DIFFERENTIAL CAPITAL



DATA SCIENCE IN ASSET MANAGEMENT

DIFFERENTIAL CAPITAL'S EVOLUTION IN ASSET MANAGEMENT

EXECUTIVE SUMMARY

Differential Capital's Data Science Evolution: From Theory to Practice

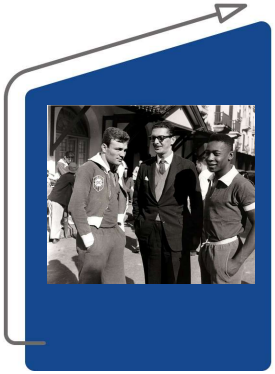
- This evidence document demonstrates concrete examples of our **systematic data science** integration across all investment processes.
- Rather than theoretical frameworks, these slides show operational systems delivering measurable investment advantages.
- Our evolution spans proprietary technology development, **alternative data** integration, **machine learning** deployment, and **systematic** decision-making processes.
- Each example represents years of development and refinement, resulting in quantifiable alpha generation and industry recognition.

DIFFERENCE | THE POWER OF DATA IN FOOTBALL

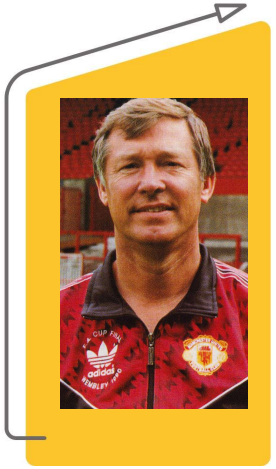
CHARLES REEP
Detailed data on passing c1950



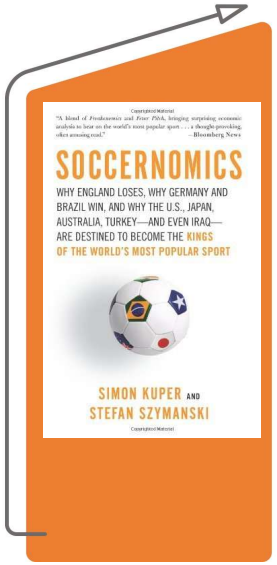
CARVALHAES
Advanced psychometric analytics c1954



FERGUSON
Video analytics 1990s



Advanced statistical techniques c2008



CATAPULT ONE
Advanced wearables



PEP GUARDIOLA
Data Science team at Man City



PROPRIETARY TECHNOLOGY INFRASTRUCTURE: EUCLID

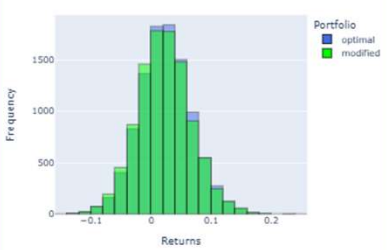
Portfolio Management and Execution Platform

- **Euclid** is our internally developed portfolio management system, designed specifically for data-driven investment approaches.
- The system provides integrated **risk analytics**, and **automated execution** capabilities.
- Unlike generic portfolio management platforms, **Euclid** seamlessly integrates with our portfolio construction systems and models.
- Key evolutionary impact includes elimination of manual processes, and systematic execution of investment ideas.
- This proprietary infrastructure provides ongoing competitive advantages that compound as our data and models improve over time.

Performance Statistics

	Optimal	Modified
Mean	2.44%	2.26%
Median	2.36%	2.16%
Std Dev	4.40%	4.47%
5%-VaR	-4.65%	-4.88%
5%-CVaR	-6.62%	-6.87%
P(Loss)	28.45%	30.74%
P(Fund < BMK)	17.87%	29.30%
P(TE < 3.5%)	95.77%	91.43%
Mean TE	2.17%	2.27%
Mean Info Ratio	39.24%	27.50%
Active Share	53.24%	55.88%

