### AI-Powered Algorithmic Trading with Python

Half-Day Training at ODSC London 2022

Dr. Yves J. Hilpisch









# You find the Gist with the resources under https://bit.ly/odsc\_ldn\_2022 (will be updated during the session)

### Agenda

- Introduction
- The Medium Article
- Trading Platform

- The AI Machine

• Data-Driven Finance • Case Study: Momentum Case Study: AI Strategy Case Study: Deployment

### Introduction



#### SERVICES

for financial institutions globally





### TRAINING

about Python for finance & algorithmic trading

### PLATFORM

for browser-based data analytics

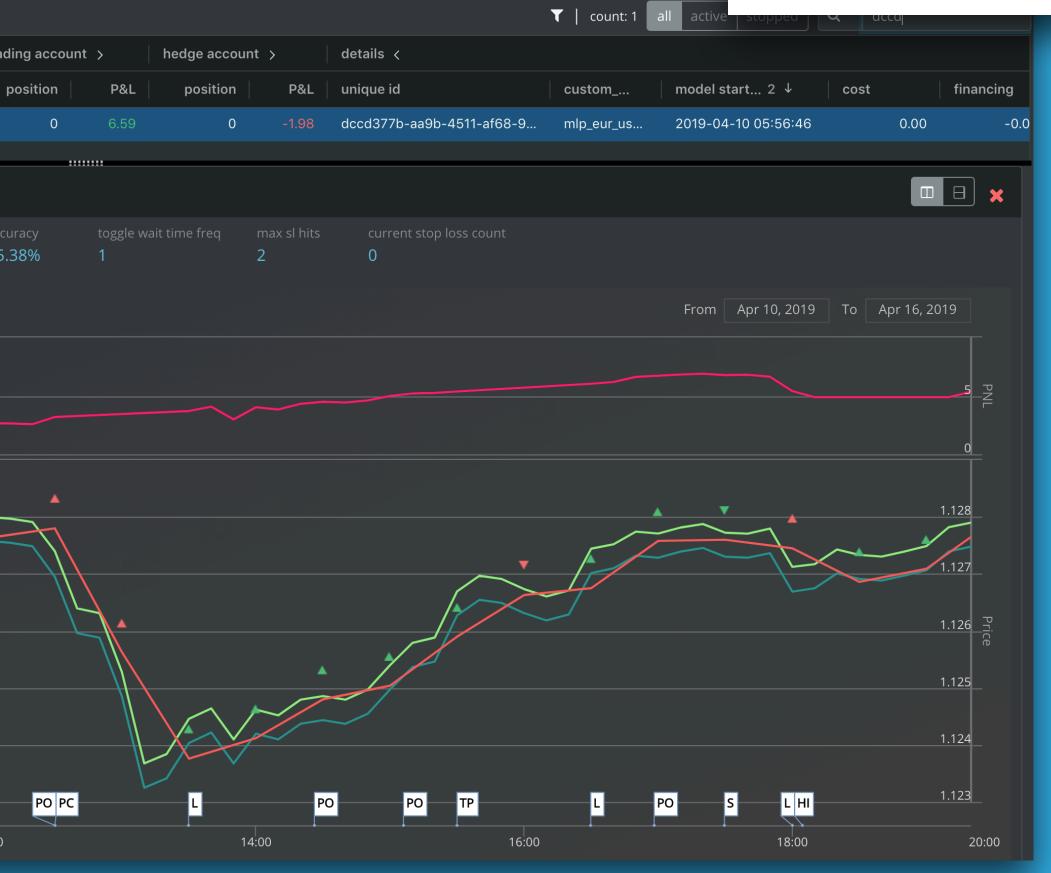
for financial analytics

### **EVENTS** for Python quants & algorithmic traders **THE PYTHON** QUANTS CERTIFICATION QUANTS in cooperation with university BOOKS about Python and finance **OPEN SOURCE** Python library

http://tpq.io

	liv	e models	backtested m	nodels stra	tegies		
as of: April 16, 201	9 at 9:15:11 AM G	GMT+2 <i>C</i>					
interrupt >	model attribu	tes		total			tradi
	s 1 ↑	inst freq	model n	position	P&L u	nreal real	р
	Stopped	EUR_USD M30	) dirfx	0	4.61	0.00 4.61	
audit deta	ails 🗕						
model name dirfx	frequency M30	ML technique MLPClassifie	lags er 10	trade quantity <b>2000</b>	SL distance % 0.2	take profit % <b>0.2</b>	accu 65.3
uirix	IVISU	WLPCIdSSIIIE		2000	0.2	0.2	05.5
Zoom 30S	1M 5M 10M	4 30M 1H 3H	12H <b>all</b>				
							•
			<u>م</u>				$\ge$
1		100	$\int \mathcal{A}$				
	PO	PC	L	<mark>PO</mark>			
06:00		08:00		10:00			12:00





http://aimachine.io

Dr. Yves J. Hilpisch is founder and CEO of The Python Quants (http://tpq.io), a group focusing on the use of open source technologies for financial data science, artificial intelligence, algorithmic trading, and computational finance. He is also the founder and CEO of The AI Machine (http:// aimachine.io), a company focused on AI-powered algorithmic trading based on a proprietary strategy execution platform.

Yves has a Diploma in Business Administration, a Ph.D. in Mathematical Finance and is Adjunct Professor for Computational Finance.

Yves is the author of six books (https://home.tpq.io/books):

\* Financial Theory with Python (2021, O'Reilly) \* Artificial Intelligence in Finance (2020, 0'Reilly) \* Python for Algorithmic Trading (2020, 0'Reilly) \* Python for Finance (2018, 2nd ed., 0'Reilly) \* Listed Volatility and Variance Derivatives (2017, Wiley Finance) \* Derivatives Analytics with Python (2015, Wiley Finance)

Yves is the director of the first online training program leading to University Certificates in Python for Algorithmic Trading (https://home.tpq.io/certificates/pyalgo) and Computational Finance (https:// home.tpq.io/certificates/compfin). He also lectures on computational finance, machine learning, and algorithmic trading at the CQF Program (http://cqf.com).

