Al investment solutions

Building custom investment solutions using artificial intelligence

www.qplum.capital January 2019

See important disclosures at the end of this presentation.

| Introduction

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Calvin Yu, CFA Qplum

Managing Director, Head of Multi-Asset Solutions

- 12+ years experience in multi-asset portfolio management
- Lead Portfolio Manager and Outsourced CIO at Goldman Sachs
- Vice President at Pacific Global Advisors, an Institutional Solutions business that was acquired from J.P. Morgan

Qplum overview

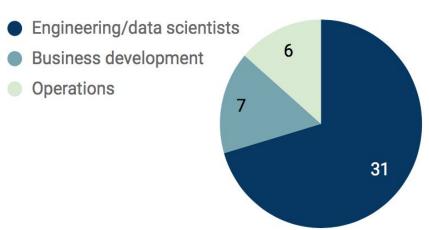
- Founded in 2014, Qplum is a SEC registered Investment Advisor ('RIA') and NFA registered Commodity Trading Advisor ('CTA').
- Offer diversified, systematic strategies across all major asset classes using proprietary deep learning, artificial intelligence ("AI") framework with end-to-end automation.



Mansi Singhal, Co-Founder and CEO

- 10+ years experience in Trading and Portfolio Management (systematic global macro)
- Brevan Howard, Bank of America Merrill Lynch.
- Masters in Computer Science from University of Pennsylvania.

Technology driven investment organization 40+ member team – Experienced investment experts, engineers and data scientists





Gaurav Chakravorty, Co-Founder and CIO

- Established one of the most profitable trading groups at Tower Research Capital.
- Youngest partner at Tower Research Capital.
- Masters in Computer Science from University of Pennsylvania.
- Graduated from the prestigious Indian Institute of Technology, Kanpur.

Key takeaways

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Traditional investment processes may be improved