Forecasted Returns Distribution



Forecasted Tracking Error Distribution



PROPRIETARY TECHNOLOGY INFRASTRUCTURE: TENSOR

Advanced PyTorch-Based Portfolio Construction Engine

- **Tensor** Optimizer is our proprietary portfolio optimization framework built on PyTorch's tensor operations and automatic differentiation capabilities.
- The system addresses limitations of traditional quadratic programming approaches through **differentiable projection techniques**, population-based **adversarial optimization**, and custom loss functions.
- Unlike conventional optimization methods that can take hours for complex portfolios, our **tensor-based** approach enables efficient handling of large-scale problems with complex constraints.
- Key innovations include hybrid constraint handling combining projection methods with penalty terms, adversarial optimization to escape local minima, and integrated **risk decomposition analytics**.
- The framework enables **customizable objective functions** for precise control of optimization objectives, from traditional mean-variance to scenario-based risk evaluation.

TENSOR
by Differential Capital

Manage Briefcase HOME

Active Briefcase: data

Portfolio Optimizer

Build, analyze, and optimize portfolios with computational precision.

1 Strategy | 2 Data | 3 Parameters | 4 Results | 5 Frontier | 6 Analysis

Select Optimization Strategy

Select an optimization strategy that best fits your investment goals:

Benchmark Tracking ✓

Create a portfolio that closely tracks a benchmark with minimal tracking error

Requires Benchmark

Select →

Quality Selection

Create a portfolio that selects instruments based on quality/ESG scores

Requires Benchmark | Requires Scores

Select →

Long-Short Strategy

Create a long-short portfolio with natural optimization of short positions

Allows Shorting

Select →

Minimal Positions

Create a portfolio with minimal number of positions while tracking benchmark

Requires Benchmark

Select →

Absolute Return

Create a portfolio with absolute return focus and strict risk management

Select →

Flexible Portfolio

Create a customized portfolio with multiple objectives and constraints

Advanced

Select →

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Active Briefcase: MyBriefcase

Portfolio Optimizer

Build, analyze, and optimize portfolios with computational precision.

1 Strategy | 2 Data | 3 Parameters | 4 Results | 5 Frontier | 6 Analysis

Optimization Results

Quality Selection Results

Efficient Frontier | View All Details | Download Report

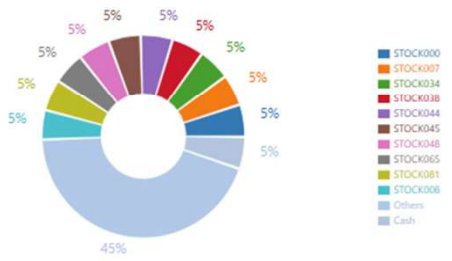
Optimization completed successfully with all constraints satisfied

Summary | Positions | Constraints | Convergence

Expected Return 0.96%	Portfolio Volatility 5.48%	Portfolio Score 66.40	Active Share 60.70%
Cash Position 4.97%	Risk-Free Weight 4.97%	Benchmark Return 0.88%	Excess Return 0.08%

Portfolio Allocation

Showing top holdings and others grouped



Top Positions

INSTRUMENT	WEIGHT
STOCK000	5.00%
STOCK007	5.00%
STOCK034	5.00%
STOCK038	5.00%
STOCK044	5.00%
STOCK045	5.00%
STOCK048	5.00%
STOCK065	5.00%
STOCK081	5.00%
STOCK008	4.53%

ALTERNATIVE DATA APPLICATION: SA RETAIL ANALYTICS

Comprehensive Retailer Performance Intelligence System

- Our retail analytics platform systematically monitors and analyzes performance across major South African retail chains using **customer ratings**, **store locations**, and **sentiment data**.
- The system processes real-time data from multiple sources including customer ratings, **geographic distribution**, sentiment analysis, and **performance rankings** across all nine provinces.
- Interactive dashboards enable comparative analysis across retailers, **temporal trend analysis** and store-level performance evaluation,.
- This comprehensive approach provides investment intelligence on retail sector dynamics, consumer preferences, and competitive positioning before traditional financial metrics reflect these trends.
- This is one of many applications that sit on our **proprietary data science application deployment platform**.

