Building logical solutions for automated trading

WINNERS OR LOSERS

MACHINE LEARNING MODEL STRATEGIES FOR DAY TRADING

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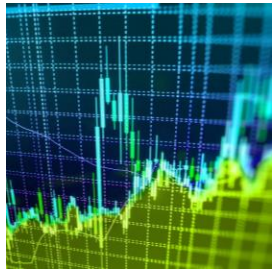
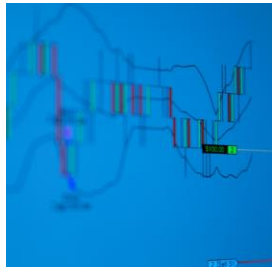
PROJECT GOAL

Building logical solutions for automated trading



Using ML to predict Win-rate from historical data



Focus: daily trading (buy open, sell close)

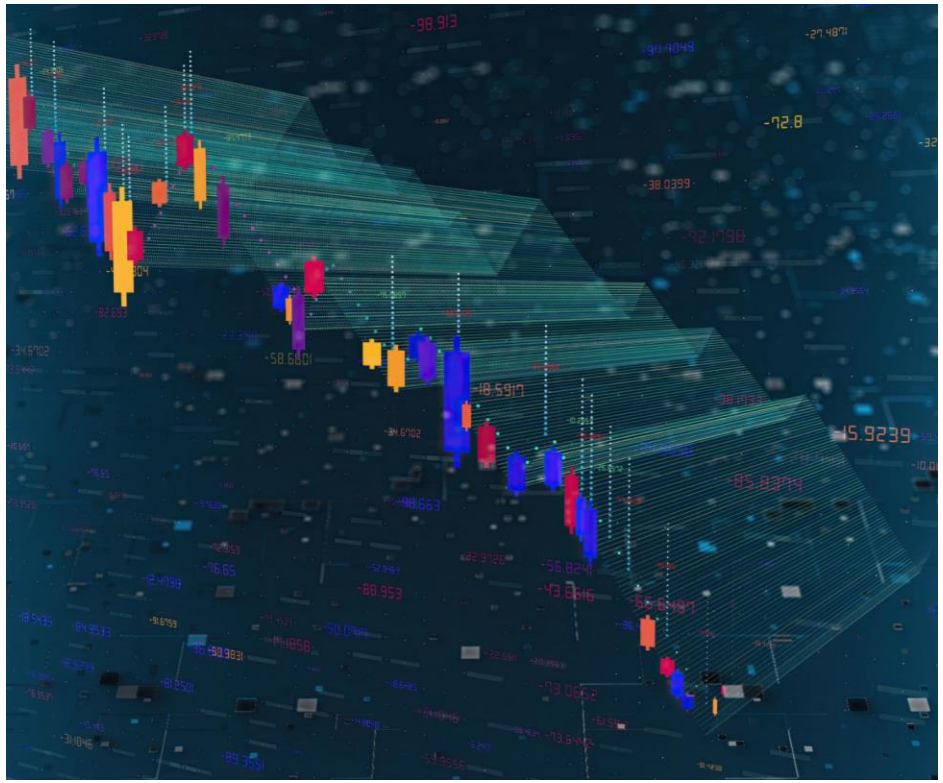
“If you want to beat the market, start by understanding it.”

Our Asset: SPY ETF

- Widely traded ETF, listed on NYSE
- Pays dividends every 3 months
- Chosen for liquidity & availability

Day Trading Strategy

- Buy SPY at market opening
- Sell SPY at market closing
- Train ML model on historical performance with different features
- Predict daily win-rates



STEP 1: GOOGLE CLOUD SETUP

Creating accounts, permissions, roles

Updating permissions = boring but necessary 😅

Then moved to GitHub for collaboration

DATA SOURCE

- Chosen API: Polygon (free & reliable)
- Delivered all market data we needed
- Alternative APIs were costly or limited

Losers-or-Winners > data > stock_data.csv > data

```csv
ticker,date,open,close,volume
SPY,2024-09-03,560.47,552.08,60600113.0
SPY,2024-09-04,550.2,550.95,47224939.0
SPY,2024-09-05,550.89,549.61,44264258.0
SPY,2024-09-06,549.94,540.36,68493805.0
SPY,2024-09-09,544.65,546.41,40445822.0
SPY,2024-09-10,548.36,548.79,36394579.0
SPY,2024-09-11,548.7,554.42,75248608.0
SPY,2024-09-12,555.01,559.09,51892735.0
SPY,2024-09-13,559.71,562.01,39310501.0
SPY,2024-09-16,561.74,562.84,36656122.0
```

