

Chapter 11

Practical Methodology

Successfully applying deep learning techniques requires more than just a good knowledge of what algorithms exist and the principles that explain how they work. A good machine learning practitioner also needs to know how to choose an algorithm for a particular application and how to monitor and respond to feedback obtained from experiments in order to improve a machine learning system. During day to day development of machine learning systems, practitioners need to decide whether to gather more data, increase or decrease model capacity, add or remove regularizing features, improve the optimization of a model, improve approximate inference in a model, or debug the software implementation of the model. All of these operations are at the very least time-consuming to try out, so it is important to be able to determine the right course of action rather than blindly guessing.

Most of this book is about different machine learning models, training algorithms, and objective functions. This may give the impression that the most important ingredient to being a machine learning expert is knowing a wide variety of machine learning techniques and being good at different kinds of math. In practice, one can usually do much better with a correct application of a commonplace algorithm than by sloppily applying an obscure algorithm. Correct application of an algorithm depends on mastering some fairly simple methodology. Many of the recommendations in this chapter are adapted from [Ng \(2015\)](#).

We recommend the following practical design process:

- Determine your goals—what error metric to use, and your target value for this error metric. These goals and error metrics should be driven by the problem that the application is intended to solve.
- Establish a working end-to-end pipeline as soon as possible, including the