

AI for Finance

Class 1: Why AI & Machine Learning for Economists

Ray Ge

Quant RUC (人量化) & IE Finance

2026 年 1 月 15 日



Course Schedule
oooooooooooo

What is a Financial AI Model?
oooooooooooooooooooo

Advantages of ML Models
oooooooo

Demand in Economics and Finance Jobs
oooooooooooo

Learning & Practice Resources
oooooo

Course Schedule

What is a Financial AI Model?

Advantages of ML Models

Demand in Economics and Finance Jobs

Learning & Practice Resources

Course Schedule
●oooooooooooo

What is a Financial AI Model?
oooooooooooooooooooo

Advantages of ML Models
oooooooo

Demand in Economics and Finance Jobs
oooooooooooo

Learning & Practice Resources
oooooo

Course Schedule

What is a Financial AI Model?

Advantages of ML Models

Demand in Economics and Finance Jobs

Learning & Practice Resources

Info

- Ray Ge
 - Research Interests: 1) Financial Risk, 2) Stocks & Bonds & Real Estate, 3) Data Science
 - lge@faculty.ie.edu (office hrs after classes or by appointments)

Why Quantitative Modeling?

- A future essential skill for economists both in academics and industry
 - Machine-learning algorithms vastly outperform human analysts

Industry Example: AI Accuracy and Speed Outperform Real-Estate Analysts

- Prediction errors for distressed real-estate asset packages is only 3% (analyst error 10%)
 - Accuracy for predicting single property values is about 5% (analyst error 8%)
 - Evaluate tens of thousands of properties per hour (analyst 1 property / hour)

Academic Example: AI & ML to Boost Research

- 1 million foreclosure housing documentations
- Human: 5min per documentation → 3,472 hours workload
(Impossible for Research)
- AI: Around 1 day running time → 10 euro electricity cost for
the computer

Expected Outcomes

1. Critical Thinking (model-based reasoning and logic)
2. Ability to handle financial and economic data with Python (Data Scientist)
3. Ability to build quantitative models for analysis and prediction with Python

Course Assessment

The course assessment simulates the real work of a company's quantitative team: modeling and presentation skills

- Homework 20%: programming assignments.
- Discussion and Q and A 10%: classroom performance and cold calls, simulating real business challenges.
- Final assessment 70%: programming project final evaluation, business quantitative model evaluation.

Textbooks

Main textbooks:

- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow (free online version available).
- Hands-On Large Language Models (free online version available).
- Quantecon.org (founded by Thomas Sargent) (free online).

Supplementary Textbooks

- The Elements of Statistical Learning (Trevor Hastie, Robert Tibshirani, Jerome Friedman)
- Deep Learning, Goodfellow

Course Outline

- Week 1: What is an economics machine-learning model; overview of AI/ML models in finance; industry overview.
- Weeks 2: Machine-learning modeling workflow; how economic knowledge explains quantitative models; Python installation and fundamentals.
- Week 3: Practical financial data analysis; downloading official data via APIs and web scraping; large-scale financial data analysis (also the start of the final quantitative project).
- Weeks 4: Linear machine-learning model training: OLS, Lasso, Ridge, Elastic Net.

Course Outline (cont.)

- Week 5 : Design a linear ML model with real financial data.
- Week 6: Classification algorithms (Quant risk and classification models)
- Weeks 7: Ensemble tree algorithms (XGBoost, Random Forest)

Course Outline (cont.)

- Weeks 8: Neural network models (ANN + CNN)
- Weeks 9: Large models (Transformer)
- Weeks 10 (Final Presentation): Quantitative modeling in finance, model showcase, improvement, discussion, and critique.

Course Schedule
oooooooooooo

What is a Financial AI Model?
●oooooooooooooooooooo

Advantages of ML Models
oooooooo

Demand in Economics and Finance Jobs
oooooooooooo

Learning & Practice Resources
oooooo

Course Schedule

What is a Financial AI Model?

Advantages of ML Models

Demand in Economics and Finance Jobs

Learning & Practice Resources

Why Should We Learn AI Models?

- Motivation for learning quantitative methods
- How these skills help future careers
- How to start learning

Machine-Learning Models are Dominating Various Areas

- Commercial Banks
- Stock
- Investment
- Real estate
- Recommendation System
- Data Science

Why ML Became a Darling of Financial & Economic Markets

So why now?

- Highly competitive market demands
- ML models can evaluate both value and risk
- Increasing market risk requires accurate investment and risk analysis (e.g., stock, real-estate investments)

