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CSC630a – Machine Learning
Gradient Project Reflection
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Gradients and Contour Plots:
The beginnings of X and Y are expanded into matrixes, where X is repeated vertically, and Y is repeated horizontally. X -> column, Y -> row.

```python
def draw_gradient(x, y):
    draw_arrow(x, y, -0.4 * x + 0.1 * y - 0.25, -0.6 * y + 0.1 * x)
```

The Black Box
The 'black box' idea is the idea that once a machine learning model is created, there is no way to determine how the model will map its inputs to its outputs. In resistance to the issue, there has been a movement of increasing the "explainability" of AI. Many of the most significant changes revolve not around breaking our current definitions of ML but changing the tools that we use to create models such that we can follow the patterns of calculations and how they correspond to the algorithm's decisions: "developers should opt for AI models that are "inherently interpretable" and "provide their own explanations" … in many cases, interpretable models can produce results that are just as accurate as black-box deep learning algorithms" (TechTalks).

This becomes increasingly important as we approach an age where technology is going to be determining many aspects of our lives and communities for us. While it can be an extremely beneficial tool, if we cannot understand *and* control how our algorithms are making these decisions, we will lose the ability to hold algorithms and their creators accountable.

Check attached files for gradient project code, variable class, and Logistic Regression. I was able to create a fully functioning Variable class and came close in fixing the errors in my Logistic Regression function. Still, I feel confident overall in my understanding of the concepts (gradient descent, the representation of data in a multi-dimensional space, and the expansion of the black box), and how they relate to the field as a whole.