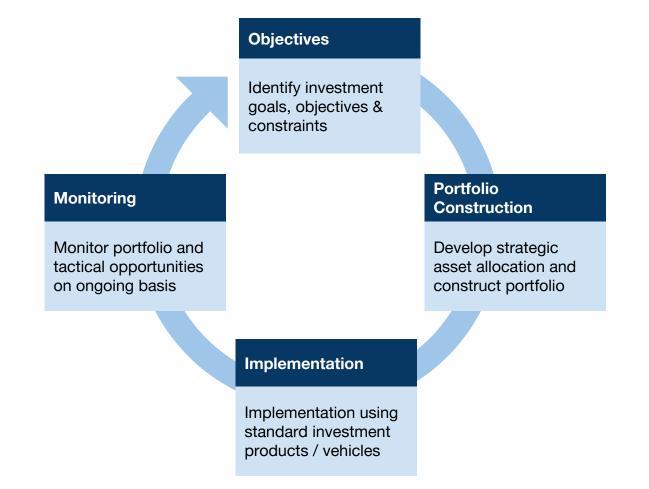
Custom solutions better meet objectives

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Traditional processes

Traditional investment process





Potential considerations of traditional investment process



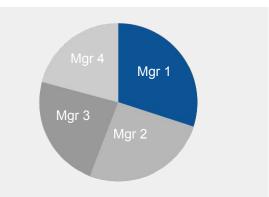
Dated assumptions

	Compound Reduce 2018 (NG)	Arthough Recurs 2008 (70)	Benualized Volacility (No	Refute SOLT	infinition									
inflation.	125	2.24	1.8	225	180	U.S. Call	05							
LS. Cash	2.00	280	0.50	200	6.08	100	Internation Transmiss							
LA transmission Transmiss	3.00	1.07	1.79	110	0.7	6.23	100	8.5. Long Transview						
A. Long Transmiss	2.80	1.21	1275	2.00	621	001	6.91	100	THIS.	-				
375	275	2.10	5.00	3.80	607	6.17	0.45	651	100	Appropriate Bunda	U.S. Shart			
5. Aggregate Bonds	38	3.32	3.75	3.00	42	613	661	676	6.76	100	Deration Government/Der	IIS loss		
15. Short Denation Generalment, Unefit	3.90	3.52	200	515	-0.09	14	121	041	6.67	0.54	180	Baration Coverance/Dis	EX.10v Grade	
A Long Duration towaranest/Coold	3.25	2.60	9.30	1.25	-027	000	0.40	0.09	2.64	095	6.90	1.80	Europeants Banak	U.S. Lon
LA. Her brade corporate bonds	3.90	3.47	6.00	1.25	62	- 604	54	2.64	2.44	6.82	540	0.79	1.00	European Bonels
LA. Long Corporate Bands	1.75	4.0	2000	125	6.0	-006	0.39	6.95	617	0.01	047	0.08	ON	100
1.5. kigh Yield Bonds	5.05	5.59	4.50	525	042	-040	-0.25	-9.27	0.N	0.29	0.8	942	0.57	0.0
15. Leveraged Leave	5.00	5.28	125	500	0.32	-034	-0.50	-046	8.00	-4.0	-6.0	-6.0	0.30	0.24
Norld Sovernment trenck hedged	2.90	234	100	125	4.24	433	0.00	5.05	6.52	035	0.50	0.00	0.52	0.56
Northid Bovenment Blanck	2.80	171	6.50	2.00	40	610	0.64	0.45	2.44	0.75	645	0.39	0.88	0.34
and with convenient book bedged	3.28	2.24	8.00	125	-6.27	0.17	6.75	6.79	641	0.72	6.80	0.72	0.80	0.84
Nordel ex-13.5. Generalment Books	18	2.54	500	2.00	902	0.8	4.54	6.37	04	642	042	0.50	0.55	0.51
inerging Markets Sovereign Oebt	53	571	425	5.50	600	-002	0.22	636	636	8.60	0.45	0.50	0.76	0.05
merging Warkets Local Corrency Debt	6.25	6.94	1225	6.52	0.12	612	6.5	1.02	5.45	046	0.4	0.35	0.56	0.48
merging Markets Corporate Bonds	1.0	3.37	1.2	1.50	0.08	-009	4.4	10.0	8.80	0.31	0.49	040	0.75	0.47
A MARINE VENE	2.80	2.01	1.21	1.80	-0.04	0.03	0.44	647	642	E44	Gat	0.87	0.85	0.00

Delays in tactical decisions



Implementation in isolation





Custom solutions

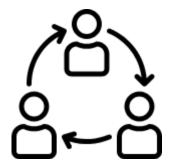
Custom solutions may better meet objectives

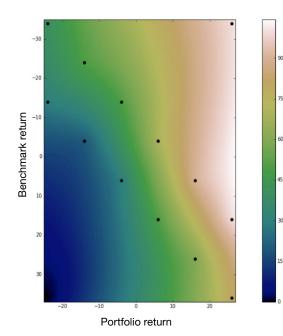
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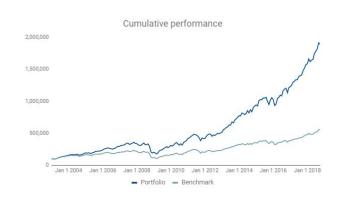


Custom utility function of investor preferences

Develop custom investment solution to better meet objectives







Illustrative customization process

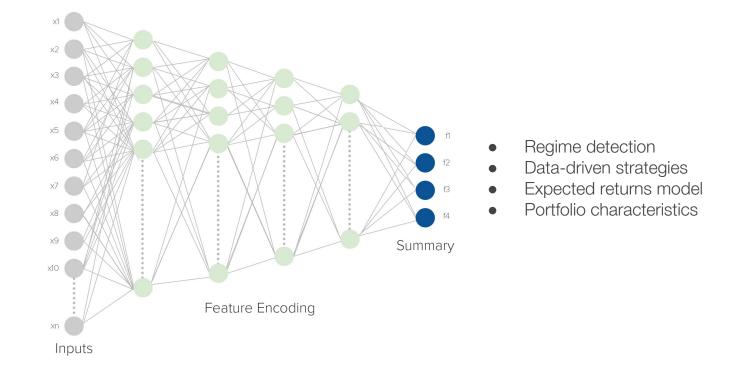
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Define Investment Objectives	Design Customized Solutions	Investment Study	Implementation
 Risk and return mandate Asset & sub-asset class, geographic, sector constraints Unique utility functions 	 Investment parameters Risk budgeting Investment universe Investment strategies Risk management 	 Blind Walk-forward Back-tested Performance Scenario analysis & Simulations Portfolio Characteristics 	 Portfolio construction Trading & operations Tax optimization Currency hedging Portfolio monitoring