Retailer Ratings

Retailer Comparison
Date Comparison
Store Performance
Geographic Comparison

Retailer

Checkers

Date

2025-06-12

Per-Retailer Top & Bottom Ratings (Selected Date)

retailer	Top Rating	Bottom Rating
Checkers	4.70	3.00
Pick n Pay	4.60	2.60
Spar	4.70	3.10
Woolworths	4.60	3.60

Top 10 Stores by Rating

Name	Vicinity	Rating	User Ratings Total	Confidence Score	Overall Sentiment	Positive Themes	Negative Themes
checkers robberg bay	and, Shop 9 Robberg Bay Shopping Centre Corner of Longships Drive, White Caps Way, Plettenberg Bay	4.70	53.00	249.10	NA		
checkers wilkoppies	Cnr Of Austin and, Buffelsdoorn Rd, Wilkoppies, Klerksdorp	4.70	33.00	155.10	NA		
checkers liquorshop musina mall	Musina Mall, N1 & Schoonplaas, Limpopo Ave, Musina	4.70	22.00	103.40	NA		
checkers constantia	Emporium, Ladies Mile Rd, Constantia, Cape Town	4.60	3089.00	14209.40	NA		
checkers hyper nelspruit	and, Valley Hyper Corner of Du Preez Street, Samora Machel Dr, Mbombela	4.60	2119.00	9747.40	NA		
checkers blueberry square	Blueberry Square Shopping Centre Corner Of Beyers Naude Drive And, Blueberry St, Roodepoort	4.60	1965.00	9039.00	NA		
checkers drakenstein sentrum	Cnr Wemmershoek And, Lustigan Rd, Paarl	4.60	512.00	2355.20	NA		
checkers new market lifestyle centre	New Market Lifestyle Centre Corner of Ring Rd East and, Heidelberg Rd, Newmarket Park, Alberton	4.60	297.00	1366.20	NA		
checkers hyper brackenfell	Fairbridge Mall,Cnr Old Paarl Road,&, Brackenfell Blvd, Brackenfell	4.50	3416.00	15372.00	NA		

Bottom 10 Stores by Rating

Name	Vicinity	Rating	User Ratings Total	Confidence Score	Overall Sentiment	Positive Themes	Negative Themes
checkers ocean dunes (sibaya)	2 Heleza Blvd, Umhlangha, uMhlanga	3.00	42.00	126.00	NA		
checkers brentwood	and, Brentwood Mall Corner of Great North Road, Stanley Rd, Brentwood Park, Benoni	3.10	50.00	155.00	NA		
checkers the greenery	Corner Of Oost St &, Thabo Mbeki St, Polokwane Ext 4, Polokwane	3.30	42.00	138.60	NA		
checkers grahamstown	The Carlton Centre, 109 High St, Makhanda	3.50	76.00	266.00	NA		
checkers liquorshop kby game centre	Longholand and, New Park Shopping Centre, Cnr Bultfontein, Lawson St, New Park, Kimberley	3.50	32.00	112.00	NA		
checkers musgrave centre	115 Musgrave Rd, Berea, Durban	3.50	30.00	105.00	NA		
shoprite checkers	Shoprite - Chamdor, Krugersdorp, Gauteng	3.60	260.00	936.00	NA		
shoprite checkers - kagiso	Main Reef Road, Kagiso, Krugersdorp	3.70	299.00	1106.30	NA		
checkers foods cowey park	91, Cowey Park, Problem Mkhize Rd, Essenwood, Durban	3.70	118.00	436.60	NA		
checkers lintons corner	And, Linton Corner Shopping Centre Lynnwood Road, Solomon Mahlangu Dr, Pretoria	3.70	66.00	244.20	NA		