Yves is the originator of the financial analytics library **DX Analytics** (http://dx-analytics.com) and organizes Meetup group events, conferences, and bootcamps about Python, artificial intelligence and algorithmic trading in London (http://pqf.tpq.io), New York (http://aifat.tpq.io), Frankfurt, Berlin, and Paris. He has given keynote speeches at technology conferences in the United States, Europe, and Asia.



#### http://hilpisch.com



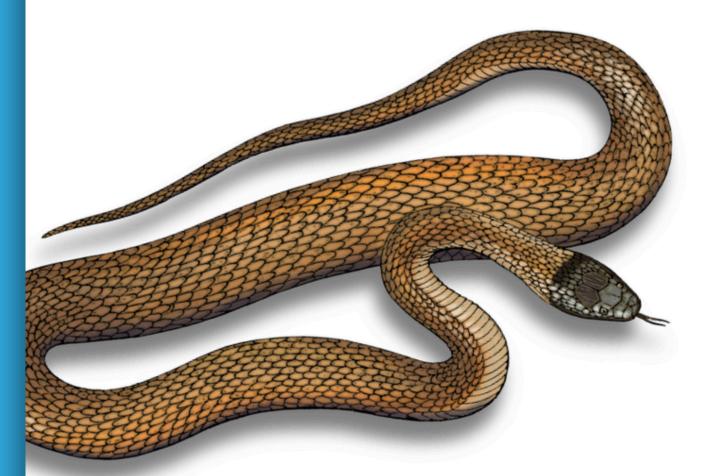


### Financial Theory with Python – A Gentle Introduction



### Financial Theory with Python

A Gentle Introduction



**Yves Hilpisch** 

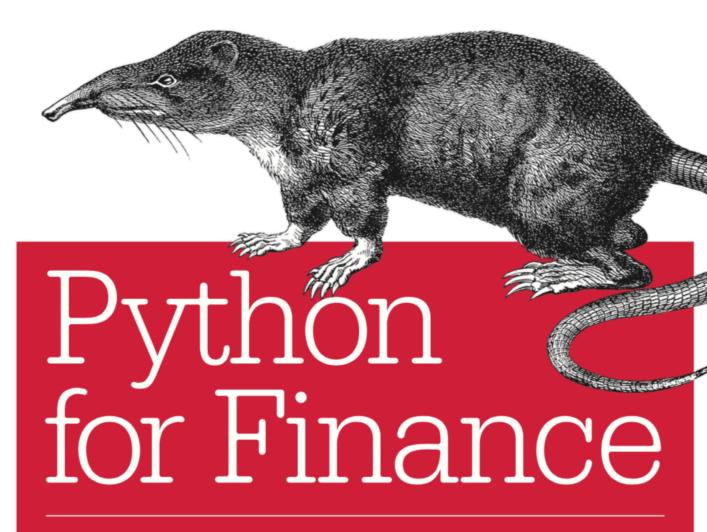
Yves Hilpisch

Finance with Python and Python environments Basic Finance Concepts and Models:

- Risk-Return
- Pricing of Instruments
- Expected Utility Theory
- Mean-Variance Portfolio Theory
- Capital Asset Pricing Model
- Portfolio Optimization
- Basic Python Concepts and
- Packages:
- Major Python Idioms
- NumPy Package
- SciPy & SymPy Packages

Phot Edition

#### **O'REILLY**°



MASTERING DATA-DRIVEN FINANCE

Yves Hilpisch

### Python for Finance

### **OREILLY**® オライリー・ジャパン

# 

データ駆動型アプローチに向けて

Yves Hilpisch 著 黒川利明 訳 中妻 照雄 技術監修

http://books.tpq.io

### Quant Finance with Python

Wiley Finance Series

### Derivatives Analytics with Python

Data Analysis, Models, Simulation, Calibration and Hedging

**YVES HILPISCH** 

A ...

WILEY

Wiley Finance Series

## **Listed Volatility** and Variance Derivatives

A Python-based Guide

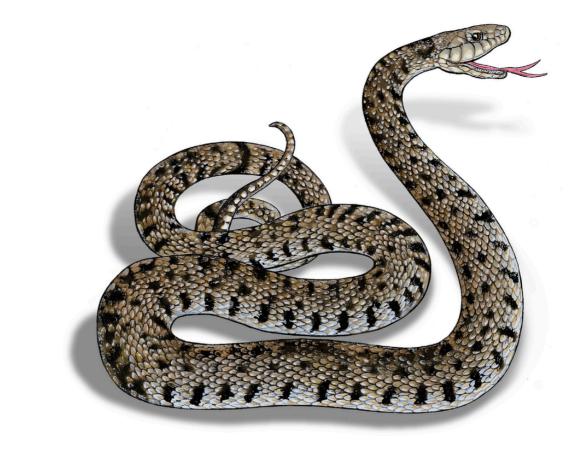
**YVES HILPISCH** 

WILEY

http://books.tpq.io

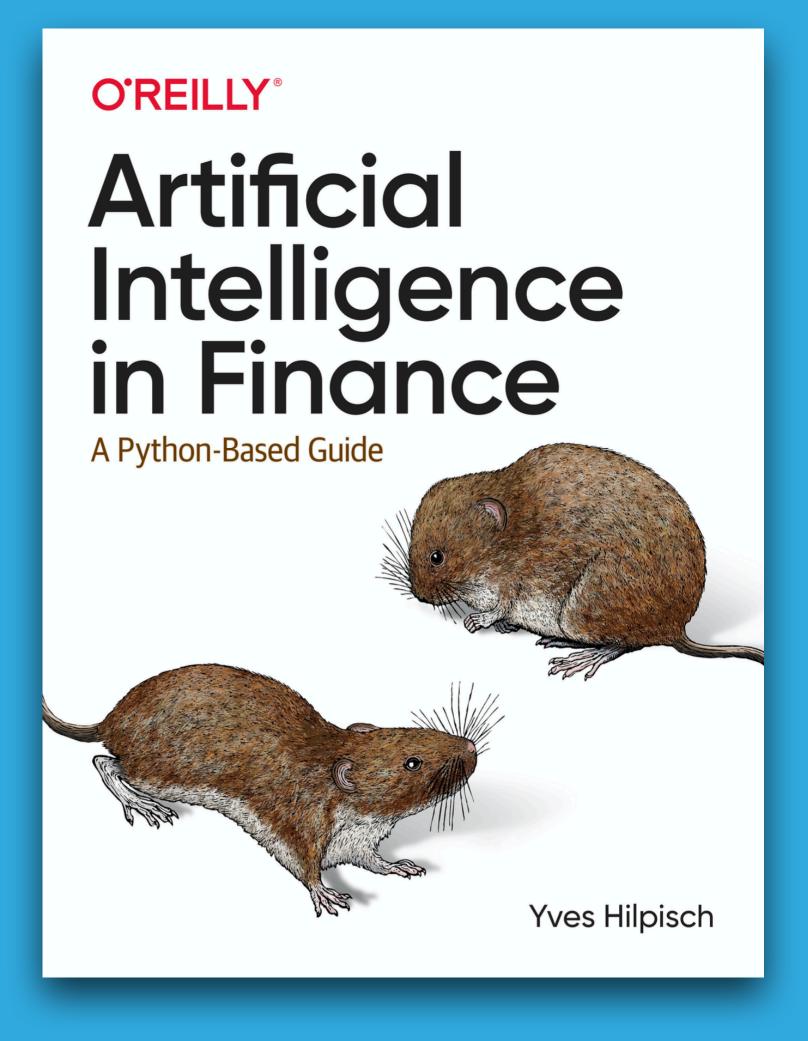
### **O'REILLY**<sup>®</sup> **Python** for Algorithmic Trading