Al driven investing



Automated Feature Extraction







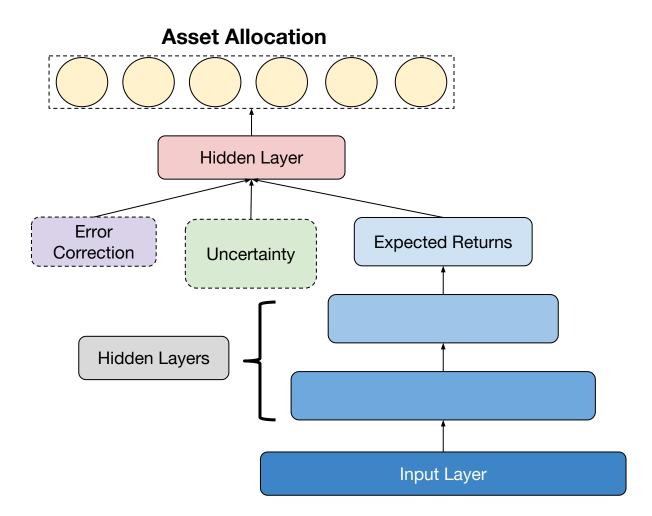
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SSRN whitepaper:

Deep Learning for Tactical Asset Allocation https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3242432



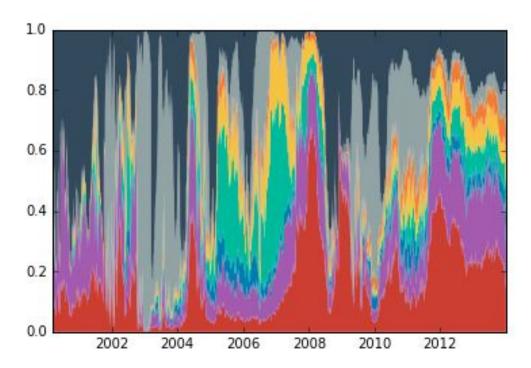
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Source: SSRN whitepaper: Qplum - Deep Learning for Tactical Asset Allocation <u>https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3242432</u>

| Deep Learning for Tactical Asset Allocation (cont'd)

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VGK	VTI	

Source: SSRN whitepaper: Qplum - Deep Learning for Tactical Asset Allocation <u>https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3242432</u>

Deep Learning for Tactical Asset Allocation (cont'd)



Source: SSRN whitepaper: Qplum - Deep Learning for Tactical Asset Allocation <u>https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3242432</u>

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Illustrative applications

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Illustrative application - Risk-targeted global tactical strategies

• Qplum designed a set of custom risk-targeted global tactical strategies, based on the following specifications:

0	Strategy:	Global tactical asset allocation
0	Benchmark:	Set of risk benchmarks based on global market cap portfolio
		(e.g., 12% vol, 8% vol, and 4% vol)
0	Universe:	Global equities, fixed income, and commodities
0	Drawdown/risk management:	Based on client specific risk tolerance
0	Implementation:	Listed ETFs in a separately managed account
0	Currency hedging:	Dynamic currency hedging to reduce hedging costs
0	Liquidity:	Daily

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Illustrative application - Risk-targeted global tactical strategies (cont'd)

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Illustrative portfolio performance (backtested)

	Aggressive	Dynamic	Conservative
Annualized Returns	10.2%	8.8%	5.3%
Standard Deviation	10.7%	8.2%	4.7%
Sharpe Ratio	0.96	1.08	1.13
Max. Drawdown	22.0%	17.8%	14.6%
Max. yearly loss	20.2%	16.5%	12.7%
Positive months	64.6%	65.7%	65.3%
Annual Turnover	6.2	5.9	5.7

*Backtested performance from January 1995 until October 2017.