Retailer Ratings

Retailer Comparison

Date Comparison

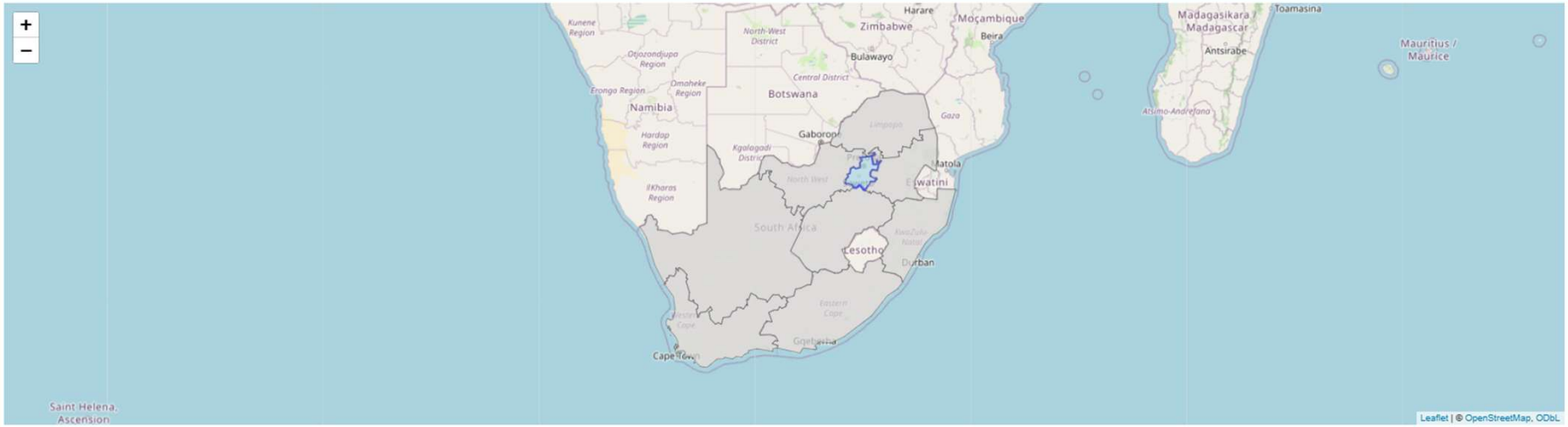
Store Performance

Geographic Comparison

Date

2025-06-12

Map of Provinces



Retailer Summary in Selected Province

Retailer	# Stores	Average Rating	Rank in Province
Woolworths	104.00	4.28	1.00
Checkers	91.00	4.22	2.00
Spar	113.00	4.06	3.00
Pick n Pay	110.00	3.97	4.00

ML INTEGRATION: ASSET ALLOCATION MODELS

Multi-Model Regime-Based Investment System

- Our precious metals allocation system employs four distinct approaches: static state-based rules, dynamic decision trees, neural networks, and LLM integration.
- This multi-model framework has generated **statistically significant alpha** over JSE All Share benchmarks across 30 years of backtesting.
- The evolution from traditional allocation methods to **AI-integrated systematic** approaches demonstrates measurable performance improvements.
- This systematic approach replaces subjective market timing decisions with **evidence-based** regime identification and allocation optimization.
- The system uses generative AI to produce well-written reports and analysis, combining structure recommendation from predictive AI with **unstructured market context**.

DIFFERENTIAL **CAPITAL**

Precious Metals & SA Equity Allocation Analysis

Multi-Model Quantitative Assessment with Market Regime Analysis

July 14, 2025

Investment Research
Quantitative Analysis

Performance data as at July 14, 2025

EXECUTIVE SUMMARY

In the current macroeconomic climate marked by supportive real interest rates and heightened demand for precious metals, portfolio managers are advised to consider a tactical deviation from the default 100% JSE All Share allocation. The best-performing model analyzed, **LLM Multi-Stage**, with a Sharpe ratio of 1.112, suggests a significant allocation to gold (40%), platinum (25%), and selected mining equities, while reducing JSE All Share exposure to 10%.