From Idea to Cloud Deployment



Yves Hilpisch

Python & AI for Finance & Trading



http://books.tpq.io



### Pythonからはじめる アルゴリズムトレード

自動売買の基礎と機械学習の本格導入に向けた Pythonプログラミング



Yves Hilpisch 著 村上振一郎 訳 YVES HILPISCH

### Trading con Python



Creare algoritmi per la compravendita e l'analisi di mercato

APCEO





# (pro)quants@dev

**Community** of professional & aspiring quant developers & quant researchers.

> 700 Members and growing.

Webinar series "Reinforcement Learning in Finance"

https://bit.ly/quants\_dev





### Data-Driven Finance

### FINANCIAL TIMES

#### COP clock runs down

#### Summit's 'blah blah blah' is welcomed -- GILLIAN TETH Business climate pledges' credibility gap — BIG READ, PA

#### rotest legacy

- NHS waiting list soars to almost 6m

» Wall St cashes in on GE's decline and fa

w price and the break-up of the group.- rat

+ Johnson Matthey cans battery chemical

» Uber chief flies in to fix London crisi

» Race to feed Afghans as winter looms

+ Lukashenko threatens EU gas supplies

unsit of gas and goods to Europe if the EU imp other subscribes on his regime over the migran

Foreign buyers triple home ownership

udde" and "shocking",- rate

ITTER. - PAGE 14, LEX. PAGE

#### Iran impasse Long wait for liberty goes on



#### Xi cements grip on China after vote puts him on par with Mao

Party says nation 'rejuvenated' 
 Third five-year term likely
 New emphasis on socialism

BUT'S YER

De Klerk, last president of apartheid era, dies at 85

FW de Kherk, who shared the Nobel

Subscribe In print and onlin

For the latest news go to

E THE FISANCIAL TIMES LTD 202 No. 60,043 #

www.ft.com

XI, the pleasus said, had "resolved

A.

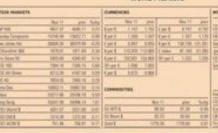
Coffee hit 31-41-42-41-





Johnson's £4m outside earnings open him to charges of hypocrisy from MPs

ets Johnson, who this work ordered



World Markets



### THE WALL STREET JOURN

DOW JONES News Corps \*\*\*\*

WEDNESDAY, NOVEMBER 10, 2021 ~ VOL. CCLXXVIII NO. 112 DJIA 36319.98 🔻 112.24 0.3% NASDAQ 15886.54 🔻 0.6% STOXX 600 482.71 👻 0.2% 10-YR. TREAS. 🛦 19/32, yield 1.431% OIL \$84.15 🛦 \$2.22 GOLD \$1,830.20 🛦 \$2.80 EURO \$1.1596 YEN 112.88

WSJ.com

John Flannery Larry Culp Aug. 2017 Oct. 2018

#### **GE Breakup Marks End of an Era** What's News

Sept. 2001 \$224.19B

and ebbed under four CEOs as it focused on

1980

Tax Bill

tax increase.

wary.....

Looms as

#### Business & Finance •

General Electric, the company that for more than century stood as a beacon of U.S. manufacturing might will split into three public ompanies, drawing the curin on an era of business the dominance of industrial conglomerates. A1, A12, A13

• U.S. stocks fell back, from record levels, with the Nasdaq, S&P 500 and Dow declining 0.6%, 0.4% and 0.3%, respectively. B12

• Rivian priced its highly anticipated IPO at \$78 a share, well above its raised expecta-tions, valuing the electric-vehicle maker at more than \$77 bil-lion on a fully diluted basis. **B1** 

• Panera plans to go public nd has secured an uno onal investment from resta rateur Danny Mever's SPAC. B1

• Semiconductor makers ave earmarked less than 17% of the roughly \$146 billion the industry will devote to capital pending this year to legacy chips, Gartner estimates. **B1** 

◆ Hertz, which emerged from bankruptcy this summer, listed on the Nasdaq, with shares losing down nearly 10% in the irst day of trading. **B1** 

◆ DoorDash said it agreed to acquire European food-deliv-ery company Wolt in a deal valued at over \$8 billion. **B3** 

• Presto is close to a deal to ombine with a SPAC and go public in a merger that would ogy firm at about \$1 billion. B3

• Videogame company Unity agreed to pay \$1.63 oillion for major parts of vi-

ual-effects studio Weta. **B4** 

#### World-Wide +

Nicaragua, after a presiential election the U.S. called raudulent, is now widely en to have become Latin merica's third dictatorship and part of a broader trend of nocratic backsliding across he region, U.S. officials and olitical analysts said. A1

◆ Ports snarled with suply-chain problems will be ble to redirect money from other federally funded projects to help ease the logjams under a plan outlined by the Biden administration. A2

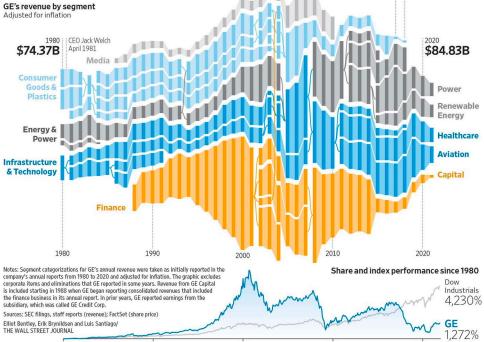
◆ The Oklahoma Supreme urt overturned a ruling that held J&J liable for tributing to the state's opioid-addiction crisis. A2

◆ Pfizer and partner BioN-Tech asked U.S. health reglators to expand the auorization of their Covid-19 booster to people as young as 18 years old. A3

◆ A federal judge said reords from the Trump White

louse can be turned over to

Over the past four decades, GE's revenue swelled CEO Jeff Immelt : 2004 different businesses, including a shift away from consumer goods and a bet on finance.