AI vs Machine Learning vs Deep Learning

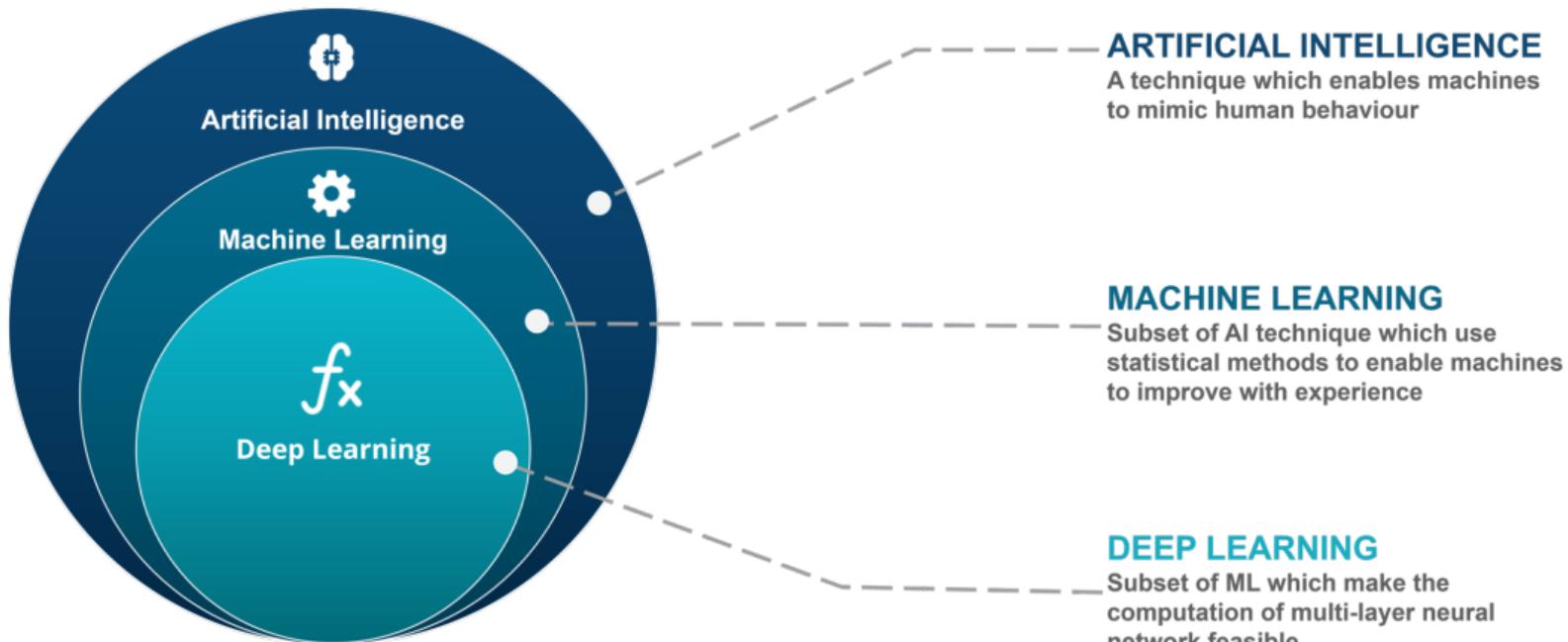


图: AI vs Machine Learning vs Deep Learning

Common ML Algorithms in Economics

Economics typically uses:

1. **Linear algorithms**: OLS, 2SLS, Logit, etc. These are foundational – BLUE (Best Linear Unbiased Estimation). For economics students, mastering econometrics and statistics is essential. Other linear methods: LASSO, Ridge, Elastic Net, MARS.
2. **Ensemble learning**: XGBoost, CatBoost, AdaBoost, Random Forest.
3. **Deep learning**: ANN (Artificial Neural Network), CNN, RNN.
4. **Others**: Bayesian estimation, KNN, K-means, PCA, Causal Forest (Susan Athey), Double Machine Learning (Victor Chernozhukov), etc.

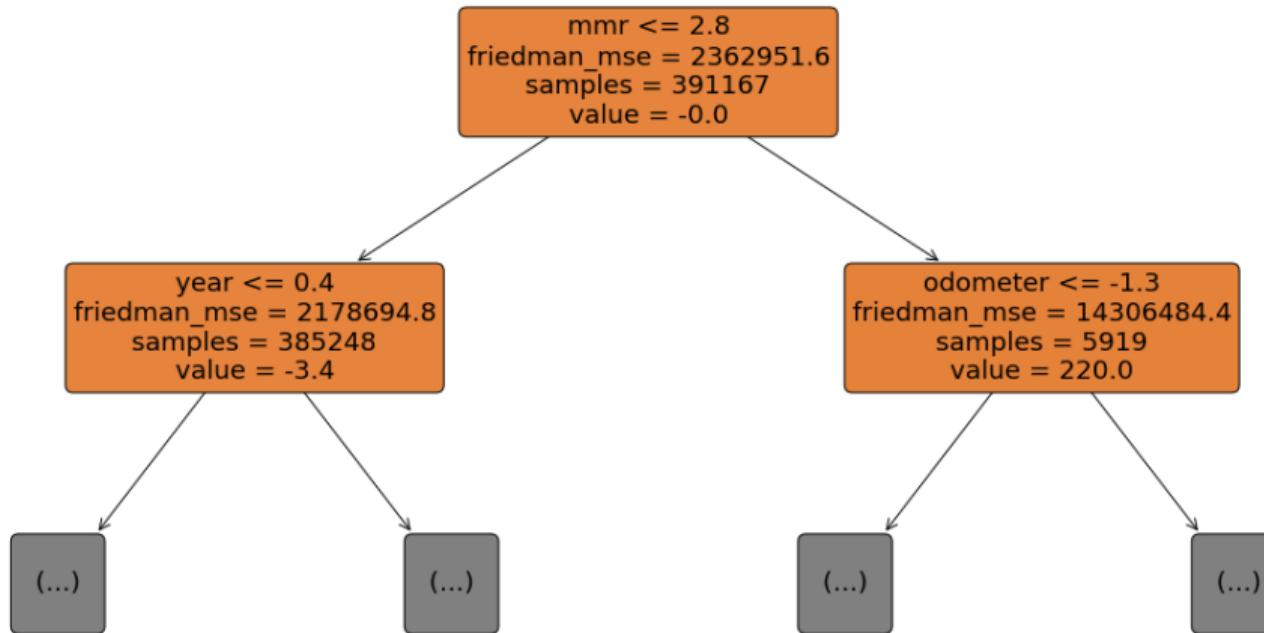
Machine Learning is not a Black Box

- In Python, building ML models is straightforward.
- Ensemble methods like XGBoost, CatBoost, AdaBoost simplify ensemble learning.
- TensorFlow and PyTorch streamline deep-learning model construction.
- HuggingFace Transformers, Unslloth, LlamaFactory simplify large-model building.
- We'll show two simplified ML models (minimal architectures and parameters for learning purposes).