PIPELINE STRUCTURE

Our Orchestrator: Composer

Dag 1 : Ingest

Fetch data from API

Upload to GCS

Store Metadata

BigQuery Load

Dag 2: Predict

Read from BigQuery

Load model from GCS

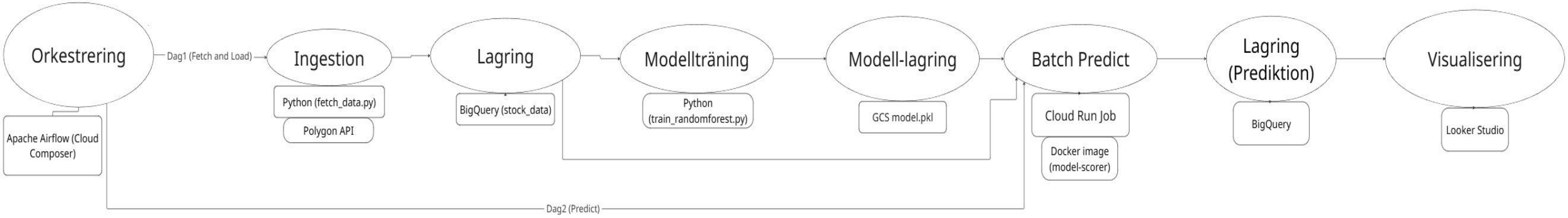
Feature Engineering

Run predictions

Save predictions CSV

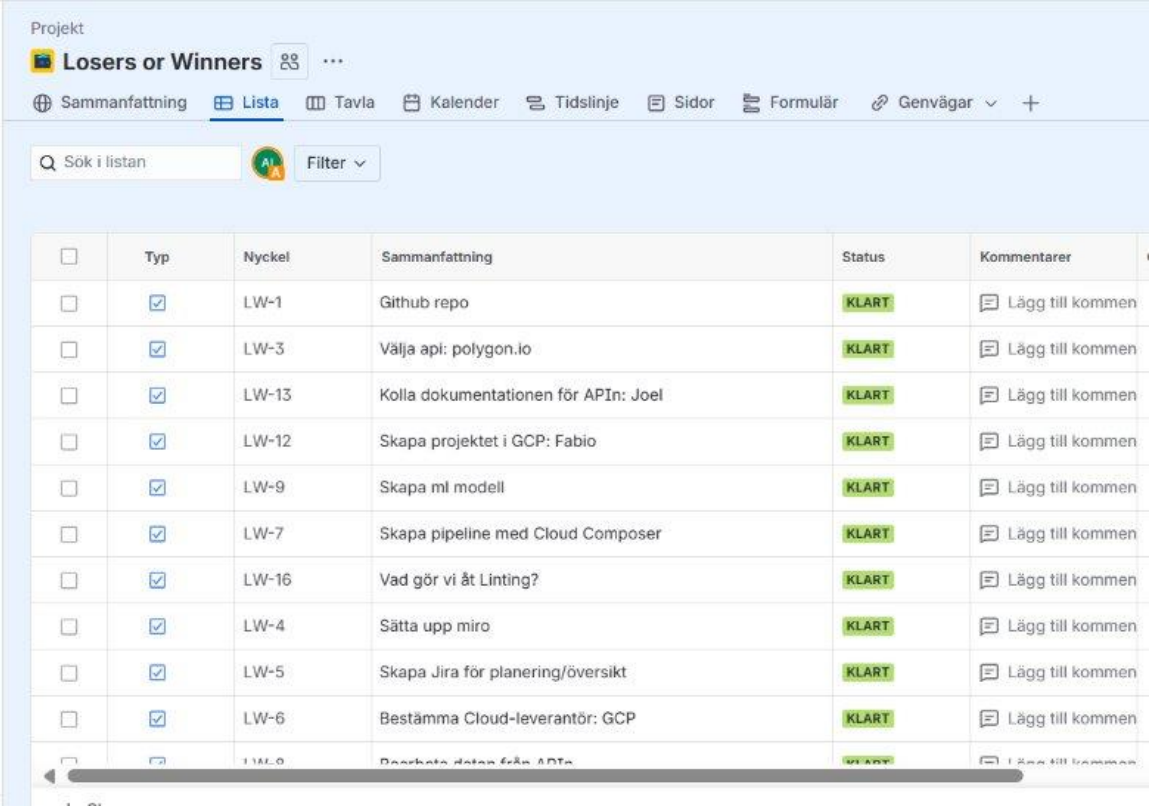
Store in BigQuery

Winners or Losers: Pipeline



AGILE FRAMEWORKS

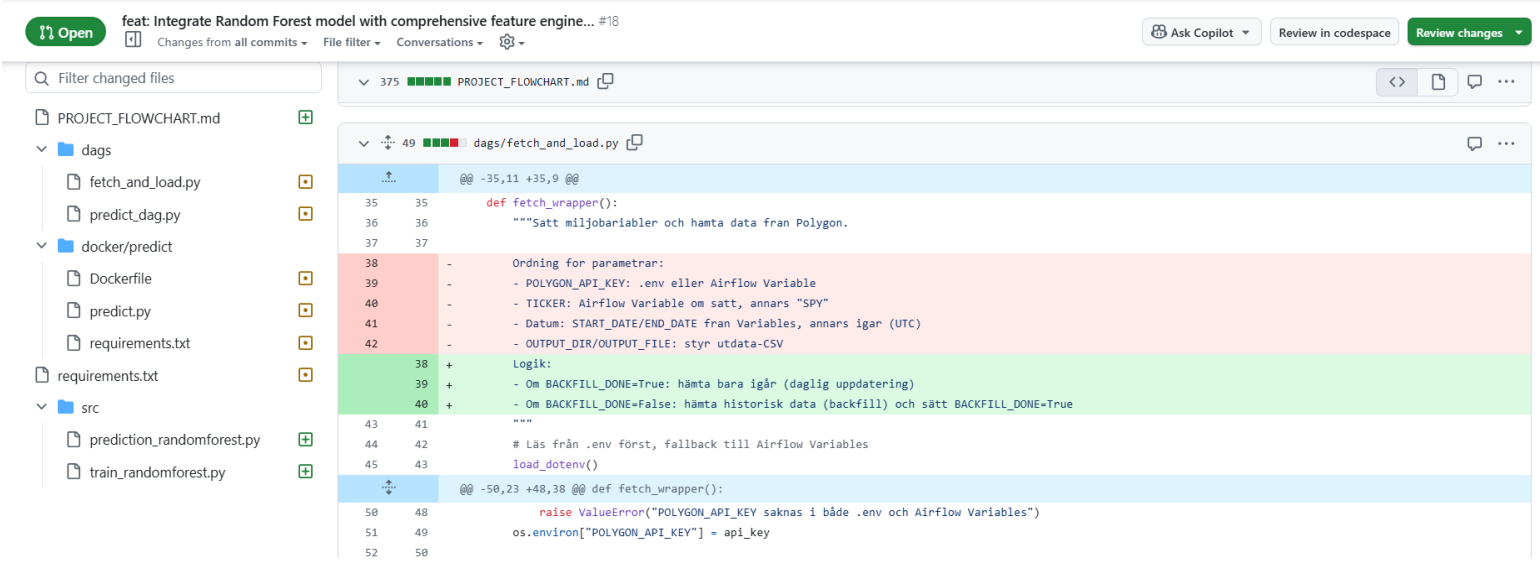
- ✓ Weekly sprints illustrated on KanBan Board via Jira.
- ✓ Shared Word doc for daily progress
- ✓ Continuos Stand-Ups to inform about progress and problems.
- ✓ Dividing tasks between each other each week.
- ✓ One Project Owner and rotating Scrum Master.
- ✓ Using Miro for pipeline visualization
- ✓ **Documentation = survival !!**



Typ	Nyckel	Sammanfattning	Status	Kommentarer
	LW-1	Github repo	KLART	Lägg till kommen
	LW-3	Välja api: polygon.io	KLART	Lägg till kommen
	LW-13	Kolla dokumentationen för APIn: Joel	KLART	Lägg till kommen
	LW-12	Skapa projektet i GCP: Fabio	KLART	Lägg till kommen
	LW-9	Skapa ml modell	KLART	Lägg till kommen
	LW-7	Skapa pipeline med Cloud Composer	KLART	Lägg till kommen
	LW-16	Vad gör vi åt Linting?	KLART	Lägg till kommen
	LW-4	Sätta upp miro	KLART	Lägg till kommen
	LW-5	Skapa Jira för planering/översikt	KLART	Lägg till kommen
	LW-6	Bestämma Cloud-leverantör: GCP	KLART	Lägg till kommen