Company that symbolized U.S. manufacturing power to split into three parts

#### BY THOMAS GRYTA

General Electric Co., the ompany that for more than a century stood as a beacon of U.S. manufacturing might and management prowess, will spli nto three public companies drawing the curtain on an era of business—the dominance of industrial conglomerates.

The decision, announced Tuesday by Chief Executive Larry Culp, ends the myth that GE wielded a magic touch to run companies better, and make everyone richer, through its management of varied en terprises around the world. When Mr. Culp took over as CEO of a wounded GE three years ago, he faced calls from inside and outside to break it apart. He resisted the idea saying he wanted to fix GE and just needed more time. He re paired company finances, but ultimately concluded that investors wanted a simple structure. "It was clear this Please turn to page A13

◆ General Electric through the years in photos..... A12-13 Heard on the Street: GE sheds

ings simply had to ask one question of the content they

were considering recirculating

Please turn to page A

"Has it gone viral in the past"

**Facebook Rife With Stolen Content** 

Latest in a series

#### By KEACH HAGEY the facebook files 🖭 AND JEFF HORWITZ

**Musk Eyes** Facebook has allowed pla-

Elon Musk's pledge to sell warned in internal memos. to disseminate content on the following year. "Step 1: 10% of his Tesla Inc. stock highlights the complex finan-facebook pages at one point in Facebook, while individual us Facebook, while individual us Facebook, while individual us Facebook, while individual us Facebook, stock Facebook

Share Sale gaining and recycled content to flourish on its platform de- viewed by The Wall Street effort) way to make a big Face- continues to be a formula for spite having policies against it, Journal. Pages are used by the tech giant's researchers businesses and organizations book Page?" Mr. Allen wrote in success on Facebook, accord-an internal slide presentation ing to data the company has cial web the world's richest man has spun around his per-sonal fortune. 2018 went to pages that stole or repurposed most of their content, according to a re-Facebook has been slow to

2020

in late 2019, wrote that Face

Mr. Allen, who left Facebook

Meta Curbs **Targeted Ads** 

Personalized advertising o politics is dropped.....



#### BY LISA BANNON AND ANDREA FULLER

Over the past decade, the University of uthern California has used a for-profit ompany to help enroll thousands of students n its online social-work master's program. The nonprofit school used its status-symbol image to attract students across the lents it targeted for recruitment, often with U.S. Education Department data found. Com gressive tactics. Most students piled on debt to afford the tuition, which last year

pared with other master's-degree programs

reached \$115,000 for the two-year degree The majority never set foot on the posh Los Angeles campus but paid the same rate for online classes as in-person students. took out federal loans borrowed a median \$112,000. Half of them were earning \$52,000

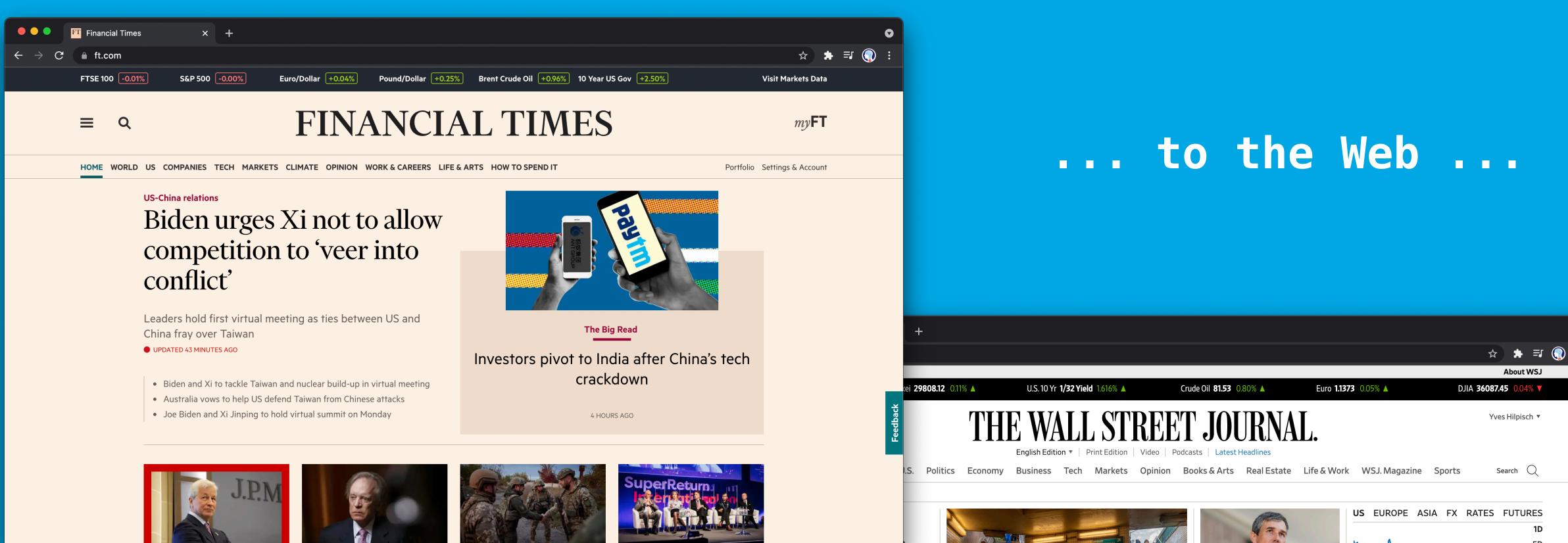
Please turn to page A14

Recent USC social-work graduates who or less annually two years later, a Wall

**Democracy Loses Favor** Is Santa

From print ...