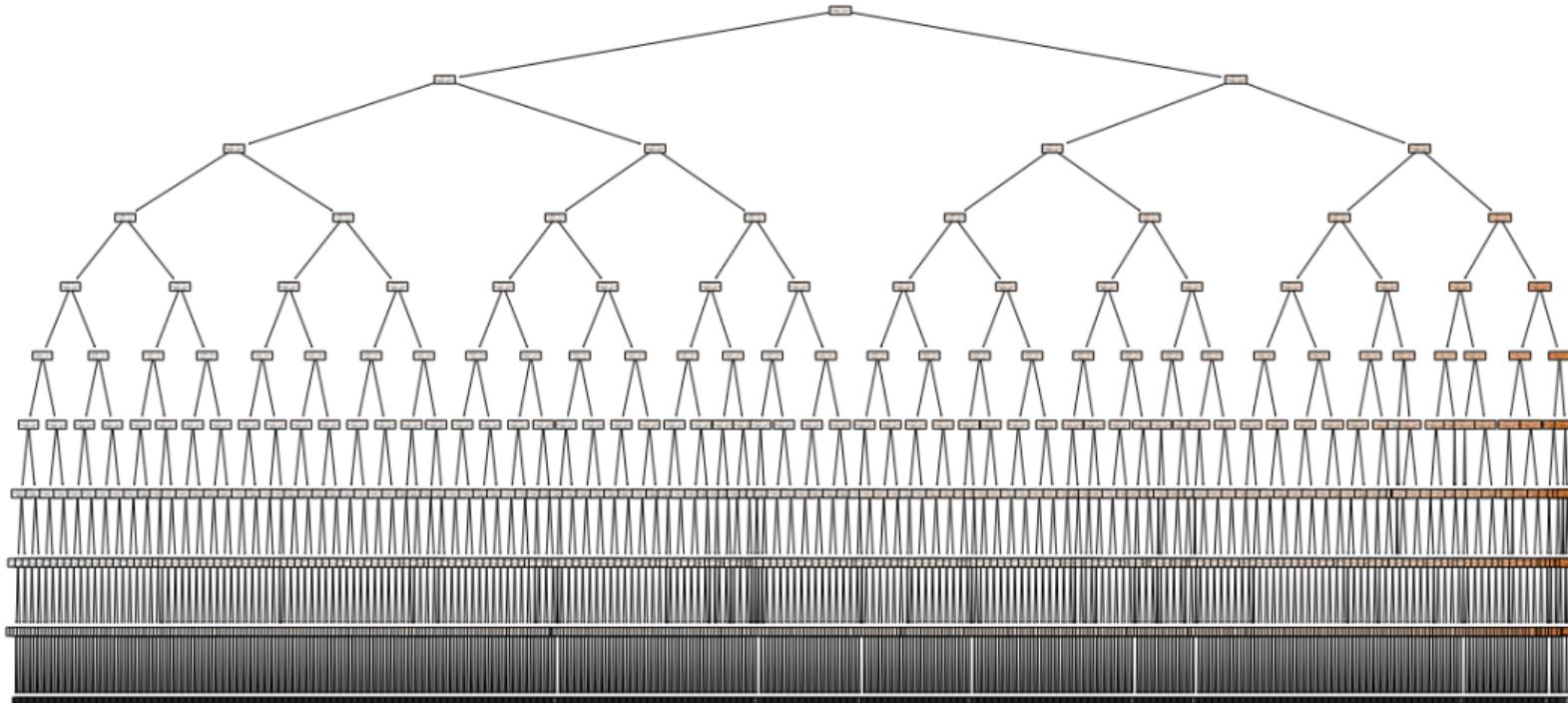
Ensemble Learning (Gradient Boosting Model Construction & Prediction)

```
hyperparameters_gb={'n_estimators':200,'learning_rate':0.1,  
reg_gb=GradientBoostingRegressor(**hyperparameters_gb)  
reg_gb.fit(xtrain_ann,ytrain_ann)  
ytest_gb = reg_gb.predict(xtest_ann)
```

Ensemble Learning (Gradient Boosting Framework)



Ensemble Learning (Gradient Boosting Framework)



Deep Learning (ANN Model Construction)

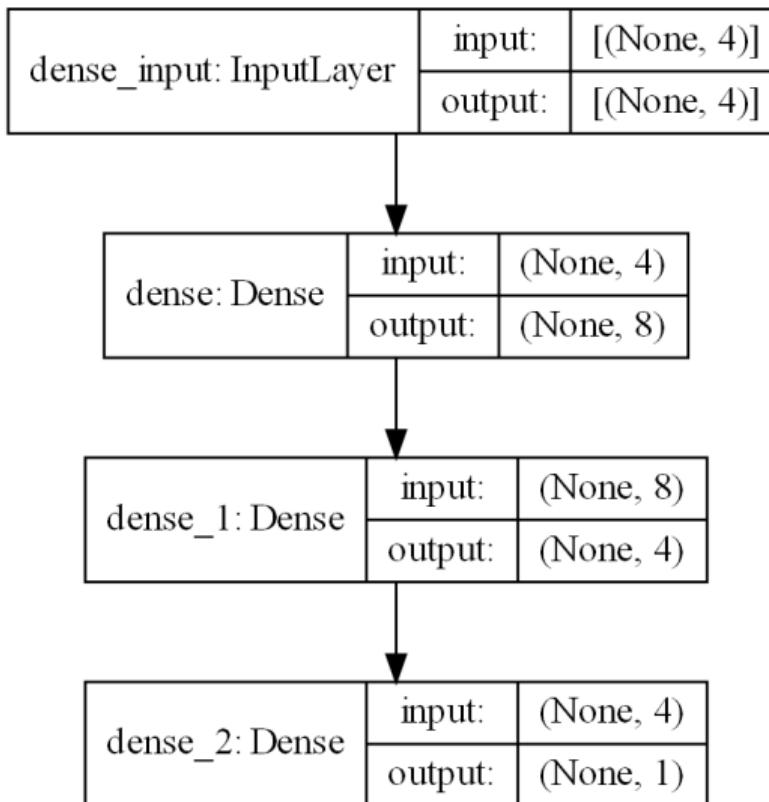
```
K.clear_session()  
epochs=10  
batch_size=128  
model_ann = Sequential()  
optimizer = keras.optimizers.Adam(lr=0.001)  
model_ann.add(Dense(8,activation = 'relu',  
                   input_dim = len(xtrain_ann.columns)))  
model_ann.add(Dense(4,activation = 'relu'))  
model_ann.add(Dense(1,activation ='linear'))  
model_ann.compile(optimizer = optimizer,loss = 'mse',metrics = [ 'mae'])  
model_ann.summary()
```

