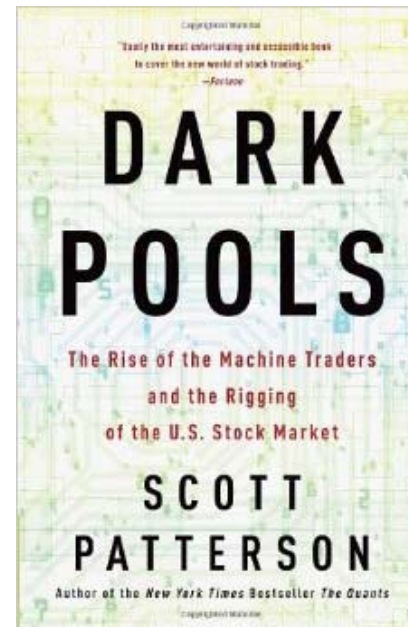
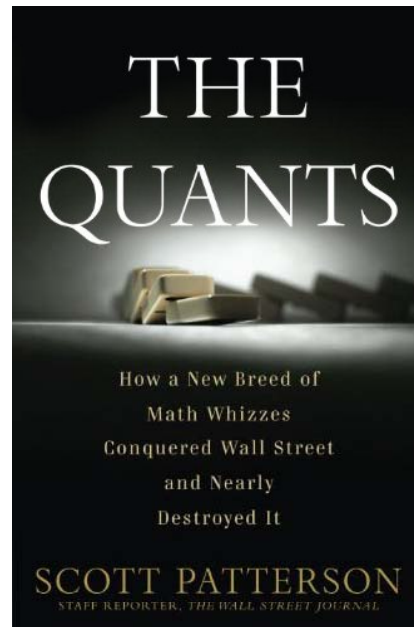


Quantitative Researcher

Wujie Huang

The New York Times Best Sellers



Just take the history and stories, and ignore the analysis and claims.

What does a Quant do?

A quant designs and implements mathematical models for

1. the pricing of derivatives
2. assessment of risk
3. predicting market movements

Types of quant roles:

1. high freq VS long term
2. various asset classes
3. Market Making/Stat Arbitrage/Momentum/Mean Reversion
4. Alpha generation/Optimization/Risk management/Execution

Potential employers:

- Commercial banks: ask less of you, and pay less. Good job security.
- Investment banks: long hours but pay well. Not so good job security.
- **Hedge funds**: a lot of work but somewhat flexible as long as you produce potential to make a huge amount of money but volatile
- **Proprietary trading firms** (Prop shops): even higher compensation but very volatile

Resources:

On Becoming a Quant by Mark Joshi
Automated Trading by Max Dama

What starting package are you looking at:

Base + 1st yr bonus (minimum guarantee) + signing bonus

= 1st yr total: 200k-300k and possibly more

Non-compete agreement:

Duration: 1-2 years

Scope: direct competitors

Compensation: \$\$

投资有风险
入行需谨慎

Required skills:

1. problem solving and reasoning
2. programming
3. basic Maths / linear algebra
4. probability and basic statistics
5. algorithms /data structure
6. familiarity with machine learning
7. minimum finance

Interview process:

Initial contact → early stage → onsite → additional info → make offer

Info session
informal chat
dinner

coding test
campus interview
phone interview

full day

references
executive assessment

time frame: 2-3 weeks to 5-6 weeks

How to apply:

1. via CareerBridge / Campus interview
2. via Recruiter / Headhunter

When to apply:

1. as early as possible, recruiting season begins in September
2. **BUT** only when you're ready!!! You won't have a second chance!

How do you know you're ready (or not):

1. try mock interviews
2. the best way: 实战演练
at least get a few onsites before applying for your dream job

Useful Tips:

Before the interview:

1. Preparation is the key!!!
2. Take advantage of resources you have
3. Experience: internships, projects
4. Write codes on blank paper / whiteboard
5. Make sure you know everything in your resume really really well

During the interview:

1. You have (some) control over your interviews
2. The interview is not over yet (until you walk out the door)!

After the interview:

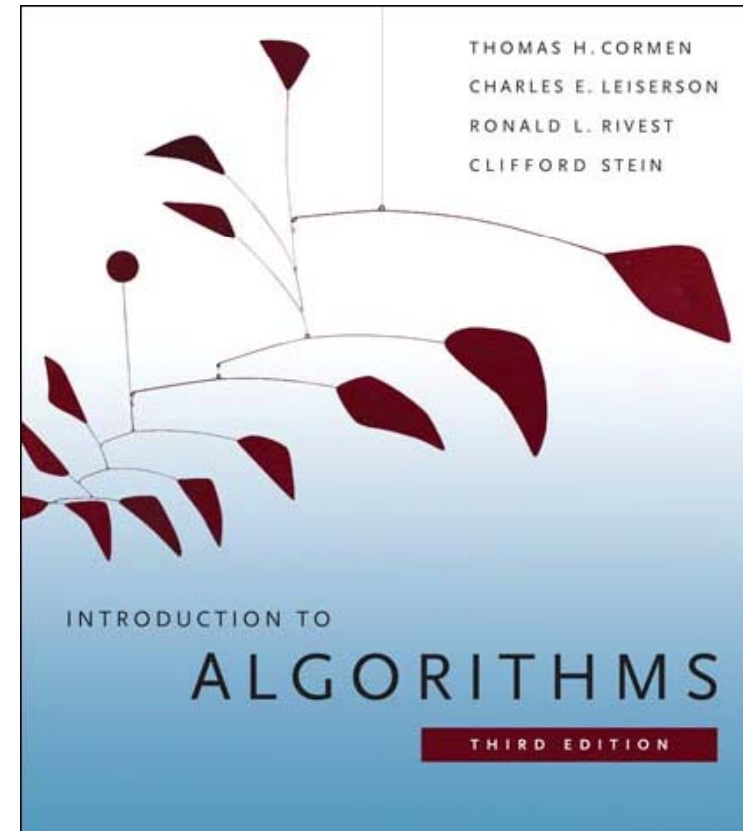
1. how to negotiate your offer
2. when to make your decision and accept/turn down offers

Basic algorithms/data structures:

sorting/order statistics
greedy
dynamical programming
stack/queue/priority queue
binary tree
hash table/set and map in C++
graphs (usually not necessary)

Resources:

1. [CLRS \(text and problems\)](#)
2. TopCoder
3. GeeksforGeeks



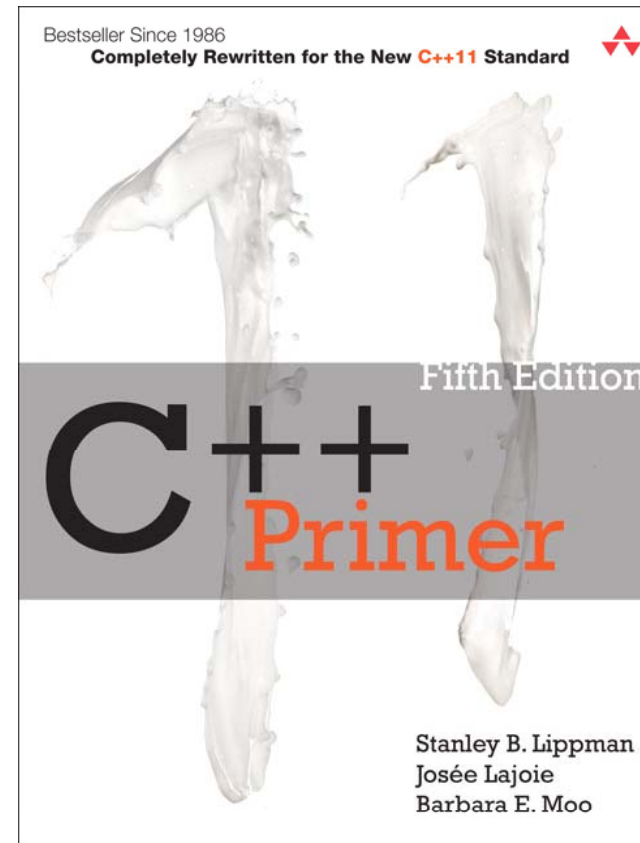
Programming:

Required: C++/Java

Recommended: Python/R/MATLAB

Resources:

1. [Leetcode \(real interview questions\)](#)
2. Project Euler (more Math problems)
3. TopCoder (coding competition)
4. GeeksforGeeks



Leetcode online judge (OJ):

LeetCode OJ

Problems ▾


Pick One!

