

A List of Machine Learning and Financial Markets / Trading Resources

Important Note: Some of the content, notation, and terminology in the supplemental resources below may differ from our course material, in which case they do not override or supersede the CS7646 (ML4T) lectures and required readings.

Posts [@691](#) asks if we could provide additional resources and references that we have found useful.

Below you will find additional resources that dive into the details of the topics introduced in this course (and more). Many of these books and videos are part of our personal libraries (as books we've read, are reading, or use as references). There's a lot here. But, since the intent of this post is to serve as a list to additional resources, we wanted to provide a robust, yet curated set of references. Sometimes when one author's material doesn't resonate, switching to another author or source might facilitate understanding and learning.

In addition to this list, please feel free to add suggestions and recommendations below as follow-up posts.

FINANCIAL MARKETS AND TECHNICAL ANALYSIS RESOURCES

[With the rise in machine learning and algorithmic trading, some have questioned how well manual trading systems will perform.](#) These types of discussions tend to support the idea that top performing traders and funds will move to Machine Learning, Artificial Intelligence, and Algorithmic trading.

1	Stockcharts.com - Technical Analysis School and Indicators	This is a good reference site, mostly because of its breadth of Technical Analysis information and free charting tools. This site could serve as a source of inspiration for indicators and strategies used in Projects 6 and 8.
2	Investopedia.com	This site often comes up in internet searches regarding Technical Analysis and Financial Markets terminology. It may prove a useful source of information for multiple projects.
3	Technical Analysis Explained (Book) - Martin Pring	Most recently updated in 2014, this book discusses many technical analysis approaches and indicators. It is one of two well-recognized and often recommended books on Technical Analysis. Long-term the value of this book may decrease as machine learning tools play an increasingly important role.
	Python for Finance (Official Course Supplemental Reading) (Book) (Amazon and Oreilly)	This is a good book that provides examples that could help with project implementations. For example, the section on optimization is directly applicable to our Optimize Something project.
4	Technical Analysis of the Financial Markets (Book) - Thomas Murphy	This book, in my opinion, is probably the most well-recognized book on technical analysis. This book really isn't designed to be read cover-to-cover, but to serve more as a reference. Long-term the value of this book may decrease as machine learning tools play an increasingly important role.
5	What Hedge Funds Really Do - (Official Course Book) - Tucker Balch (Amazon)	Required for CS7646 (ML4T), this is a compact, concise book that covers the core elements of hedge funds, markets, and portfolios.

MACHINE LEARNING RESOURCES

There are many wonderful on-line resources that explore Machine Learning to a greater depth. Below are some of the sites, books, and courses we've found useful.

1	An Introduction to Statistical Learning (ISL) (Book)	This book is often suggested within our CS7646 (ML4T) Piazza forum for its coverage of learners, discussion of decision trees, and how it assesses learner performance. This book as a kinder, gentler version of Elements of Statistical Learning. It is available freely from the author's website. Chapters 1, 2, and 8 are most relevant to our work in CS7646.
2	Elements of Statistical Learning (ESL) (Book)	One can think of this as the more mathematically rigorous version of ISL (above). It is also available freely from the author's website. The chapter on Boosting is relevant to our course, in addition to their discussions on decision trees and ensemble learners.
3	The Hundred-Page Machine Learning Book (Amazon)	A very quick introduction to many machine learning concepts in slightly more than 100 pages. As a quick introduction, it does not go into the detail necessary for a thorough understanding of the material (to the extent expected in the Georgia Tech ML specialization). However, as a quick reference or high-level Machine Learning study guide, it is a useful resource.
4	Machine Learning (Official Course Supplemental Reading) - Tom Mitchell (Book) (Amazon)	<p>This book is a classic in machine learning. Some have asserted that this book is dated and question its continued use based on that reason alone. However, that line of reasoning is akin to questioning the relevance of a book written to teach foundational calculus simply because it wasn't published recently. While this book may not cover the latest in deep learning or reinforcement learning, it presents a concise, thorough discussion of foundational machine learning. This book continues to be required reading in CS7641 (Machine Learning).</p> <p>Note: Mitchell's Machine Learning book is sometimes hard to find online at a reasonable cost. It may be available through the Georgia Tech library.</p>
5	Machine Learning - Kevin Murphy (Book) (Amazon)	Murphy's Machine Learning book is one of the leading alternatives to Mitchell's Machine Learning book. It covers a lot of material and presumes a solid mathematical foundation. A second edition of the book is in the works and (as of the time of writing this post) scheduled for a Fall2021 release.
6	Machine Learning Course Video - CS7641 Georgia Tech	At some point, these are must watch videos for anyone in the Georgia Tech Machine Learning specialization. The first two modules discuss decision trees, regression, and classification. The first two reinforcement learning modules discuss reinforcement learning, while the latter two focus on game theory. While the material dives into more detail than covered in our course, it might prove useful for anyone working to understand the foundational RL concepts beyond what is introduced in CS7646.
7	Machine Learning Course Video - CMU-601 - Carnegie Mellon University	An introduction to machine learning course by Tom Mitchell and Maria-Florina Balcan. The first two lectures address decision trees. Midway through are a few lectures on boosting. Near the end is a lecture on reinforcement learning. Mitchell's videos cover material from his Machine Learning book and elsewhere.
8	Intro to Machine Learning Videos - CS480/680 - University of Waterloo	This is another good Introduction to Machine Learning course. It includes some material that is not in most Intro to ML material: Transformers. Transformer architectures include terms like muppets , ernie , bert , elmo (for Sesame Street fans). Andrew Ng, a leader in the Machine Learning field, ends a blog post on muppets with, " This edition of The Batch [his blog] is brought to you by the letters A and I. "
10	Machine Learning Course (Coursera Platform)	This is one of Andrew Ng's first Machine Learning courses on the Coursera platform, offered in conjunction with Stanford University. It is a good course and many people completed all or part of this course prior to enrolling at Georgia Tech.