Deep Learning (ANN Training & Prediction)

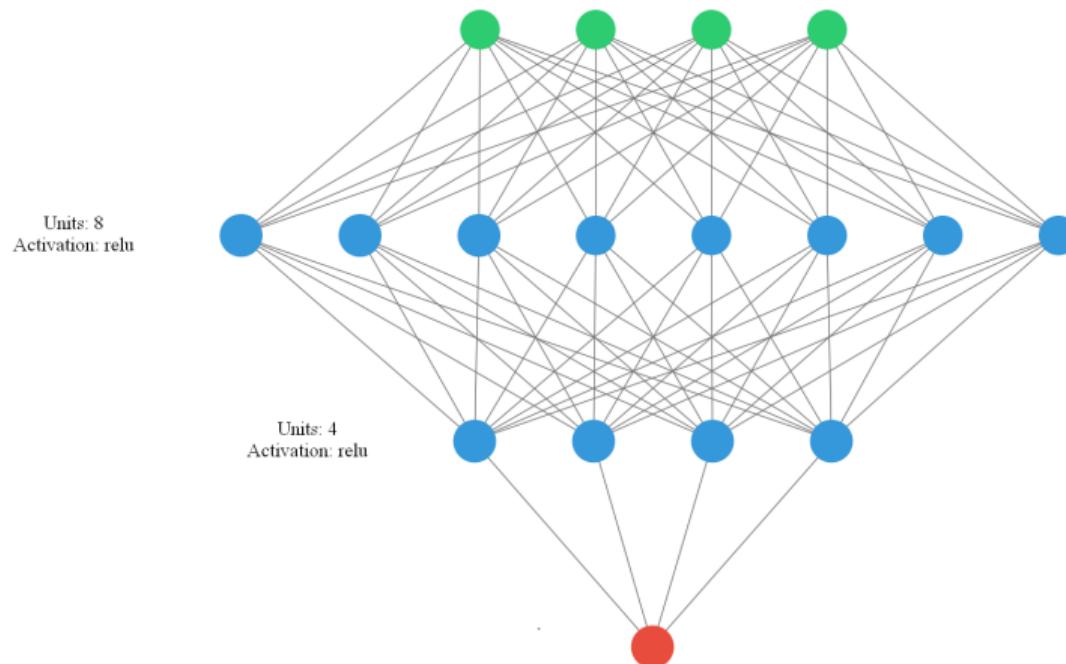
```
%%time
with tf.device('/gpu:0'):
    model_ann.fit(xtrain_ann,ytrain_ann,
                   batch_size=batch_size,epochs=epochs,
                   verbose=0)
ytest_ann = model_ann.predict(xtest_ann,batch_size = 32)
```

Wall time: 1min 29s

Deep Learning (ANN Framework)



Deep Learning (ANN Framework)



Artificial Intelligence GPT Model

```
from transformers import AutoTokenizer, AutoModelForCausalLM

# Load the tokenizer and model
tokenizer = AutoTokenizer.from_pretrained("gpt2")
gpt_model = AutoModelForCausalLM.from_pretrained("gpt2")
# Example input text
input_text = "what is python"
# input_text = "Python example of using bert for word embedding"

# Tokenize the input text
inputs = tokenizer(input_text, return_tensors="pt")

# Generate text
outputs = gpt_model.generate(**inputs, max_new_tokens=50)

# Decode the generated text
generated_text = tokenizer.decode(outputs[0], skip_special_tokens=True)
print(generated_text)
```

Short History of Machine Learning

1. Linear models: Legendre (1805) and Gauss (1809) used linear regression to predict planetary motion.
2. Early deep-learning: Warren McCulloch & Walter Pitts (1943) created a computational neural-network model.

source: Timeline of AI (Wikipedia)

Cases where ML Surpassed Humans

1. AlphaGo (Microsoft): beat world champion Lee Sedol in 2016.
2. GitHub Copilot (Microsoft): AI writes code on demand, completing junior-coder tasks.
<https://copilot.github.com/>
3. ChatGPT (Microsoft): automatically generates articles, code, replacing finance analysts, economists, programmers.
4. Future: $AI \rightarrow AI \rightarrow AI \rightarrow \dots$

What Cannot be Replaced by AI?

- Independent thinking
- Creativity
- In the AI era, the core competition is for young talent with independent thinking and creativity (just like you all).

Course Schedule
oooooooooooo

What is a Financial AI Model?
oooooooooooooooooooo

Advantages of ML Models
●oooooo

Demand in Economics and Finance Jobs
oooooooooooo

Learning & Practice Resources
oooooo

Course Schedule

What is a Financial AI Model?

Advantages of ML Models

Demand in Economics and Finance Jobs

Learning & Practice Resources

What is Learning? The Human Societal Learning Process

We can compare machine learning with human learning.