The charts above compare the returns of simulations that are based on back-tested data, of the investment strategy of qplum, a customized strategy built for the client's needs. Additionally, the information in the graph reflects simulated allocation to various sectors of the investment strategy that is based on back-tested data. The investment strategy used to produce the simulated returns is the same as the investment strategy that qplum intends to initially use in managing the portfolio, but the program may alter its investment strategy in accordance with its governing documents in the future. The simulated returns are net of trading fees and transaction costs but gross of the management fee and incentive allocation that will be charged by the Investment Manager. The returns reflect the reinvestment of dividends and interest. Performance is reported gross of all other expenses such as custodial and other fees. The simulated returns do not reflect the results of actual trading decisions. Unlike the results from actual trading decisions, simulated results may have over-or-under compensated for the impact of certain market and macroeconomic factors, such as market disruptions, lack of liquidity, and the effect of interest rates. Simulated results also are designed with the benefit of hindsight. No simulated trading can completely account for the impact of financial risk in actual trading (for example, the ability to adhere to a particular trading program in spite of trading losses and the fact that an actual portfolio may not be fully invested at all times). There are frequently sharp differences between simulated results and the results usubsequently achieved from actual trading. No representation is being made that a portfolio managed by qplum in accordance with the parameters in this presentation would achieve profits or losses similar to those set forth herein.

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Illustrative application - 130/30 small-mid cap equity strategy

• Qplum designed a custom multifactor long/short equity strategy, based on the following specifications:

0	Strategy:	130/30 small-mid cap equity
0	Benchmark:	Russell 2500 Growth
0	Universe:	US small and mid cap stocks
0	Active risk budget:	2%
0	Beta to benchmark:	1.0
0	Turnover:	Below 150%
0	Implementation:	Single name stocks in a separately managed account
0	Liquidity:	Daily

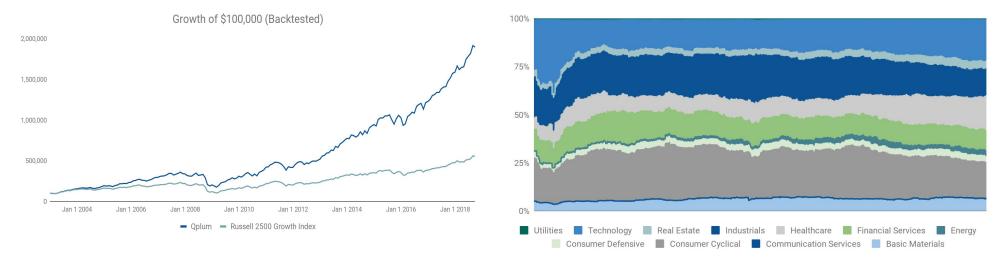
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Illustrative application - 130/30 small-mid cap equity strategy (cont'd)

Illustrative portfolio performance



^{*}Backtested performance from January 2003 until September 2018.

The charts above compare the returns of Russell 2500 Growth Index and the simulated returns, that is based on back-tested data, of the investment strategy of qplum, a customized strategy built for the client's needs. Additionally, the information in the graph reflects simulated allocation to various sectors of the investment strategy that is based on back-tested data. The investment strategy used to produce the simulated returns is the same as the investment strategy that qplum intends to initially use in managing the portfolio, but the program may alter its investment strategy in accordance with its governing documents in the future. The simulated returns are net of trading fees and transaction costs but gross of the management fee and incentive allocation that will be charged by the Investment Manager. The returns reflect the reinvestment of dividends and interest. Performance is reported gross of all other expenses such as custodial and other fees. The simulated returns, lack of liquidity, and the effect of interest rates. Simulated results also are designed with the benefit of hindsight. No simulated trading can completely account for the impact of financial risk in actual trading (for example, the ability to adhere to a particular trading program in spite of trading losses and the fact that an actual portfolio may not be fully invested at all times). There are frequently sharp differences between simulated results and the results subsequently achieved from actual trading. No representation is being made that a portfolio managed by qplum in accordance with the parameters in this presentation would achieve profits or losses similar to those set forth herein.

Other Portfolio Applications of Deep Learning

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Key takeaways

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Traditional investment processes may be improved

Custom solutions better meet objectives

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Thank you

Contact: calvin@qplum.co

Website: www.qplum.capital

Past webinars:

https://www.qplum.co/investing-events

SSRN whitepaper:

Qplum - Deep Learning for Tactical Asset Allocation https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3242432

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