Submissions

Discuss

Book

Articles

 wjhuang

Single Number

Total Accepted: 59112

Total Submissions: 130143

Question

Solution

My Submissions

Given an array of integers, every element appears twice except for one. Find that single one.

Note:


Your algorithm should have a linear runtime complexity. Could you implement it without using extra memory?

Show Tags

Have you met this question in a real interview?

Discuss

C++ ▾



```
1 class Solution {
2 public:
3     int singleNumber(int A[], int n) {
4
5     }
6 };
```

Submit Solution

Project Euler

←

→

10001st prime
Problem 7

By listing the first six prime numbers: 2, 3, 5, 7, 11, and 13, we can see that the 6th prime is 13.

What is the 10 001st prime number?

Answer:

Confirmation Code:


Click image for new code

GeeksforGeeks

GeeksforGeeks

A computer science portal for geeks

Home	Algorithms	DS	GATE	Interview Corner	Q&A	C	C++	Java	Books
Array	Bit Magic	C/C++	Articles	Gfats	Linked List	MCQ	Misc	Out	

Algorithms

Analysis of Algorithms: Asymptotic Analysis, Worst, Average and Best Cases, Asymptotic Notations, Analysis of Loops, Solving Recurrences, Amortized Analysis, What does 'Space Complexity' mean?, NP-Completeness Introduction, A Time Complexity Question, Time Complexity of building a heap, Quiz on Analysis of Algorithms, Quiz on Recurrences

Searching and Sorting: Binary Search, Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Heap Sort, QuickSort, Bucket Sort, ShellSort, Interpolation search vs Binary search, Stability in sorting algorithms, When does the worst case of Quicksort occur?, Lower bound for comparison based sorting algorithms. Which sorting algorithm makes minimum number of memory writes?, Find the Minimum length Unsorted Subarray, sorting which makes the complete array sorted, Merge Sort for Linked Lists, Sort a nearly sorted (or K sorted) array, Iterative Quick Sort, QuickSort on Singly Linked List, QuickSort on Doubly Linked List, Find k closest elements to a given value, Sort n numbers in range from 0 to $n^2 - 1$ in linear time, A Problem in Many Binary Search Implementations, Search in an almost sorted array, Sort an array in wave form, Why is Binary Search preferred over Ternary Search?, K'th Smallest/Largest Element in Unsorted Array, K'th Smallest/Largest Element in Unsorted Array in Expected Linear Time, K'th Smallest/Largest Element in Unsorted Array in Worst Case Linear Time, Find the closest pair from two sorted arrays, Find common elements in three sorted arrays, Given a sorted array and a number x, find the pair in array whose sum is closest to x, Count 1's in a sorted binary array, Binary Insertion Sort

Quiz on Sorting, Quiz on Searching

Greedy Algorithms: Activity Selection Problem, Kruskal's Minimum Spanning Tree Algorithm, Huffman Coding, Efficient Huffman Coding for Sorted Input, Prim's Minimum Spanning Tree Algorithm, Prim's MST for Adjacency List Representation, Dijkstra's Shortest Path Algorithm,

C++ Programming Language

C vs C++: Write a C program that won't compile in C++, Name Mangling and extern "C" in C++, How does "void *" differ in C and C++?, Write a program that produces different results in C and C++, Type difference of character literals in C and C++,

Reference Variables: References in C++, Can references refer to invalid location in C++?, When do we pass arguments by reference or pointer?

Function Overloading: Function Overloading in C++, Functions that can't be overloaded in C++, Function overloading and const keyword, Function overloading and return type, Does overloading work with Inheritance?, Can main() be overloaded in C++?,

Default Argument: Default Arguments in C++

Inline Functions: Inline Functions in C++

new and delete: malloc() vs new, delete() and free() in C++,

Class and Object: Structure vs class in C++, Can a C++ class have an object of self type?, Why is the size of an empty class not zero in C++?,

Static Members: Some interesting facts about static member functions in C++, Static data members in C++

'this' Pointer: 'this' pointer in C++, Type of 'this' pointer in C++, "delete this" in C++

Constructor and Destructor: Constructors in C++, Copy Constructor in C++, Destructors in C++, Does compiler create default constructor when we write our own?, When should we write our own copy constructor?, When is copy constructor called?, Initialization of data members, When do