1. Learning is not a new concept.
2. Human evolution itself is a learning process.
3. Learning = Try + Improve + Repetition.

Human Learning is Slow and Accumulative

The only lesson history teaches us is that we do not learn from history. — Hegel



Human Learning Issues

- From the ML perspective, Hegel's point means society's learning rate is too low, i.e., η is too small.
- Note: learning rate is a key hyperparameter in ML, controlling how fast the algorithm learns.

ML Advantages Over Human Learning

1. ML mimics human learning via algorithmic iteration: try + improve + repeat.
2. The difference is the speed of repetition and optimization: a human may spend months or years per cycle; a machine can do it in less than a second.
3. Experienced financial analysts rely on decades of work and thousands of cases, yet ML can analyze hundreds of thousands—or even millions—of assets in a few hours, constantly improving its predictive power. Thus ML far surpasses human analysts in both accuracy and efficiency.

How ML Learns from Data

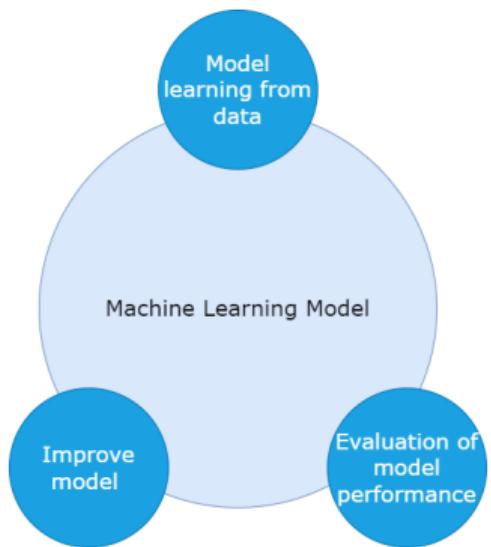


图: How ML Learns from Data

ML Models in Economics

1. ML models in finance/ economics—quantitative modeling (Quant)—are widely used in stock investment, high-frequency trading, asset management, risk management, asset valuation, insurance, fraud detection, etc.
2. Many of our economics peers aspire to become quant researchers, data scientists, etc.
3. For economists, mastering Python-based quantitative modeling is essential.

Course Schedule
oooooooooooo

What is a Financial AI Model?
oooooooooooooooooooo

Advantages of ML Models
ooooooo

Demand in Economics and Finance Jobs
●oooooooooooo

Learning & Practice Resources
oooooo

Course Schedule

What is a Financial AI Model?

Advantages of ML Models

Demand in Economics and Finance Jobs

Learning & Practice Resources

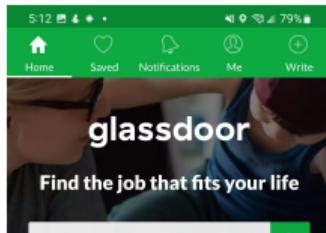
Why Quant Models Are Basic Skills for Economists?

1. Economists' simple analyses are no longer sufficient (e.g., clients want to know not just the price rise but why, and by how much).
2. Quant models run far faster than human analysis (e.g., real-estate price analysis, stock fundamentals, price forecasting, risk forecasting, report generation).
3. High-quality quant models (including ML and deep-learning variants) often match or exceed human analytic accuracy.

⇒ Quant models are the future essential skill for economists.

Job Market Demand in Economics and Finance

The best way to gauge market trends is to see what talent is needed. On Glassdoor we searched quantitative modeling demands and requirements.



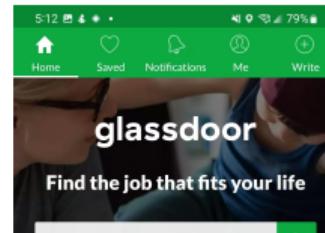
Get notified of new jobs

Tired of searching for jobs? Create a job alert to see the freshest jobs daily

Create Job Alert

Suggested Searches

quant
Townshipin Cities Amf, MN (US)



Get notified of new jobs

Tired of searching for jobs? Create a job alert to see the freshest jobs daily

Create Job Alert

Suggested Searches

quant
Townshipin Cities Amf, MN (US)

Quant Talent Demand Cases 1, 2

1:15 4 73%
← Quant Research and Model... Morgan Stanley • New York, NY

Job Company Rating Why V

QUALIFICATIONS

7-10 years of experience in the financial services industry in a quantitative field, preferably with experience in model development/review, risk modeling and portfolio optimization

At least Master's Degree in a technical field such as Mathematics, Statistics, Econometrics or Operations Research

Existing experience in leading conversations in Firm Risk Committees as well as with Model risk management function is preferable

Programming skills in statistical packages such as R, python or Matlab and familiarity with database systems such as Sybase, MS SQL

Familiarity with vendor risk systems such as RiskMetrics, BlackRock Aladdin, MSCI/

1:50 4 71%
← Quant Analyst Barclays PLC • New York, NY

Job Company Rating

What we're looking for:

- Bachelor's Degree in quantitative discipline e.g. Finance, Mathematics/ Statistics or Economics
- Experience in statistical model development
- Knowledge of data analysis, theory and statistical techniques
- Proficiency with analytical software Python, R, SQL tools e.g., Oracle, Unix platforms, and Microsoft Office

Skills that will help you in the role:

- Graduate studies, Masters or PhD in quantitative discipline
- Analytical work experience in a financial services company and strong technical and / or statistical skills with proven ability to process large datasets into meaningful

Quant Talent Demand Cases 3, 4

1:49 4G 72% [View Job](#)

← OPTIONS DESK QUANT
XR Trading, LLC • Remote

Job Company Rating

Required Skills

- Strong mathematical aptitude
- Fluency in statistical methods and modeling
- Coding skills in Python (C++ familiarity is a plus)
- Exposure and familiarity with machine learning techniques
- Values teamwork but capable of thinking independently
- Works on own initiative / hustle – takes a pragmatic approach
- Effective communication with all levels of professional experience
- Ability to retain information and then teach others what you have learned