#### Virtual Meeting

The White House said the U.S. and Chinese presidents discussed a variety of topics including Afghanistan, North Korea and Iran, as well as human rights, climate change and concerns over Taiwan. 🖓 492 🕘 7 min read

▶ How U.S. Plays Catch-Up on China's Push for Influence

#### **President Signs Infrastructure Bill** Into Law

The passage of the \$1 trillion bill to repair roads and bridges, upgrade the electrical grid and expand access to broadband



internet marks a rare bipartisan policy win for the White House. 🕘 6 min read

• What's in the Bill? From Amtrak to Roads to Water Systems



America's Infrastructure Struggles With New Weather Forecast

•

Historically anomalous heat and rain have overwhelmed systems designed to withstand old meteorological patterns, and climatologists expect still worse with climate change. "We've never seen destruction like this before." 🖵 523 🕘 Long read

Shell to Move Headquarters to London Amid



Beto O'Rourke Announces Bid for Texas Governor 4 min read



Kyle Rittenhouse Homicide Trial Wraps Up 2 5 min read



					V	1Y
		har free		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	my I	6M
71	γ <sup>ν.</sup> Υ		m			3M
h.	marth					5D
						1D
US	EUROPE	ASIA	FX	RATES	FUTUI	RES

IA	36087.45	-12.86	-0.04%
P 500	4682.80	-0.05	-0.00%
sdaq	15853.85	-7.11	-0.04%
ssell 2000	2400.93	-10.84	-0.45%
Total Mkt	48582.45	-17.28	-0.04%
ew Watchlist	View Al	l Market	Data →
ew Watchlist	View Al	l Market	

America Will Be Number One—in Taxes By The Editorial Board | Review & Outlook

**OPINION** 

					\$				? ^ □								
APPLIB																	
MARKETS	S COMPANY NEWS CHARTING PORTFOLIOS & MONITORS SEARCH TO	DOLS															
			CAM 65 CCI	R 95				Updated: 16-No	v-2021 10:01:17	^							
United State	s   NASDAQ Stock Exchange Global Select Market   Phones & Handheld Devices		Q AAP	L.O VOV									\$	·	므 으 (	$\sim$ $\bigcirc$	?
Overview	News & Research Price & Charts Estimates Financials ESG Event Owner	APPLIB															
BUSINESS S	UMMARY >	MARKETS COMPANY	NEWS CHART	TING PORTFOLIOS & MONITORS SE	EARCH TOOLS	DEVELOPME		N TOOLS MY L	AYOUTS								
		🖶 AAPL.O 🗸 APPL	EINC 🕂		M	• • 12	23.08 c USD	Vol 13,358	CAM 72 CCR 96	1					Updated: 03-I		
variety of rel	esigns, manufactures and markets smartphones, personal computers, tablets, wearables and acc ated services. The Company's products include iPhone, Mac, iPad, and Wearables, Home and Ac y's line of smartphones based on its iOS operating system. Mac is the Company's line of persona	United States   NASDAQ Glo	bal Select Consoli	idated   Phones & Handheld Devices												Valuat	ion VC
its macOS of Home and A	perating system. iPad is the Company's line of multi-purpose tablets based on its iPadOS operatin ccessories includes AirPods, Apple TV, Apple Watch, Beats products, HomePod, iPod touch and	Overview News & Reserve	arch Price & Ch	arts Estimates Financials ESG	Event Ov	wnership De	ebt & Credit	Peers & Valuati	on Derivatives	Filings						ĺ	
and third-par line of smart	ty accessories. AirPods are the Company's wireless headphones that interact with Siri. Apple Wa watches. Its services include Advertising, AppleCare, Cloud Services, Digital Content and Payme				STA	ARMINE MODE	ELS →		High	lights	All Models	NEWS >		News	Investor Briefs	s Globa	al Press
customers a	e primarily in the consumer, small and mid-sized business, education, enterprise and governmer	Open		AAPL.O : 123.13	124.00 Bul	llish			Bearish			03-Dec-2020					
NEWS >		Prev. Close	<b>© 123.08</b>		123.50 Pric	ce Momentum		97	Intrinsic Valuation		19	10:15:43 E	BUSINESS Apple sued o	ver old iPhones in E	urope Tech giaı		TIME
16-Nov-2021			123.24 / 123.35	in the standard		alyst Revisions			Relative Valuation		23		《外企动向》苹果因旧款				ETNN
08:51:09	Refinitiv Newscasts - Evidence of Belarus providing migrants tourist visas	VWAP			122.50	art Holdings			Insider		27		《外企動向》蘋果因舊款			•	ETNN
05:40:45	S. Korea's new law on in-app payment is 'monumental': CAF chief	Turnover Volume	 () 13,358		122.00	ort Interest nings Quality		95 95									FEDE
04:00:00	KILL Singtel in Partnership with Apple Inc, Selects Nextech AR Solutions To Showcase Augme		0.500%			edit Risk - Com	bined	96					Analysts' Weekly Ratings Analysts' Weekly Ratings				CREP /IEBAN
01:48:19	Apple Pty Ltd "Disney Melee Mania" coming this December exclusively on Apple Arcade		G 67.66%			edit Risk - Smai		92					《A股焦点》欧菲光:被				
01:10:00	iPhone Black Friday Deals 2021: Best Early Apple iPhone Sales Reported by The Consumer P	Beta (5Y Monthly)	1.272	<b>2</b> 12:00 15:00		edit Risk - Struc	ctural	88					《A股焦點》歐菲光:被				ETNN
	UPDATE 1-Buffett's Berkshire cuts U.S. drugmaker stakes, invests in drug royalty company	Mkt Cap - Default∨	USD 2.093T	Today 5D 3M 6M 1Y 5Y	Cre	edit Risk - Text	Mining	85					《ヘ放魚和/ 画手ル・ ŵ Dow Jones Selected Sto				
00:29:52		PE (LTM)	37.676	No Benchmark $\checkmark$	Cor	mbined Alpha	Model	72					RPT-Hong Kong-Le mag				
15-Nov-2021		Div Yield	0.666%	Last	REL	LATIVE VALUA						RESEARCH >			Contributor	Inte	
23:52:47	EXCLUSIVE-Engine No. 1 partner leaves hedge fund after successful challenge of Exxon		APL34.SA (1:0.1)	52Wk: 53.153			Global	Trailing 12 M		Next 12 M		03-Dec-2020	Equiti Global Arat	oic Smart Report		Equit	
23:39:51	Jamf Announces Upcoming Conference Participation	DR Type		Daily	2-Sep n-2021		Rank	AAPL	Industry Median	AAPL	Industry Median	02-Dec-2020	Trefis Report: App	le - \$99.92 Trefis P	rice Estimate	Trefis	
23:27:41	Black Friday 2021 deals at Best Buy are here, with huge savings on Samsung, Apple and more	DR Bank			PE		32	36.284	8.368	30.782	13.425	02-Dec-2020				Equit	
23:12:15	How to connect any AirPods to your iPhone				1.000/	/EBITDA	24	26.610	8.037	22.303	8.094	01-Dec-2020		echnical and Funda	mental Analysis		k Trade
EVENTS >	UPCOMING		Share Class		0.70	' Yield	31	0.653%	1.808%	0.666%	3.242%	01-Dec-2020				Equit	
18-Nov-2021		IPO Date 12-Dec-1980 RECOMMENDATIONS	Lot Size	100 ∆ 1 Week		/Sales	18	7.514	1.149	6.363	1.013	30-Nov-2020 29-Nov-2020		atters" Report for AA	Pl · the econo	Equit	
NTS	AAPL34.SA Final Cash Dividend of gross BRL 0.123473 paid on Nov 18, 2021 going	Mean		Analysts Per Level	P/C		31 2	26.393 33.482	5.920 1.505	24.353 47.447	11.821 2.774	EVENTS >	The Leonomy Ma		Upcoming		ast
19-Nov-2021		AAPL		Strong 11	P/B ES1			33.482			2.774 Summary	26-Jan-2021					
			Mean	Buy				QTR	Dec-2020	FY Sep		NTS	Q1 2021 Apple Inc I	arnings Release			
NTS	AAPL.NLB Final Cash Dividend of gross CAD 0.033913 paid on Nov 19, 2021 going e		•	Buy 19					S Rev	EPS	Rev	25-Feb-2021					
		Phones & Handheld Devices	S Mean	Hold 8	Me	an Estimate		1.3	9 102.00B	3.96	315.25B	18:00:00	Apple Inc Annual Sh	areholders Meeting			
				Sell 1	Sma	art Estimate		1.3	9 101.94B	3.95	314.43B	PEERS >					
				Strong ∎ 1 Sell	Pre	edicted Surprise	е	0.00		-0.32%	-0.26%	Company Nan					EV/
		Price Target (Mean)		USD 125.92 Upside	2% Mea	an Chg %		0.62	% 0.29%	0.95%	0.33%		2.09			28.17%	
					<b>•</b> •••							HP Inc	31.34	B 1.97%	56.64B	8.40%	

