficient contrast and are pleasant to the eye
Clarity	• Slides do not follow a logical order • Terms are not defined • Explanations lack details	• Some slides are not arranged in logical order • Some terms are not properly defined • Explanations do not provide enough detail to understand the main ideas and results	• Slides are arranged in logical order • Terms are properly defined • Explanations provide enough detail to understand the main ideas and results
Timeliness	• Presentation is either very short or goes significantly past the time limit • Answers to questions are either very lengthy or extremely short	• Presentation is somewhat short or goes past the time limit • Answers to questions are too lengthy or lack sufficient explanation	• Presentation makes full use of allotted time, but does not go over limit • Answers to questions are brief, but provide a sufficient explanation
Correctness and Ability to Answer Questions	• Presented ideas and answers to questions are completely inaccurate • Most questions are unanswered	• Presented ideas and answers to questions have some inaccuracies • Some questions are not answered	• Presented ideas and answers to questions are completely accurate • All questions are answered

5. Finding Good Sources For Research

Go here for a list of high-quality scientific journals and conference proceedings in AI:
http://www.guide2research.com/journals/machine-learning
https://scholar.google.es/citations?view_op=top_venues&hl=en&vq=eng_artificialintelligence

There are also many good sources listed at the end of each chapter in the AIMA textbook.