Data Science

Competing in Algorithm Challenges

- Getting Started in Data/Algorithm Challenges
- Getting Started in Marathon Matches
- Marathon Match Tutorials
- How to Run the Arena
- Getting Around in the Arena
- The Practice Rooms

Data Science Rating Systems

Algorithm Rating System

Copilots & Problem Writers

Help Center > Data Science > Competing in Algorithm Challenges > Algorithm Tutorials
> Dynamic Programming: From novice to advanced

Dynamic Programming: From novice to advanced

By [h]Dumitru[h] -- topcoder member

An important part of given problems can be solved with the help of dynamic programming (DP for short). Being able to tackle problems of this type would greatly increase your skill. I will try to help you in understanding how to solve problems using DP. The article is based on examples, because a raw theory is very hard to understand.

Note: If you're bored reading one section and you already know what's being discussed in it - skip it and go to the next one.

Introduction (Beginner)

[Dashboard](#) > [TopCoder Competitions](#) > ... > [Algorithm Overview](#) > [Algorithm Problem Set Analysis](#)

TopCoder Competitions

Algorithm Problem Set Analysis

[View](#) [Attachments \(1\)](#) [Info](#)

Added by mike , last edited by xellos0 on Mar 03, 2015 ([view change](#))

Labels: (None) [EDIT](#)

Editorials for all rounds starting from SRM 467 can be edited by any TopCoder member. It can be language correction, word corrections, description of alternative solutions, etc. If you want to improve the wording of editorial writer or correct some lar wish to add a comment or describe another approach, there's a section for this at the bottom of each problem.

Before editing, please be sure to check the following [guidelines](#).

If you see that you occasionally broken the page formatting, you can use page history page (like [this](#)) to restore the latest p (contest@topcoder.com).

Match Editorial Archive - 2015

February

02.17.15 SRM 650 - [Problem Set & Analysis](#) (Part 1)

02.10.15 SRM 649 - [Problem Set & Analysis](#)

02.02.15 SRM 648 - [Problem Set & Analysis](#) (WIP)

January

01.24.14 SRM 647 - [Problem Set & Analysis](#) (Part 1)

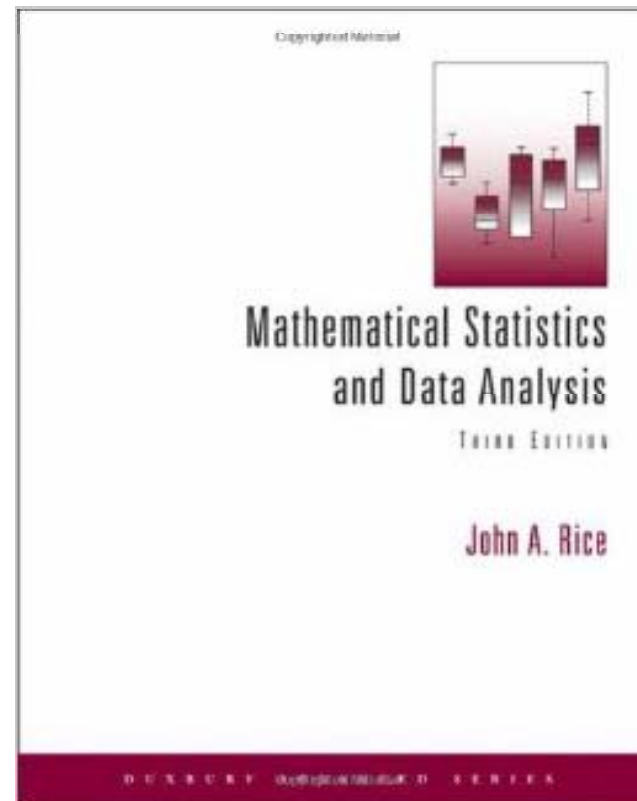
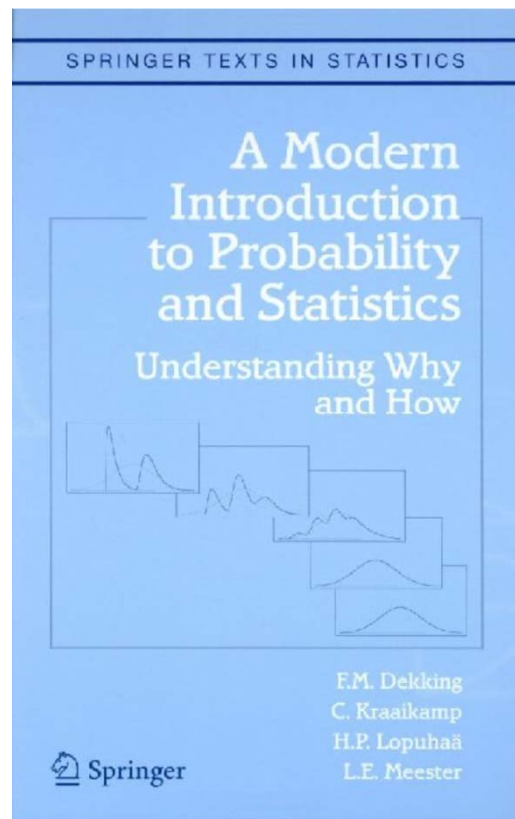
01.15.14 SRM 646 - [Problem Set & Analysis](#) (Part 1)