The LLM analysis highlights the following critical factors influencing this allocation strategy:

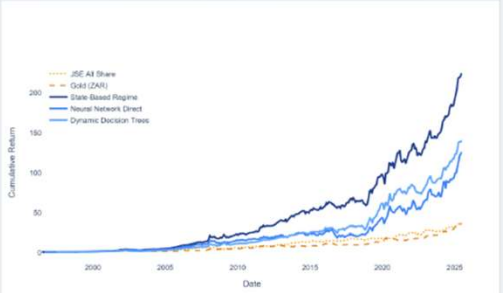
- **Real Interest Rates and Inflation**: Currently at 1.517%, real yields favor non-yielding assets like gold, while inflation expectations (2.463%) may drive further demand for precious metals. This environment supports higher gold prices, reinforcing the recommendation for increased allocations.
- **Geopolitical Tensions**: Recent geopolitical developments have pushed gold prices to a three-week high as investors seek safe-haven assets amidst rising uncertainty. This context aligns with increasing allocations to gold and platinum.

Although the JSE All Share continues to benefit from localized economic factors, its appeal is somewhat diminished by a strong US dollar (USD Index at 97.859) and mixed risk appetites, which are negatively affecting equity valuations. The neural network model signals an allocation of only 31.5% to JSE All Share, contrasting with the robust outlook for precious metals.

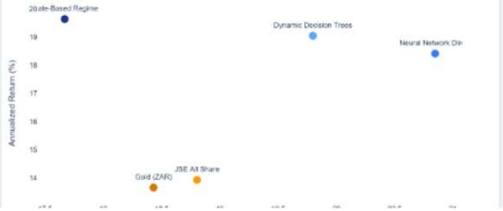
The analysis displays agreement among the models regarding the strategic preference for gold and platinum, underscoring their current attractiveness as hedges against inflation and geopolitical risks. Conversely, models such as the **Dynamic Decision Trees** suggest more conservative allocations to platinum and the equity markets, indicating a divergence in views on the short-term performance of PGMs versus equities.

Given the moderate VIX reading of 17.11, which indicates typical market stress levels, a cautious approach is warranted. Continued monitoring of USD strength and geopolitical developments is essential, as these