Required ExperienceExhibits and interests in addition to[Easy Apply](#)

1:20 4G 72% [View Job](#)

← Data and Applied Scientist
Microsoft Corporation • Redmond, WA

Job Company Rating

Required:

- A bachelors or higher degree in computer science, machine learning, statistics, math, economics, business or other scientific or quant-focused field

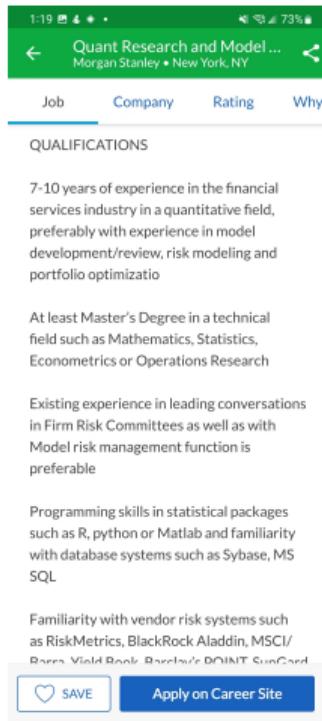
- Programming skills (esp. related to data technologies like Python, Java, C#, etc.)
- 2 or more years of experience using data/ML/AI to impact critical product or business decisions

Preferred:

- Experience with hypothesis testing, graph theory and experiment design
- A proven track record of collaborating across organizational boundaries and

[Apply on Career Site](#)

Quant Talent Demand Cases 5, 6



Quant Research and Modeler
Morgan Stanley • New York, NY

Job Company Rating Why V

QUALIFICATIONS

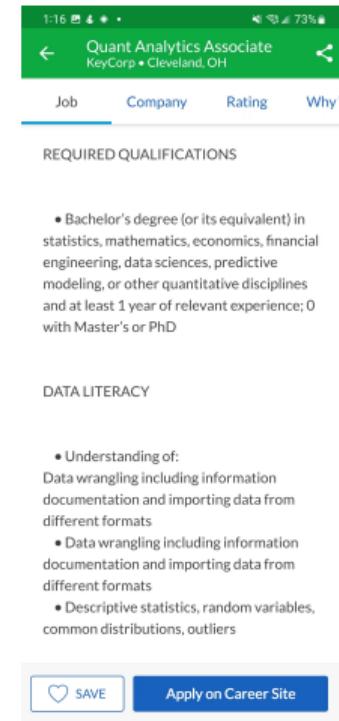
7-10 years of experience in the financial services industry in a quantitative field, preferably with experience in model development/review, risk modeling and portfolio optimization

At least Master's Degree in a technical field such as Mathematics, Statistics, Econometrics or Operations Research

Existing experience in leading conversations in Firm Risk Committees as well as with Model risk management function is preferable

Programming skills in statistical packages such as R, python or Matlab and familiarity with database systems such as Sybase, MS SQL

Familiarity with vendor risk systems such as RiskMetrics, BlackRock Aladdin, MSCI/ DiversiVest Rock, Riskalyze, DRINK, SmartRisk



Quant Analytics Associate
KeyCorp • Cleveland, OH

Job Company Rating Why V

REQUIRED QUALIFICATIONS

- Bachelor's degree (or its equivalent) in statistics, mathematics, economics, financial engineering, data sciences, predictive modeling, or other quantitative disciplines and at least 1 year of relevant experience; 0 with Master's or PhD

DATA LITERACY

- Understanding of:
Data wrangling including information documentation and importing data from different formats
- Data wrangling including information documentation and importing data from different formats
- Descriptive statistics, random variables, common distributions, outliers

Key Keywords for Quant Modeling Jobs

From the above postings we see two tightly related keywords: Economics and Python.

- Economics: In today's financial markets, economics is often classified as a STEM discipline, requiring strong quantitative, statistical, and programming skills. Economics students' math-stat abilities are expected to match those of math or statistics majors. Good programming ability is also essential.
- Python: The most popular language for quantitative modeling today.

Knowledge Base for Economic Quantitative Modeling

1. **Economics:** the social science concerned with production, distribution, and consumption of goods and services.
2. **Quantitative modeling:** using econometrics & ML to build models that explain and solve economic problems.
3. **Python:** the trending programming language for building quantitative models.

Economic AI Modeling: an Organic Combination of Three Knowledge Areas

This course content goes beyond Python alone:

- Having Python skills does ****not**** equal economic forecasting.
- Applying economic theory does ****not**** equal quantitative modeling.
- Economic AI modeling = Python + Economics + ML models.

Industry Quant Modelers: Specific Roles & Workflow

Building quant models is complex with stringent accuracy and quality controls. Model quality management is even more critical than the algorithm itself.

1. First-line modeler: gathers business requirements, obtains data, builds the quant model, and hands it to developers for application.
2. Second-line modeler (model validating): reviews first-line models, identifies issues, and suggests improvements.
3. Third-line modeler (model auditing): ensures compliance, legal, and regulatory adherence.

So This Modeling Class is for:

Targeted at:

1. Those wishing to work in industry as quant researchers, data scientists, etc.
2. Those wishing to pursue academic research
3. Even those intending to start their own ventures.

Course Schedule
oooooooooooo

What is a Financial AI Model?
oooooooooooooooooooo

Advantages of ML Models
oooooooo

Demand in Economics and Finance Jobs
oooooooooooo

Learning & Practice Resources
●ooooo

Course Schedule

What is a Financial AI Model?

