

1 Why?

Keeping a research notebook is the most important thing one can do to ensure steady progress in a research project. It is useful for two reasons:

1. Ensure clarity of thought: it is impossible to write coherently without first thinking coherently. Keeping a research notebook is thus a way to self-verify whether one's thoughts about a subject are coherent.
2. Keep track of intermediate results: in a research project, we develop many small intermediate results that eventually lead to the big insight. It is important to store these intermediate results in an easy-to-access way.

2 How?

The qualities of a good research notebook are:

1. Self-contained: except for established concepts and notations, the notebook should contain all background information needed to understand its content.
2. Concise: A rambling research notebook indicates a confused state of mind.
3. Neatly organized: as one of the purpose of the notebook is to store intermediate results, they should be written in such a way that allows for easy retrieval and double-checking of these results.

I highlight the importance of the easy double-checking of the results. When we look back at the results, sometimes we forget how we obtained them and wanted to verify they are correct. If we do not store the results in a way that allows for easy double-checking, we will waste a lot of time in this step.

For theoretical result, this involves writing the proof in a neat manner. For experimental result, this involves making it easy to reproduce the results of the experiments. I usually copy the code corresponding to one intermediate result into its own folder with meaningful name.

3 Template

Each entry in the notebook can follow this template:

1. Date
2. What is it I will spend time on next?
3. Why is this important? How is it relevant to the research goal?
4. After I spent time on this, what did I learn? What are the expected and surprising outcomes?