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Teaching Statement

During my office hours for the graduate level machine learning course, a student asked how regularization actually prevents overfitting. Rather than simply restating what was said in class, that regularization penalizes large weights, I invited the student to write out the math and code an example with me. Together, we wrote out a loss function with a regularization term and then coded a high order polynomial regression example. As we gradually increased the regularization penalty, the student could see the unnecessarily complicated curve transform into a simpler curve that captured the underlying pattern of the data better. This experience reflects my broader teaching philosophy: I aim to guide students to conceptual understanding by teaching mechanistic and contextual reasoning.

Conceptual understanding comes from the ability to reason mechanistically about the math and apply these insights in context. For instance, when we use mean squared error (MSE) as a loss function, we are implicitly assuming a Gaussian distribution of errors around our labels. If we apply MSE without recognizing this assumption, such as in situations where errors are heavy-tailed or non-Gaussian, the model may perform poorly despite appearing mathematically correct. Without a proper understanding of such underlying assumptions, we risk misusing mathematical tools outside their intended context. Therefore, my primary learning goals for students are that they can reason about the mechanisms of the method and apply it in context with a critical lens. This will help prepare students who aim to take a more research oriented route (graduate school) as well as students who plan to apply these methods in industry.

I intend to structure my class time around interactive lectures and Jupyter notebooks that give examples of topics discussed in lectures. Lectures would give students the symbols and language they need to understand the mathematical concepts, while Jupyter notebooks would allow students to problem solve and create visualizations to help them connect the symbols and language to an example. Students would engage with these notebooks individually and in small groups, which would allow collaborative learning and discussion to deepen their understanding. When I taught weekly recitations for the graduate level machine learning course, I guided students through Jupyter notebooks that gave examples of topics discussed in lectures. I believe that engaging with applied exercises reinforces understanding far more effectively than lecture alone.

To achieve this style of teaching, it is essential that students feel both motivated to learn and comfortable asking questions. I am passionate about probabilistic machine learning and excited to share this passion with students. In my experience, taking a class with an enthusiastic professor makes all the difference in my own enthusiasm to learn the material. It is not enough, however, to only be enthusiastic; students need to feel comfortable asking questions. I do not view their uncertainty as a weakness, but rather as a sign of genuine engagement with the material. I see it as my role to encourage questions and discussion about the material, both in the classroom and during office hours. Students' questions provide valuable opportunities for deeper learning.

Outside of the classroom, I have been actively involved in lab meetings for my advisor's research group, where I regularly present and mentor students. I frequently lead lightning chats and group meetings in which we read and discuss recent papers. I have explained methods to a diverse audience (e.g., undergraduate, Master's, and Ph.D. students) with backgrounds not only in Computer Science, but also in mechanical engineering, chemical engineering, and physics. Additionally, I have mentored two Master's students. These mentees have actively contributed to research projects, where more recently one of these was accepted at Machine Learning for Health (ML4H), co-located with NeurIPS.

As a Lecturer, I am qualified to teach higher level courses on artificial intelligence, machine learning, and data science; and also enthusiastic to teach first-year courses in programming, data structures, and algorithms. I look forward to the possibility of teaching in the Department of Computer and Information Science at the University of Pennsylvania.