GITHUB & COLLABORATION:

- All commits with comments before merge
- Linting & clean code enforced
- Full transparency across team members



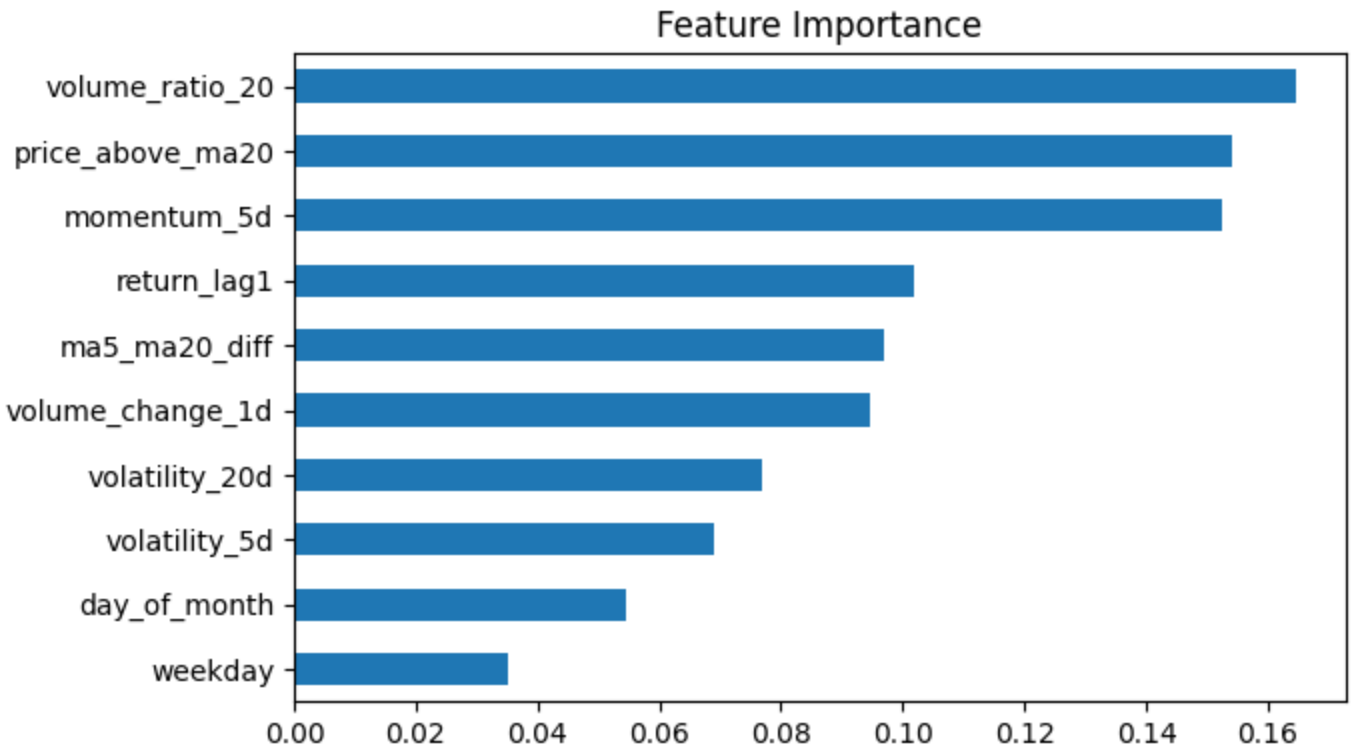
FIRST ML MODEL: LOGISTIC REGRESSION

```
📈 Baslinje (köp varje dag, sälj vid stängning):
Totalt antal dagar: 251
Vinstdagar: 135
Förlustdagar: 116
Winrate: 53.78%
```

- Simple, quick baseline
- Predict win-rate from historical data
- Problems: low accuracy, overfitting risk. Worked only on tot. daily win-rate
- **“Not perfect, but a starting point."**

```
🗓️ Winrate per veckodag (köp vid öppning, sälj vid stängning):
Monday    : 58.33% (28 vinstdagar, 20 förlustdagar)
Tuesday   : 56.6% (30 vinstdagar, 23 förlustdagar)
Wednesday : 54.9% (28 vinstdagar, 23 förlustdagar)
Thursday  : 42.86% (21 vinstdagar, 28 förlustdagar)
Friday    : 56.0% (28 vinstdagar, 22 förlustdagar)
```