☆		Ū	$\square$	?	$^{\circ}$	
	U	odated	: 16-Nc	v-2021	10:01:	

### ... to the Terminal ...

				_
?	)			
:0 1	)0: V(	2 0'	0	Î
0	ž	Ķ	≯	
re	ess	5		
/16	Ξ			
N	IN			
'N	IN			
D	ΡE			
ΞF	þ			
3/	<b>۸</b> ۷	I		
N	IN			
N	IN			
al				U
а	de	€		
	14-			
is	ĸ			
		Ë	퓌	
		-	_	
		Ë	Ŧ	
E/	//			
2	3.	39	9	
	6.	63	3	

#### **Tick Data**

[4]:	%%time data = ek.get_timeser	star end_ inte	PL.0', rt_date=': _date='20: erval='tic Lds=['*']	21- ck'
	CPU times: user 120 m Wall time: 2.7 s	ıs, sys:	14.5 ms,	to
[5]:	data.info()			
	<pre><class #="" 'pandas.core.f="" (total="" 2="" 41213="" <="" column="" columns="" data="" datetimeindex:="" non-null="" pre=""></class></pre>	entries, columns	2021-11 <sup>.</sup> 5):	-1:
	0 VALUE 41145 nd 1 VOLUME 41213 nd dtypes: Float64(1), I memory usage: 1.0 MB	on-null		
[14]:	data.tail()			
[14]:	AAPL.O Date	VALUE	VOLUME	
	2021-11-15 15:29:59.134	150,4456	10	
	2021-11-15 15:29:59.313		1	
	2021-11-15 15:29:59.588	150.4409	150	
	2021-11-15 15:29:59.745	150.445	1	
	2021-11-15 15:29:59.936	150 / / 88	5	

021-11-15 15:00:00', 1-11-15 15:30:00', k',

total: 135 ms

15 15:00:00.004000 to 2021-11-15 15:29:59.936000

### ... to powerful APIs.

	Apple Event on 18. C	October 2021 (https://www	w.apple.com/de/apple-e	vents/october-2021/).	
[9]:	headlines = ek.ge	et_news_headlines(que	ry='R:AAPL.0 macbook		
			nt=5,		
			e_from='2021-10-18',		
		date	e_to='2021-10-19')		
[40]					
[10]:	headlines				
[10]:		versionCreated	text	storyld	sourceCode
	2021-10-18 23:30:18.401	2021-10-18 23:30:18.401000+00:00	Apple is finally fixing the things people hate	urn:newsml:reuters.com:20211018:nNRAh2psl1:1	NS:WASHPO
	2021-10-18 23:10:18.012	2021-10-18 23:10:18.012000+00:00	Apple event – live: Macbook Pro and other new	urn:newsml:reuters.com:20211018:nNRAh2kj3a:1	NS:INDEPE
	2021-10-18 21:41:19.927	2021-10-18 21:41:19.927000+00:00	New MacBook Pro features ultra-fast chips, ret	urn:newsml:reuters.com:20211018:nNRAh2u38b:1	NS:EFEING
	2021-10-18 21:33:50.860	2021-10-18 21:33:50.860000+00:00	Apple Event: MacBook Pro 2021 alleged pictures	urn:newsml:reuters.com:20211018:nNRAh2u1wj:1	NS:TIMIND
	2021-10-18 21:33:50.623	2021-10-18 21:33:50.623000+00:00	Apple launches new MacBook Pro: Price, specs a	urn:newsml:reuters.com:20211018:nNRAh2u1vv:1	NS:TIMIND