Advantages of ML Models

Demand in Economics and Finance Jobs

Learning & Practice Resources

Skills: Reading White Papers & Research Papers

- Model documentation helps you quickly master a model (e.g., <https://xgboost.readthedocs.io/en/stable/tutorials/model.html> or its offline PDF). Source: model website or GitHub.
- Papers delve deeper into internal structures (e.g., <https://arxiv.org/abs/1603.02754>). Find them via Google Scholar or arXiv.

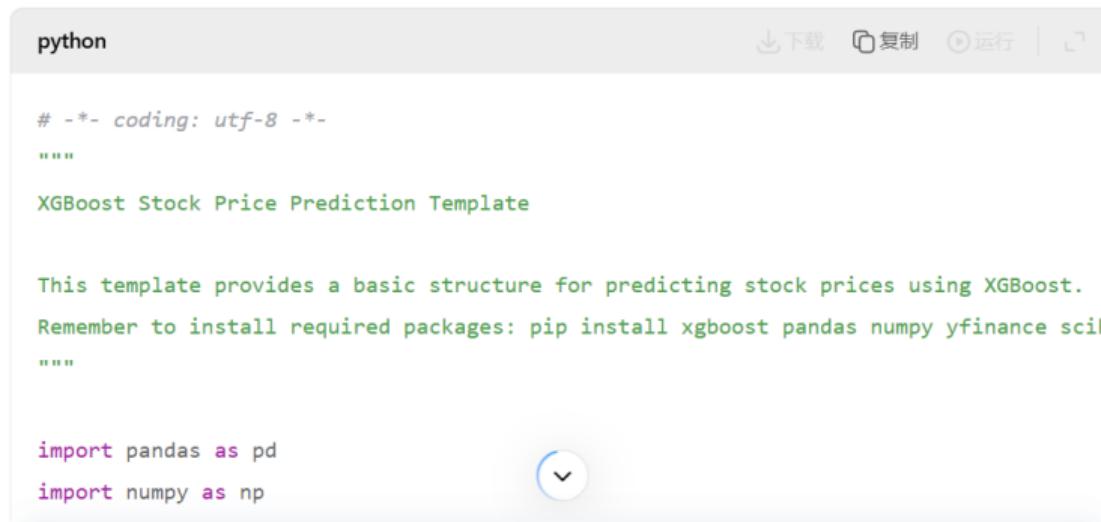
If You Encounter Coding Issues

- Search engines such as Google
- StackOverflow
- Python's help function
- Gemini, ChatGPT, Deepseek, Copilot, Cursor

Example of a Coding Issue

give me python template of using xgboost to predict stock price, give me python codes only

引用 7 篇资料作为参考 >



The screenshot shows a code editor window with the following content:

```
python
# -*- coding: utf-8 -*-
"""
XGBoost Stock Price Prediction Template

This template provides a basic structure for predicting stock prices using XGBoost.
Remember to install required packages: pip install xgboost pandas numpy yfinance scik
"""

import pandas as pd
import numpy as np
```

The code editor has a toolbar at the top with icons for download, copy, run, and others. The status bar at the bottom shows navigation icons.

Data Resource 1: Built-in scikit-learn Data

Advantages: convenience, one-line code. Disadvantages: small size, not suitable for realistic modeling, only for simple demos.

sklearn.datasets: Datasets

The `sklearn.datasets` module includes utilities to load datasets, including methods to load and fetch popular reference datasets. It also features some artificial data generators.

User guide: See the [Dataset loading utilities](#) section for further details.

Loaders 1

<code>datasets.clear_data_home([data_home])</code>	Delete all the content of the data home cache.
<code>datasets.dump_svmlight_file(X, y, f, [*[, ...]])</code>	Dump the dataset in svmlight / libsvm file format.
<code>datasets.fetch_20newsgroups(* [, data_home, ...])</code>	Load the filenames and data from the 20 newsgroups dataset (classification).
<code>datasets.fetch_20newsgroups_vectorized(* [, ...])</code>	Load and vectorize the 20 newsgroups dataset (classification).
<code>datasets.fetch_california_housing(*[...])</code>	Load the California housing dataset (regression).
<code>datasets.fetch_covtype(*[, data_home, ...])</code>	Load the covtype dataset (classification).
<code>datasets.fetch_kddcup99(*[, subset, ...])</code>	Load the kddcup99 dataset (classification).
<code>datasets.fetch_lfw_pairs(*[, subset, ...])</code>	Load the Labeled Faces in the Wild (LFW) pairs dataset (classification).
<code>datasets.fetch_lfw_people(* [, data_home, ...])</code>	Load the Labeled Faces in the Wild (LFW) people dataset (classification).
<code>datasets.fetch_olivetti_faces(*[, ...])</code>	Load the Olivetti faces data-set from AT&T (classification).
<code>datasets.fetch_openml([name, version, ...])</code>	Fetch dataset from openml by name or dataset id.
<code>datasets.fetch_rcv1(* [, data_home, subset, ...])</code>	Load the RCV1 multilabel dataset (classification).

Data Resource 2: Kaggle Datasets

- Kaggle, a subsidiary of Google LLC, is an online community of data scientists and ML practitioners.
- URL: <https://www.kaggle.com/datasets> (offline PDF available).
- Advantages: real large data, relatively new, many finance-related datasets.

The screenshot shows the main interface of the Kaggle website. On the left, there's a sidebar with navigation links: Create, Home, Competitions, Datasets (which is highlighted), Code, Discussions, Courses, More, and Your Work. The main content area has a search bar at the top. Below it, a section titled "Datasets" is shown with the sub-instruction: "Explore, analyze, and share quality data. Learn more about data types, creating, and collaborating." It features a "New Dataset" button and a "Your Work" button. Further down, there's another search bar labeled "Search datasets" and a row of category buttons: Computer Science, Education, Classification, Computer Vision, NLP, Data Visualization, and Pre-Trained Model. At the bottom, there's a "Trending Datasets" section and a footer with navigation icons.

