

ML homework 1: question 5

Q. What is a possible application of active learning?

The answer generated by chatGPT:

In medical imaging diagnosis, active learning is used to improve the labeling of medical images (e.g., MRI or CT scans) for diagnosing diseases like cancer or identifying abnormalities.

My opinion is:

I agree with ChatGPT's explanation because, firstly, active learning stands out from other protocols due to its unique ability to query only when the algorithm is "confused" or uncertain about a particular instance. This characteristic is especially valuable in applications like medical imaging, where identifying abnormalities (like in CT scans) is critical.

The primary advantage of this protocol is that, it significantly reduces the labeling burden. In many medical applications, labeling data requires the expertise of specialists such as doctors. Hiring professionals with such expertise to label large amounts of data can be both time-consuming and expensive, making it impractical for large datasets. By using active learning, only the most uncertain cases (such as CT scans that are difficult to distinguish from normal ones) need to be verified by the experts.

Secondly, active learning operates in a sequential manner. After the model identifies and queries the most uncertain case, an expert provides the label, and the model is immediately updated. This allows the algorithm to refine its understanding, so similar cases are less likely to be queried again. In contrast to batch learning, which updates the model with a fixed set of labeled data all at once, this sequential approach ensures that the expert is not asked to label similar cases repeatedly, therefore simplifying the process.