November 30, 2023

To whom it may concern,

I am writing this letter to help you understand Haoxuan XIE's performance in the Introduction to Neural Networks Online Research Seminar. To provide an overview of what the student has achieved in this program, I am also including a program summary for your reference.

This program focused on artificial neural networks and how they have been used for machine learning, emphasizing both the basic algorithms and the practical tricks needed to get them to work well. we started with an introduction of modern neural networks and basic concepts of convolutional neural networks to advanced topics such as auto-encoders and transfer learning. We also learned about the regularization of neural networks and then dived into convolutional neural networks, transfer learning, and auto-encoders. Live lectures, lab sessions, and office hours were offered to guide the students through the course material. As a result of the program, students worked in groups on a final presentation.

Overall, Haoxuan XIE's performance in this program was excellent.

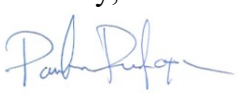
Haoxuan is mostly attentive when others present ideas or materials, as indicated by his comments that reflect and build on others' remarks. It would be great if he could provide more insightful and original comments that are not too general. Nevertheless, Haoxuan performed well in terms of participation in and outside class.

There were two graded assignments, with each submitted as Jupyter notebooks. Haoxuan did an excellent job on the quizzes. He provided correct and well-developed answers to the questions, which showed his excellent command of the topics, and ability to apply the knowledge to the analysis problems in different contexts.

By the end of the program, the students worked on an advanced topic in groups. The project requires students to acquire and understand new knowledge as well as concepts and methods, implement the new method in Python, and interpret the results in the context of the material learned during the program. Haoxuan's group project titled "Classifying Galaxies Using Convolution Neural Network" is a noteworthy endeavor in the field of astronomy and deep learning. The project's objective is to explore the application of Convolutional Neural Networks (CNN) in the classification of galaxies, a challenging and intriguing task. One of the strengths of this project is the utilization of the Galaxy10 DECals dataset, which contains a diverse set of galaxy images. This dataset serves as a robust foundation for the study, allowing for a comprehensive understanding of CNN principles and applications in the context of galaxy classification. The project effectively demonstrates how CNNs can extract features from the data, enabling the successful classification of various types of galaxies. Additionally, the in-depth discussion on the construction of the CNN model, including the use of techniques like L2 regularization, batch normalization, and data augmentation, showcases a deep understanding of deep learning principles. The use of standard performance metrics, such as F1 score, recall, precision, and accuracy, to evaluate the model's performance adds rigor to the project's findings. Overall, this research provides valuable insights and experiences for beginners interested in the application of CNNs in astronomy and galaxy classification. It lays a solid foundation for future studies in this exciting intersection of deep learning and astrophysics. The project's clarity, methodology, and results contribute significantly to the field of image processing and deep learning. In this project, Haoxuan took part in setting their project purpose, building the CNN model, and writing part of the essay. More specifically, he was responsible for building the Data Augmentation model and completing Related Work in the essay. In the oral presentation, he introduced the structure and functions of their code. Overall, Haoxuan demonstrated great effort and his performance in the final project is excellent.

I hope this letter will be helpful as a reference for you to assess Haoxuan XIE's academic capability.

Sincerely,



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