Why We Use Jupyter and VScode for Python

- Install Python via Jupyter:
<https://www.anaconda.com/products/individual> and
<https://jupyter.org/try>
- Jupyter is the most popular Python work environment, widely used in finance, tech, and government.
- Facilitates large team & project collaboration (first-line Quant team, second-line Quant team, EE team, Business team).
- Enables cloud computing (enterprise: AWS, MS Azure, Databricks; personal: Google Colab)
<https://colab.research.google.com/>

Jupyter

File Edit View Run Kernel Tabs Settings Help

+ ☰ ↻ C

Filter files by name

/

Name	Last Modified
a_Study	2 hours ago
a_Weather Paper	a month ago
b_template	4 months ago
c_old_projects	a month ago
c_PBOC	7 days ago
c_Rwork	9 days ago
c_stata	11 hours ago
c_Useful_Tools	a month ago
Test_Field	2 months ago
Work_archive	4 months ago
xgboost	4 months ago
code_test_field.ipynb	19 days ago
codebook.ipynb	7 hours ago

Terminal 2 ipystata_psid-v2-xgb.ipynb Launcher latex.ipynb

Notebook

Python 3 (ipykernel)

R

Stata

Console

Python 3 (ipykernel)

R

Stata

Python Packages for ML Modeling

Install xgboost, scikit-learn, pandas, pytorch, keras, TensorFlow.

The screenshot shows the PyPI project page for xgboost. At the top, there's a navigation bar with links for Help, Sponsors, Log in, and Register. Below the bar, the project name "xgboost 1.6.1" is displayed, along with a "pip install xgboost" button and a "Latest version" button. A note indicates the package was released on May 9, 2022. The main content area is titled "XGBoost Python Package". On the left, a "Navigation" sidebar includes "Project description" (which is currently selected), "Release history", and "Download files". Below that is a "Project links" section with a "Homepage" link. The "Project description" section contains a "pypi package 1.6.1" link and an "Installation" section with a "From PyPI" link. It also includes a note about installing using pip: "For a stable version, install using `pip`:

Making the Most of Your Learned Skills

Your decade-long training in English, econometrics, economics, programming, and especially creativity and wisdom should find an outlet.

1. **Math skills**
2. **English reading skills**
3. **Coding skills**
4. **Economics skills**
5. **Young talent**

Related Literature

- Chen, Tianqi, and Carlos Guestrin. "Xgboost: A scalable tree boosting system." Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 2016.
- Gu, S., Kelly, B., & Xiu, D. (2020). Empirical asset pricing via machine learning. *The Review of Financial Studies*, 33(5), 2223–2273.
- Leippold, M., Wang, Q., & Zhou, W. (2021). Machine learning in the Chinese stock market. *Journal of Financial Economics*.
- Chernozhukov, V., Chetverikov, D., Demirer, M., Duflo, E., Hansen, C., & Newey, W. (2017). Double/debiased/evaluation machine learning of treatment effects. *American Economic Review*, 107(5), 261–265.
- Wager, S., & Athey, S. (2018). Estimation and inference of heterogeneous treatment effects using random forests. *Journal of the American Statistical Association*, 113(523), 1228–1242.

Tasks: task 1 — Install Anaconda, Python, VS Code, and WSL

- Install Anaconda Jupyter, VSCode, and WSL
- Troubleshoot collectively if issues arise.
- Differences: Windows vs macOS installation nuances; expect challenges.

Task 2 — Compute $1 + 1$

Each person should compute $1 + 1$ and save the .ipynb file.

The screenshot shows a Microsoft Edge browser window with the title "云桌面4A统一登录门户" and a tab titled "Untitled.ipynb - JupyterLab". The browser interface includes a toolbar with icons for back, forward, search, and refresh, and a menu bar with File, Edit, View, Run, Kernel, Tabs, Settings, and Help.

The main content area displays a Jupyter Notebook interface. On the left is a sidebar with a file tree showing various files and folders. In the center, a code cell contains the Python code `print(1+1)`. The output of this cell is "2". Below the code cell, there is another empty cell indicated by "[]:".

Name	Last Modified
a_Weather Paper.ipynb	4 months ago
c_old_projects	10 months ago
c_PBOC	7 months ago
c_Rwork	9 months ago
c_stata	3 months ago
c_Useful_Tools	4 months ago
old	4 months ago
Test_Field	4 months ago
xgboost	10 months ago
check_packages.ipynb	3 months ago
codebook.doc	5 months ago
codebook.ipynb	3 months ago
CookBook_Metrics.ipynb	4 months ago
package.ipynb	4 months ago
README.md	10 months ago

Task 3 — Test NumPy Random Seed

```
import numpy as np  
  
np.random.seed(123)  
np.random.normal()
```

Task 4 - Random Forest

- Ask Gemini to generate a Random Forest model to predict the Boston housing price
- Run it in your and save the results

Task 4 — Register a GitHub & Kaggle Account

- Learn Git & GitHub, create an account at
<https://github.com/>
- Learn and Register a Kaggle account
<https://www.kaggle.com/>
- We'll use Git and Kaggle for assignments, exams, and group collaboration.

Task 5 - Register Google colab

- Google colab and Kaggle provide free GPUs for modeling
- <https://colab.research.google.com/>

Task 6 - Kaggle Classes



Task 6 - Kaggle Classes: Three Certificates

- <https://www.kaggle.com/learn/intro-to-programming>
- <https://www.kaggle.com/learn/pandas>
- <https://www.kaggle.com/learn/intro-to-machine-learning>

Task 7 - Upload Your Kaggle Certificates to Github

- Upload Your Kaggle Certificates to Github
- Upload Your Codes from Task 2 to 4 to Github