TopCoder Tutorials

TopCoder Archive

Probability and Statistics

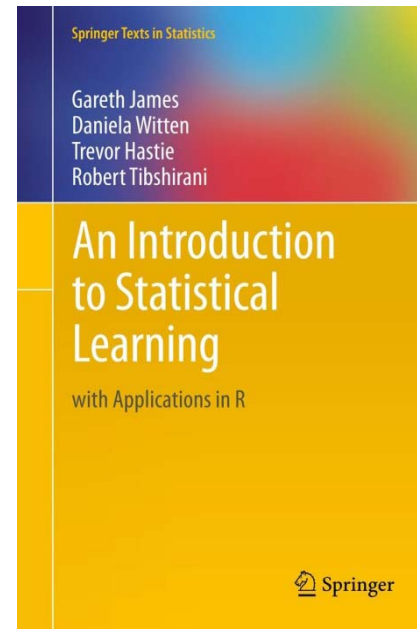
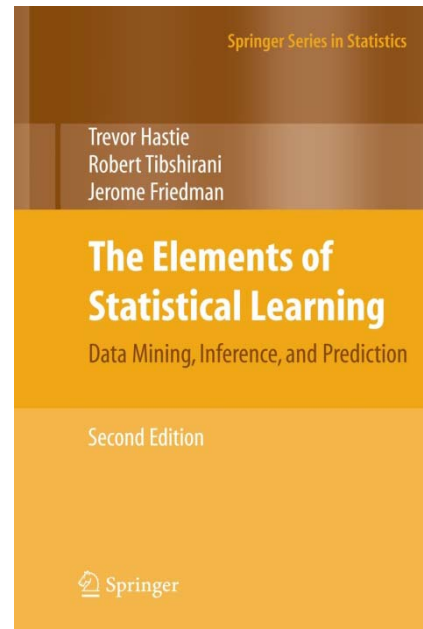
be familiar with standard distributions and their properties
be able to model problems using standard distributions
fitting of probability distribution, assessing goodness of fit
confidence interval, central limit theorem, linear regression, ...



