This thesis is on active learning where the goal is to reduce the data annotation burden by interacting with a (human) oracle during training. Standard active learning methods ask the oracle to annotate data samples. Instead, we take a profoundly different approach: we ask for annotations of the decision boundary. This is achieved using a deep generative model to create novel instances along a line. A point on the decision boundary is revealed where the instances change class. Experimentally we show on three data sets that our method can be plugged into other active learning schemes, that human oracles can effectively annotate points on the decision boundary, that our method is robust to annotation noise, and that decision boundary annotations improve over annotating data samples.