### ... to powerful APIs.

[11]:	<pre>story = headlines.iloc[0]</pre>
[12]:	story
[10].	2021  10  10
[12]:	versionCreated 2021-10-18
	text Apple is finally fixing the
	storyId urn:newsml:reuters.com:
	sourceCode
	Name: 2021-10-18 23:30:18.401000, dtype: objec
[13]:	<pre>news_text = ek.get_news_story(story['storyId']</pre>
[=0]:	
[14]•	<pre>from IPython.display import HTML</pre>
[14].	
[15].	HTML(news_text)
[12]:	
[15].	The demise of MagSafe charging. An inelegant Touch Ba
	Apple's laptops has steadily grown over the past five yea
	On Monday, the Cupartine Calif company unveiled a pr
	On Monday, the Cupertino, Calif., company unveiled a pa
	processors and free of the many limitations that plagued
	HomePod mini smart speakers. Riding high from record
	of its virtual event Monday.

Still, computers that run Apple's MacOS software account for only a fraction of the overall PC landscape — just over 7 percent as of the end of the second quarter, according to market research firm IDC. Its market share has slipped from 8 percent in the first quarter and 7.6 percent a year earlier, IDC data showed. The changes on display Monday seem to be geared more toward

3 23:30:18.401000+00:00 e things people hate... n:20211018:nNRAh2psl1:1 NS:WASHP0

εςτ

])

Bar. Limited selection of ports. The laundry list of complaints about ears. Now, Apple is finally walking back those changes.

bair of new MacBook Pro laptops, powered by its latest homegrown ed earlier models. It also showed off a set of updated AirPods and colorful d Mac sales last year, Apple made sure to make its new MacBooks the star

### ... to powerful APIs.







# **IPython**



### pandas





### The Medium Article



medium.com/oreillymedia/algorithmic-trading-in-less-than-100-lines-of-python-code-b4a4b159a485

### 

### Algorithmic Trading in Less than 100 Lines of Python Code

O'Reilly Media Follow 0 Dec 17, 2020 · 9 min read

#### If You Know Trading and Python, this Is Easy

Editor's Note: The barriers to entry for algorithmic trading have never been lower. Not too long ago, only institutional investors with IT budgets in the millions of dollars could take part, but today even individuals equipped only with a notebook and an Internet connection can get started within minutes. In this piece from <u>Python for Algorithmic Trading</u>, author Yves Hilpisch shows you how to implement a complete algorithmic trading project, from backtesting the strategy to performing automated, real-time trading.

Algorithmic trading refers to the computerized, automated trading of financial instruments (based on some algorithm or rule) with little or no human intervention during trading hours. Almost any kind of financial instrument — be it stocks, currencies, commodities, credit products or volatility — can be traded in such a fashion. Not only that, in certain market segments, algorithms are responsible for the lion's share of the trading volume. The books *The Quants* by Scott Patterson, *More Money Than God* by Sebastian Mallaby, and, more recently, *The Man Who Solved the Market* by Gregory Zuckerman paint a vivid picture of the beginnings of algorithmic trading and the personalities behind its rise.

Sign in

Get started

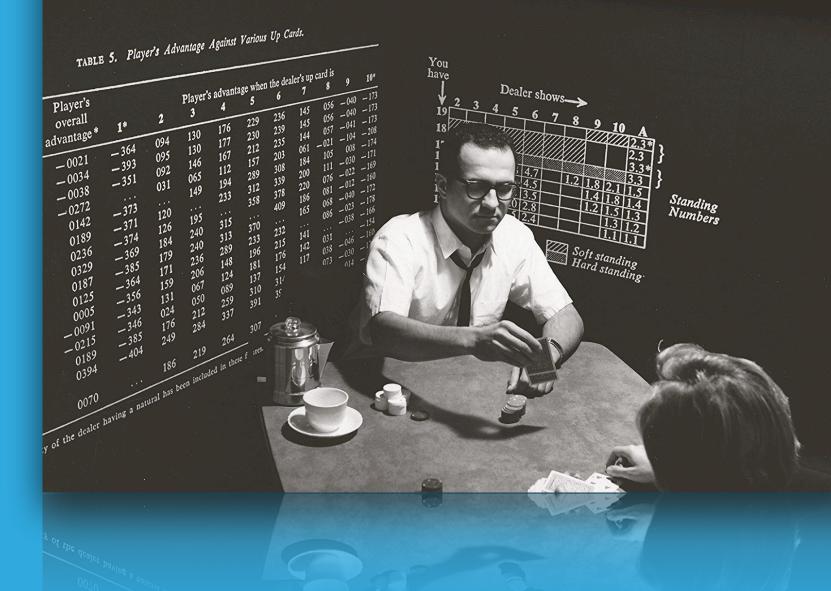
★ ★ ₹ 😱 :

in f 🗌

EDWARD O. THOR A MAN FOR ALL MARKETS

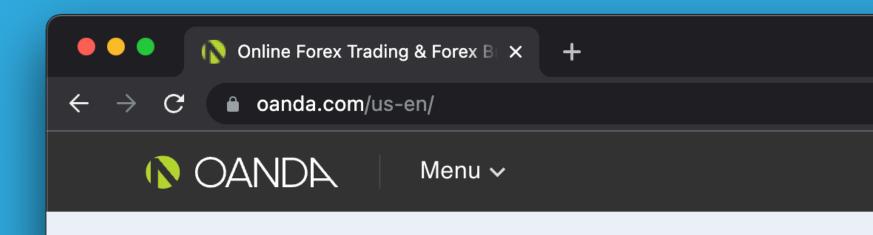
From LAS VEGAS to WALL STREET, HOW I BEAT THE DEALER and THE MARKET