Machine learning

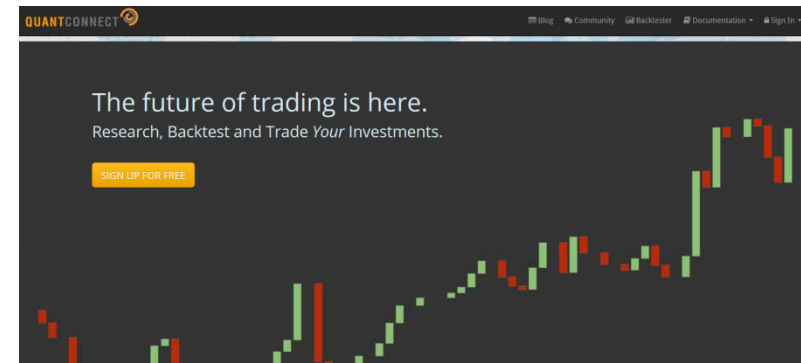
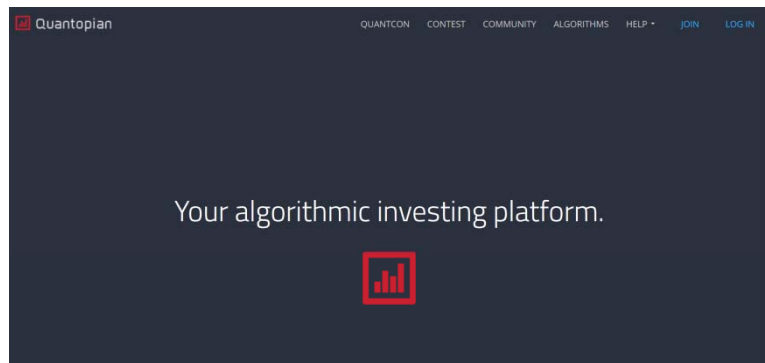
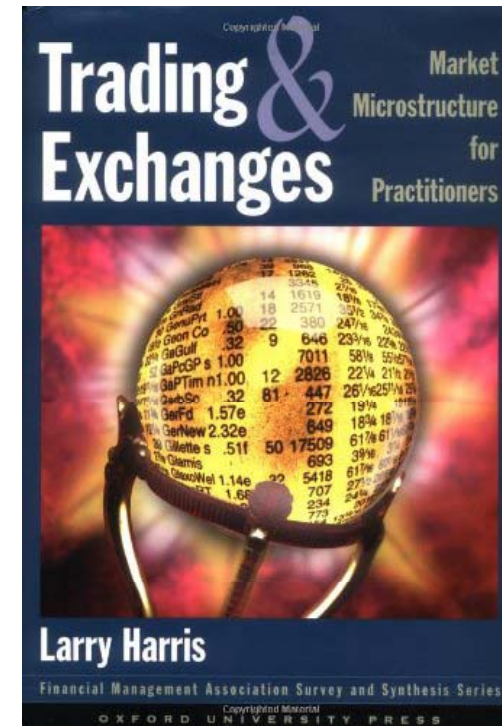
Resources:

1. [MIT 6.867 notes](#)
2. [Stanford CS229 notes by Andrew Ng](#)
3. CMU Data Mining notes by Ryan Tibshirani
4. The Elements of Statistical Learning
or An Introduction to Statistical Learning: with Applications in R

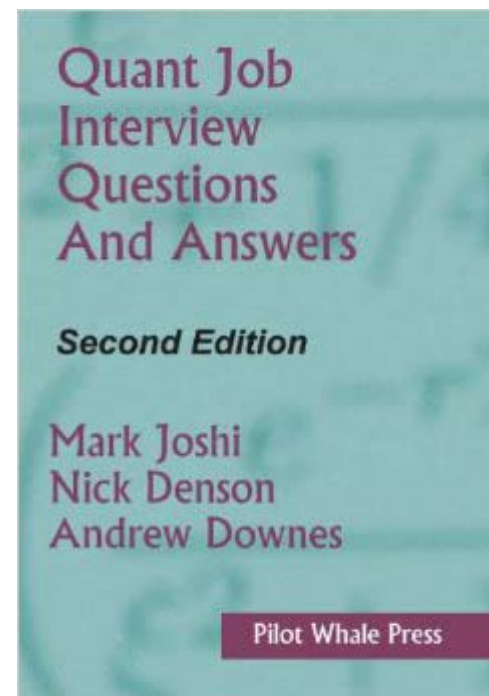
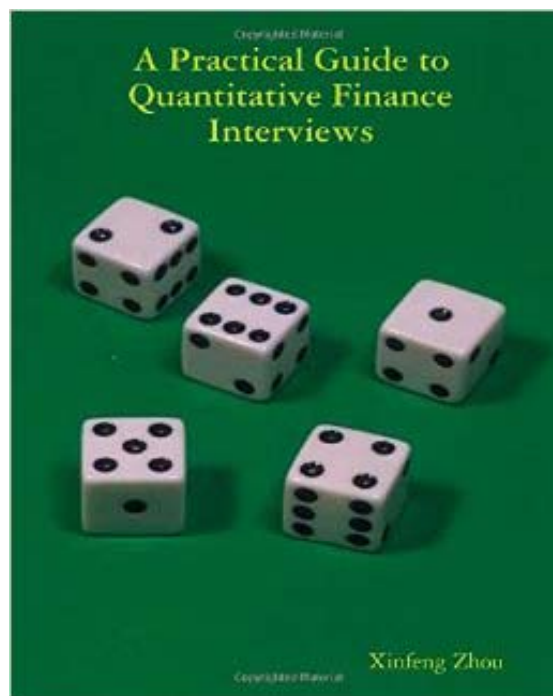
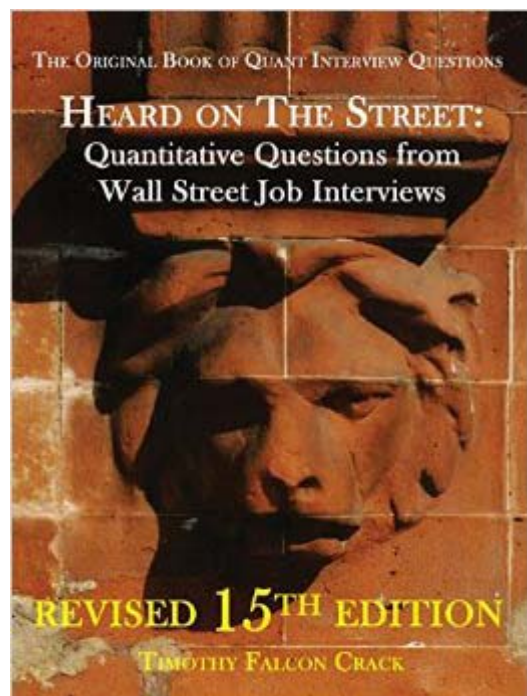


