

# Reading Note: Chapter 5

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## 1 Introduction

Chapter 5 gives a theoretical introduction to probabilistic analysis and randomized algorithms. However, it does not provide many interesting applications to these algorithms for better understanding. In addition, I skip the proof part and the advanced section, as I think they are too much "mathematical" for first round reading this book.

## 2 Key Note

- Distinction between probabilistic analysis and randomized algorithms:
  - Probabilistic analysis: the probability distribution is over the *inputs* to the algorithm, use the term average-case running time.
  - Randomized algorithm: the *algorithm* itself makes random choices, use the term expected running time. The behavior of the algorithm is determined not only by its input but also by values produced by a random process.
- For randomized algorithms, no particular input elicits its worst-case behavior.
- Two methods to produce random permutation:
  - Permute-By-Sorting: assign each element a random priority, then sort the elements according these priorities.
  - Randomize-In-Place: chooses the element  $A[i]$  randomly from among elements  $A[i]$  through  $A[n]$ .  $A[i]$  is never altered after that.

## 3 Algorithms

- Hiring problem (average-case time / expected running time:  $O(c \ln n)$ )

\* Sample codes implemented in *Codes* folder