FOREWORD BY NASSIM NICHOLAS TALEB



 $E = \frac{1}{2} MgL$ **NEW YORK TIMES BESTSELLER**  $\frac{\partial \mathcal{O}}{\partial t} \left(\frac{q}{t}\right)^{\prime h} \left(\mathcal{O}_{0}^{2} - \mathcal{O}^{2}\right)^{\prime \prime 2}$ - Vn Snjn-1 000 00 (32) NA= (FrF), 2π - ML'O ML'O  $\omega_{o}^{*} \chi = O \longrightarrow \omega_{o} = \left(\frac{c}{\Pi}\right)^{V_{o}}$  $\frac{\pi^{2}}{2m} \Delta \psi$   $\frac{\pi^{2}}{2m$  $(q_1 + \lambda_z^* < \mathsf{REVU})$ MEROOOD  $E = \langle k \rangle = \langle u \rangle = \frac{1}{2} M W_{e}^{2} A^{2}$ f(x) = f(x) =





AWARD-WINNING BROKER

### A broker you can trust

Over the past 25 years, we have built up a stellar reputation for our award-winning platforms\*, innovative trading education and transparent pricing.

#### Forex trading

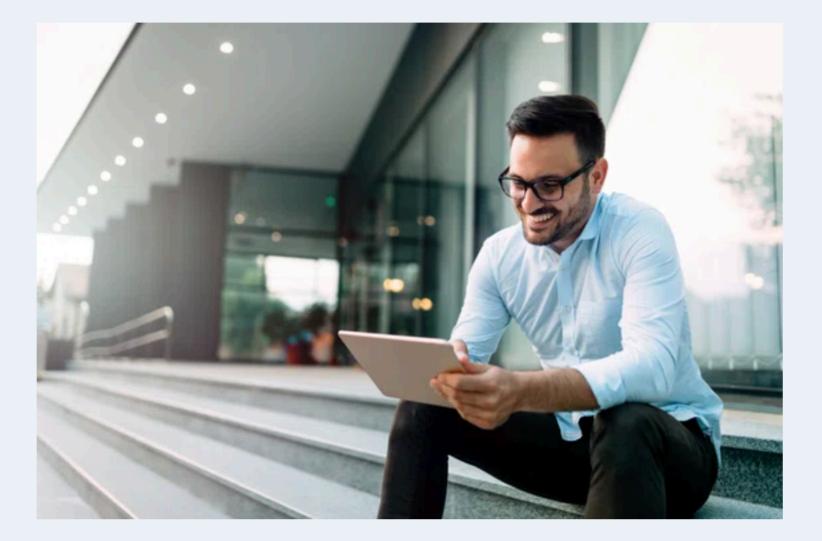
We offer over 70 major and minor currency pairs with two transparent pricing models.

See our FX markets

Access real-time rates for all the major FX pairs, plus up to 25 years' historical exchange rates across 38,000 forex pairs.

See converter





#### Currency converter

#### **FX Data Services**

Make use of OANDA Treasury, Exchange Rates API, Historical Currency Converter and Corporate Payments solutions.

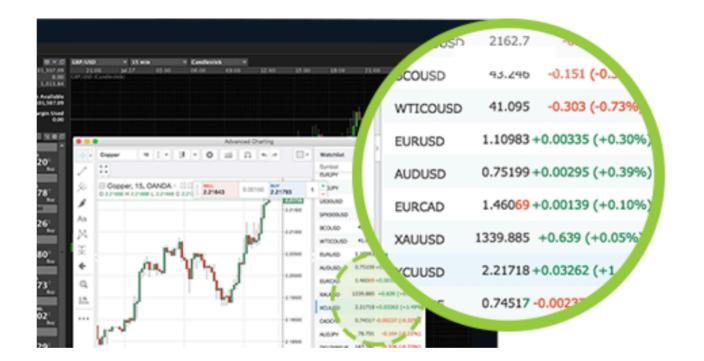
#### See our services



C

💦 Online Forex Trading & Forex B 🗙 🛛 🔊 Forex & CFD Demo Account | F 🗙 🕂

www1.oanda.com/forex-trading/platform/fxtrade-demo-platform



#### **REAL MARKET CONDITIONS**

Experience real-time rates across forex, as well as <u>Gold and Silver</u><sup>†</sup> crosses. Access commodities such as Brent Crude Oil, Natural Gas, and Wheat; global stock market indices for countries like Germany, Australia, and the US; and bonds such as U.S. Treasury Bonds and Euro-Bund futures with CFDs.

Trading FX and/or CFDs on margin is high risk and not suitable for everyone. Losses can exceed investment. Contracts for Difference (CFDs) and hedging capabilities are NOT available to residents of the United States



#### THE ULTIMATE DEMO ACCOUNT

山 🛧 🗯 🗖 🌍 :

Get unlimited, free access to your demo forex or CFD trading account and test trading strategies under real market conditions. Reset or adjust your 100,000-unit starting balance or profit/loss at any time, change your leverage, and use flexible trade sizes to test your comfort level.



**Oanda Trading Platform** oanda.cfg (configuration file) [oanda] account id = 101-004-YOURID-001account type = practice

pip install git+https://github.com/yhilpisch/tpgoa.git

access token = c71f59 YOURACCESSTOKEN 13da5b8f60fac1397232

### DISCLAIMER

All the content, Python code, Jupyter Notebooks and other materials (the "Material") come without warranties or representations, to the extent permitted by applicable law.

None of the Material represents any kind of recommendation or investment advice.

The Material is only meant as a technical illustration.

Leveraged and unleveraged trading of financial instruments, and of contracts for difference (CFDs) in particular, involves a number of risks (for example, losses in excess of deposits). Make sure to understand and manage these risks.

 Momentum Strategy •AI-Powered Strategy • Deployment of SMA Strategy

### Case Studies

### The AI Machine

### **Prediction Engines**



**Technical Rules** Statistical Methods Machine Learning Deep Learning Automated ML

Data Streaming **Transaction** Streaming **Position Management** Profit & Loss Calculation Visualization Logging & Reporting



### Deployment & Execution

### **Decision Rules**

Entry Rules Stop Loss Trailing Stop Loss Dynamic Stop Loss Take Profit **Position Sizing Capital Allocation** 

### The AI Machine





### The Python Quants GmbH

Dr. Yves J. Hilpisch +49 3212 112 9194 http://tpq.io | team@tpq.io @dyjh