Finance and Trading

- Finance Theory class notes
- Analytics of Finance class notes
- Trading and Exchanges book
- Traders@MIT Traders@MIT
- Open a brokerage account and trade!
- Online algorithmic trading platform:
Quantopian in python
Quantconnect in C#



Brain Teasers / Interview books



Classes offered at MIT

Algorithm:

6.006: Introduction to Algorithms

6.046: Design & Analysis of Algorithms

6.231: Dynamic Programming & Stochastic Control

Statistics:

6.437: Inference & Information

6.438: Algorithm for Inference

6.867: Machine Learning

14.381: Statistical Methods in Economics

Finance:

15.401/15.402: Finance Theory

15.450: Analytics of Finance

Other:

6.255: Optimization Methods

6.337: Introduction to Numerical Methods

6.262/6.265: Stochastic Process



Founded in 1990

Headquarters: Chicago

of employees: 1000+

Citadel Securities: quantitative strategies

250+ people, 50+ quants

Very successful business, especially in recent years

Performance-based rewarding

Great starting package among big firms

Located in Chicago

Recruiting process:

usually 1-2 rounds of campus/phone interviews

full day onsite, usually meet 5-6 pp

Other firms in this category: Two Sigma, D.E. Shaw, ...

The logo for PDT PARTNERS, featuring the text "PDT PARTNERS" in white, bold, sans-serif capital letters on a dark blue rectangular background.

Founded by Peter Muller in 1993 in Morgan Stanley
Spin off and became independent in 2013
Headquarters: New York
of employees: 100+

CEO Peter Muller: “the coolest guy in Wall Street”

Researchers position (quants): top school PhDs only!

label themselves as elite company: highly selective

Recruiting process:

1. campus interviews
2. “Super Saturday”: all entry level candidates come onsite
3. Research presentation + full day interview



Hudson River Trading
Founded in 2002
Headquarters: New York
of employees: <100

Positions: Algorithm Developer vs Core Developer

Strength and Culture

Recruiting process: usually 2 rounds of campus/phone interviews
full day onsite, meet ~5 pp



Founded by Mark Gorton in 1998
Headquarters: New York

Small research group + shared technology infrastructure

Strength and Culture

Recruiting process: 1-2 rounds of campus/phone interviews
full day onsite, meet 5-6 pp

other firms in this category: Jump Trading, ...



Founded in 2013

Headquarters: NYC, SF

of employees: ~20

Founders: James Chiu, Harr Chen and Pang Chau

Very promising young start-up:

1. all-star core team
2. great culture
3. high compensation

Recruiting process:

1-2 phone interviews
full day onsite, meet almost everyone in the team

Other top firms for quants:

Renaissance
Two Sigma
Jump Trading
D.E. Shaw
Virtu Financial
...

Other opportunities:

Jane Street
Susquehanna International Group (SIG)
DRW
WorldQuant
Point72 Asset Management(formerly SAC)
Teza
....

Firms near Cambridge: Domeyard, Tech Square Trading

There are lots of opportunities out there, not only in finance!

No matter what you do, do your very best!

Help your fellow students when you can!