Cumulative Performance



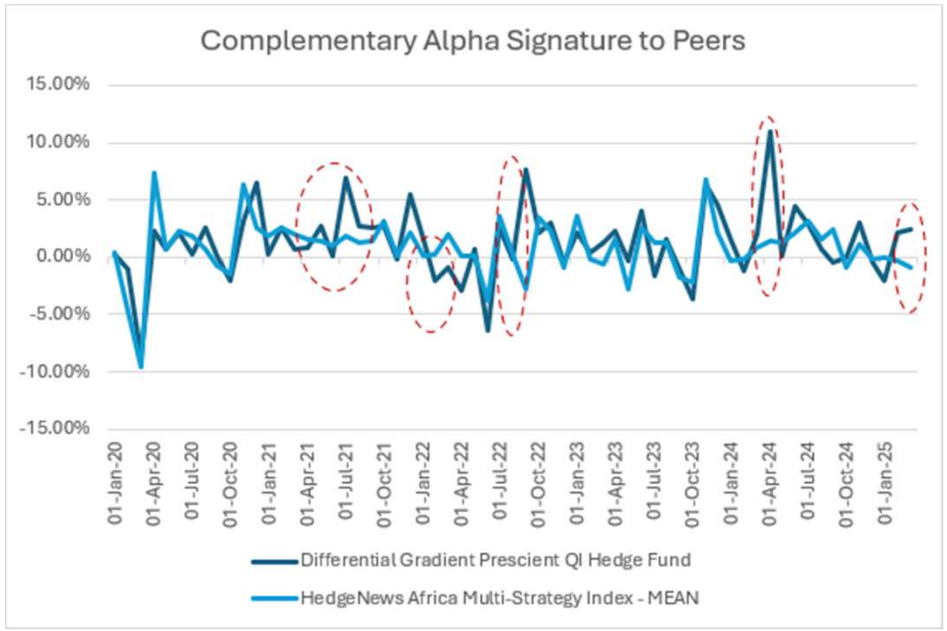
Risk-Return Profile

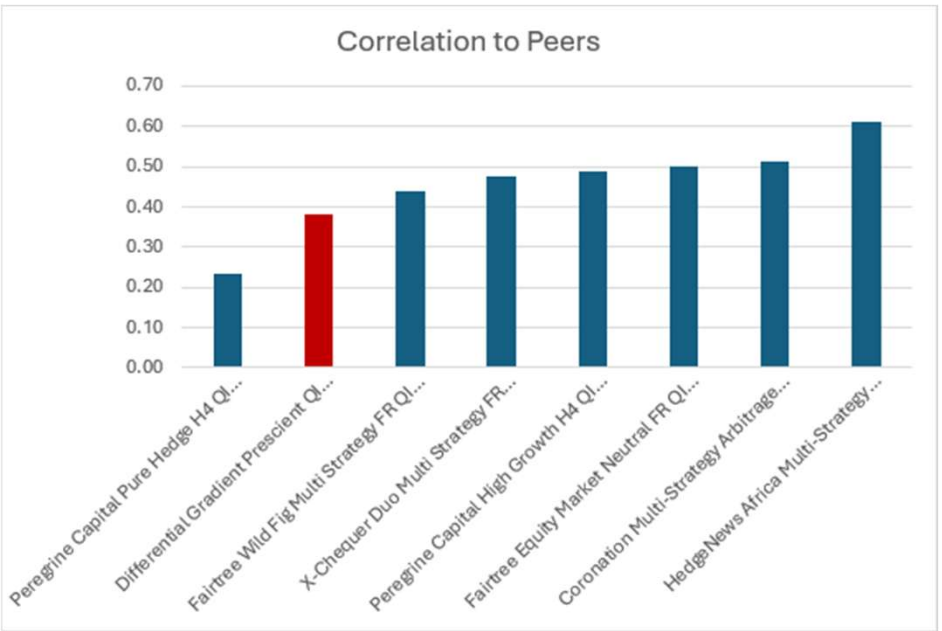


QUANTIFIED IMPACT AND RECOGNITION

Measurable Results from Data Science Evolution

- **Multi-Strategy Hedge Fund of the Year award for 2024** validates our systematic approach against industry peers.
- Asset growth from R200m seed capital in 2019 to R5bn AUM by June 2025 demonstrates institutional validation of our evolved methodology.
- Our systematic approach generates returns with low correlation to traditional peer strategies, providing genuine diversification value.


Complementary Alpha Signature to Peers
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
01-Jan-20
01-Apr-20
01-Jul-20
01-Oct-20
01-Jan-21
01-Apr-21
01-Jul-21
01-Oct-21
01-Jan-22
01-Apr-22
01-Jul-22
01-Oct-22
01-Jan-23
01-Apr-23
01-Jul-23
01-Oct-23
01-Jan-24
01-Apr-24
01-Jul-24
01-Oct-24
01-Jan-25
Differential Gradient Prescient QI Hedge Fund
HedgeNews Africa Multi-Strategy Index - MEAN


Correlation to Peers
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Peregrine Capital Pure Hedge H4 QI...
Differential Gradient Prescient QI...
Fairtree Wild Fig Multi Strategy FR QI...
X-Chequer Duo Multi Strategy FR...
Peregrine Capital High Growth H4 QI...
Fairtree Equity Market Neutral FR QI...
Coronation Multi-Strategy Arbitrage...
HedgeNews Africa Multi-Strategy...

CONCLUSION - EVOLUTION IN PRACTICE

From Traditional Asset Management to Systematic Data Science Integration

- These operational examples demonstrate measurable evolution from intuitive investment processes to **systematic data-driven methodologies**.
- Our proprietary **technology infrastructure**, **alternative data** integration, and **machine learning** deployment represent concrete advances beyond theoretical potential.
- The evidence shows actual implementation delivering **quantifiable investment advantages**, industry recognition, and institutional asset growth.
- This systematic approach to asset management evolution provides a replicable framework for industry **transformation toward more effective capital allocation**.
- Our success demonstrates that sustained competitive advantage comes from systematic integration of **data science across all investment processes**, not just overlay applications.