REINFORCEMENT LEARNING RESOURCES

Reinforcement Learning differs from supervised learning because it emphasizes learning and making decisions over time. Below are some of the best materials available online.

1	Reinforcement Learning: An Introduction (Book) - Sutton and Barlo	This is the definitive textbook on reinforcement learning. While it goes into much more depth than what is covered in CS7646, many have suggested reading the first four chapters prior to taking Georgia Tech's CS7642 (Reinforcement Learning) course.
2	Reinforcement Learning (Videos and PowerPoint Lectures) - David Silver	Although this video series is not directly associated with Sutton's book, it tends to follow it very closely. As with Sutton's book (above), it goes into much more depth than what is covered in CS7646.
3	Reinforcement Learning Course - CS7642 Georgia Tech	This is Georgia Tech's reinforcement learning course. While this material stands-alone, it builds upon the reinforcement learning material that is introduced in CS7641 - Machine Learning. Anyone looking for more RL content than is covered in CS7646 will find this a good place to start.
4	Reinforcement Learning Course - Stanford University	Another good set of videos on reinforcement learning, by Emma Brunskill at Stanford.

MACHINE LEARNING - THE HISTORICAL PERSPECTIVE

Anyone looking to understand the machine learning or deep learning journey might want to explore some of these books and articles.

1	The Deep Learning Revolution (Amazon)	This is an easy to read book that presents Deep Learning, starting with a historical perspective and stepping forward to what's possible today. It's written by Terrence Sejnowski, who is one of the founders of modern machine learning (see next entry on Parallel Distributed Processing). This is a good book and a relatively quick read.
2	Parallel Distributed Processing - Volume 1 and Volume 2	In a way, this 1986 two volume series re-launched the wave of Neural Networks (now rebranded as Deep Learning) excitement. Many of the approaches we use today build on some of the foundational ideals, concepts, equations, and algorithms found here. In fact, many of today's recognized ML leaders were members of UCSD's PDP Research Group; including Michael I. Jordan, Geoffrey Hinton, and Terrance Sejnowski. Note: Access will likely require being logged into the Georgia Tech VPN or going through the Georgia Tech Library.
3	Deep Learning (Nature Article)	A really good paper by Hinton and others regarding deep learning. Also, the references section points to other important foundational Deep Learning papers. Note: Access will likely require being logged into the Georgia Tech VPN or going through the Georgia Tech Library

DEEP LEARNING

While our projects are not oriented toward Deep Learning, we know that there is a lot of interest in this topic. Here are some resources that might be useful for further exploration and research.

1	Deep Learning	This is the current leading textbook on Deep Learning.
2	Grokking Deep Learning - (Amazon and Oreilly)	This is a very hands-on book where, like ML4T, you get lots of experience implementing algorithms. While it does a good job of building an intuition (and algorithms), one shortcoming is that it contains several mistakes and typos that can be confusing. While most people will be able to figure out the correct answers, ideally the second edition (assuming there is a second edition) corrects these mistakes.
3	Foundations of Deep Reinforcement Learning - (Amazon and Oreilly)	Sections 1.1 through 1.4 provides a nice introduction to reinforcement learning and our work in CS7646. In fact, you can see how Algorithm 1.1 (page 9) forms the core control loop in the testqlearner.py file (Project 7).
4	deeplearning.ai (online)	This is a very hands-on course, developed by Andrew Ng, designed to build skills in various deep learning tools and techniques. The modules include: Neural Networks, Improving Deep Neural Networks, Structuring Machine Learning Projects, Convolutional Neural Networks, and Sequence Models. Offered through the Coursera platform, there may be student discounts available.