**ECE 1898 – Microsoft AI for Beginners + AI Project**

For my independent study/project, I will be completing the free course from Microsoft called AI for Beginners and completing a project based upon the knowledge I gained from said course. In the schedule detailed below, I have provided dates for when I will complete each lesson/lab from the online course and the overall steps for my project.

Under the Topics section of the schedule, the first 6 weeks list the lessons (1 to 24) from the online course. Each lesson involves a pre-lecture quiz, short video, reading(s), and a post-lecture quiz; some lessons also include a lab assignment. The labs are listed in the Assignments Due section and are to be completed in the same week as their corresponding lesson. For these lab assignments, I plan to have them completed by Sunday night of each week.

For the project portion of this course, I plan to complete this project in 9 weeks (10 if some time during finals week is needed). By the end of week 6, I plan to have completed a more in-depth schedule for the software project and will be using the Agile methodology. Though I am a one-person team, I would still like to use an agile (scrum) methodology for software development due to its widespread use in industry.

After looking through different courses online, I decided upon AI for Beginners because I would like to use neural networks and natural language processing in my final project. Some ideas I had for said project included:

* **Artist-based Song Generation** – Using either a recurrent neural network or transformer, I would create a tool that generated song lyrics and music to mimic a specific artist with a large discography, such as Taylor Swift, Beyonce, the Grateful Dead, etc. If I went with this idea, I would also like to complete a small essay/write-up on the ethics of such tools and their impact on creatives.
* **Disinformation Detection** – Using a neural network and both truthful and falsified news articles, I would create a tool to automatically distinguish if an article is a trusted source or not. This model would be trained using the dataset to analyze text and compare statements in the provided data with verified sources.
* **Language Translation** – For this project idea, I would build a Spanish-English translator using multiple AI techniques and compare the outputs of said translators. As a Spanish minor, I have used many different online translators and know they can produce vastly different translations for the same sentence. I would build one translator using a neural network and another using a transformer, for example, and compare and contrast and outputs of the two.

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| Week | Topics | Assignments Due |
| *Online Course – AI for Beginners* | | |
| **Week 1**  08/28 – 09/02 | 1. **Introduction to AI**    1. Introduction and History of AI 2. **Symbolic AI**    1. Knowledge Representation and Expert Systems 3. **Introduction to Neural Networks**    1. Perceptron    2. Multi-Layered Perceptron and Creating our own Framework    3. Intro to Frameworks (PyTorch/TensorFlow) and Overfitting | **Lab 1** – Multi-Class Classification with Perceptron  **Lab 2** – MNIST Classification with Our Own Framework |
| **Week 2**  09/03 – 09/09 | 1. **Computer Vision**    1. Intro to Computer Vision (OpenCV)    2. Convolutional Neural Networks and their Architectures    3. Pre-trained Networks and Transfer Learning Training Tricks | **Lab 3** – Classification with PyTorch/Tensorflow  **Lab 4** – Detecting Movements using Optical Flow |
| **Week 3**  09/10 – 09/16 | * 1. Autoencoders and VAEs   2. Generative Adversarial Networks (Artistic Style Transfer)   3. Object Detection   4. Semantic Segmentation (U-Net) | **Lab 5** – Classification of Pets Faces  **Lab 6** – Classification of Oxford Pets using Transfer Learning |
| **Week 4**  09/17 – 09/23 | 1. **Natural Language Processing**    1. Text Representation (Bow/TF-IDF)    2. Semantic Word Embeddings (Word2Vec and GloVe)    3. Language Modeling (Training your own embeddings)    4. Recurrent Neural Networks | **Lab 7** – Head Detection using Hollywood Heads Dataset  **Lab 8** – Training Skip-Gram Model |
| **Week 5**  09/24 – 09/30 | * 1. Generative Recurrent Networks   2. Transformers (BERT)   3. Named Entity Recognition   4. Large Language Models, Prompt Programming and Few-Shot Tasks | **Lab 9** – Word-level Text Generation using RNNs  **Lab 10** – NER  **Project** – Research idea(s) for semester project |
| **Week 6**  10/01 – 10/07 | 1. **Other AI Techniques**    1. Genetic Algorithms    2. Deep Reinforcement Learning    3. Multi-Agent Systems 2. **AI Ethics**    1. AI Ethics and Responsible AI | **Lab 11** – Training Mountain Car to Escape  **Project** – Propose idea(s) for semester project and get it approved by instructor |
| *AI Project* | | |
| **Week 7**  10/08 – 10/14 | **Sprint 1**   * Sprint planning * Sprint execution | Project Planning + Documentation |
| **Week 8**  10/15 – 10/21 | **Sprint 1 (cont’d.)**   * Sprint execution (continued) * Sprint review * Planning for next sprint | Complete Project Design |
| **Week 9**  10/22 – 10/28 | **Sprint 2**   * Sprint planning * Sprint execution |  |
| **Week 10**  10/29 – 11/04 | **Sprint 2 (cont’d.)**   * Sprint execution (continued) * Sprint review * Planning for next sprint | Initial functionality implemented |
| **Week 11**  11/05 – 11/11 | **Mid-Project Review**   * Review project progress * Complete testing of system * Adjust major project components if needed | Completed reworked project design (as needed) + plan for further implementation  Initial testing completed |
| **Week 12**  11/12 – 11/18 | **Sprint 3**   * Sprint planning * Sprint execution |  |
| **Week 13**  11/19 – 11/25 | **Sprint 3 (cont’d.)**   * Sprint execution (continued) * Sprint review * Planning for next sprint |  |
| **Week 14**  11/26 – 12/02 | **Final Review**   * Finalize remaining tasks * Testing (integration, if needed) of system features * Review of project status | All functionality implemented + tested |
| **Week 15**  12/04 – 12/09 | **Testing and Quality Assurance**   * System testing and bug fixes * Final adjustments (based on testing results) | Final testing completed |
| **Week 16**  12/10 – 12/16 | **Demonstration and Wrap-Up**   * Complete project presentation and documentation * Project review with instructor | Final Project Presentation + Demonstration  Final Project Documentation |