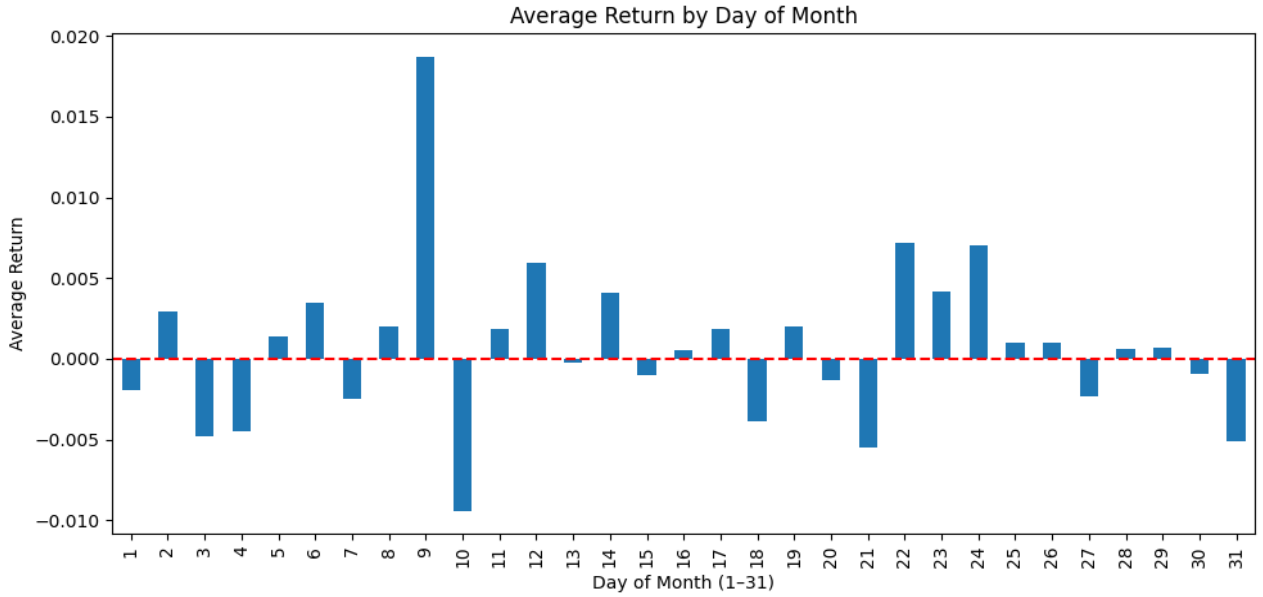
ADVANCED ML MODEL: RANDOM FOREST



- We implemented a Random Forest classifier to predict daily SPY win-rate.
- It uses ~10 engineered features (momentum, volatility, moving averages, volume,etc etc).
- The model reduces overfitting compared to linear regression and captures non-linear relationships.
- Achieved stable predictions on historical intraday data, forming the base for future improvements.

FEATURES RANDOM FOREST

- weekday – day-of-week effect (Monday to Friday)
- day_of_month – calendar patterns (Calender day)
- return_lag1 – momentum/mean-reversion
- Volatility 20d – risk regimes
- momentum_5d – short-term trend
- price_above_ma20 – medium-term trend
- ma5_ma20_diff – moving average crossover
- volume_ratio_20 – market participation
- volume_change_1d – shocks/novelties



RESULTS

- Working model with ~10 features
- Predictive capability on historical data
- Scalable with more APIs, features, assets
- Feature importance chart as visualization

WHAT WE LEARNED

Routine Tasks

Checklists

- ✓ Agile teamwork = progress
- ✓ Documentation is mandatory, already from the very beginning
- ✓ Daily check-ins solve problems faster
- ✓ **Composer is awesome but costly** 😅

Complex Processes

Flowcharts & SOPs

FINAL THOUGHTS

- ✓ Achieved all goals (and even more, since we introduced one more model that wasn't part of the plan)
- ✓ Pipeline fully functional
- ✓ Future: Docker + Workflow to replace Composer
- ✓ "This was just a school project, but we built it like a startup." 🚀