Quant Trading Strategies Using HMM or ML

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Fig. 1 BTC prices. Regime breakdown: low volatility, buffer zone 1, high volatility, buffer

Regime-Switching Behavior

5

States from Regime Detection

01 **Sideways**

02 **Slightly Bearish**

03 **Strongly Bearish**

5

States from
Regime Detection

04 **Mildly Bullish**

05 **Strongly Bullish**

5

States from Regime Detection

Determine through

Returns

Average return using:
close price.pct_change()

Volatility

Close price.pct_change().rolling(window).std() * 100

Trend

np.where(df['ema_50'] > df['ema_200'], 1, –1)

5

States from Regime Detection

Determine through

Volume

Relative Strength Index (RSI)

RSIIndicator(close=df['close'], window=14).rsi()

01

Data Processing

Eco Fixer

Let's have a look

Step 1: Data Processing

Multiple Sources

- CryptoQuant
- Glassnode
- CoinGlass

- Bitcoin Data
- Ethereum Data

Quality Control

Scaling   Imputation

Step 2: HMM Model

- Miner Flows
- Exchange Flows
- Network Data
- Market Data
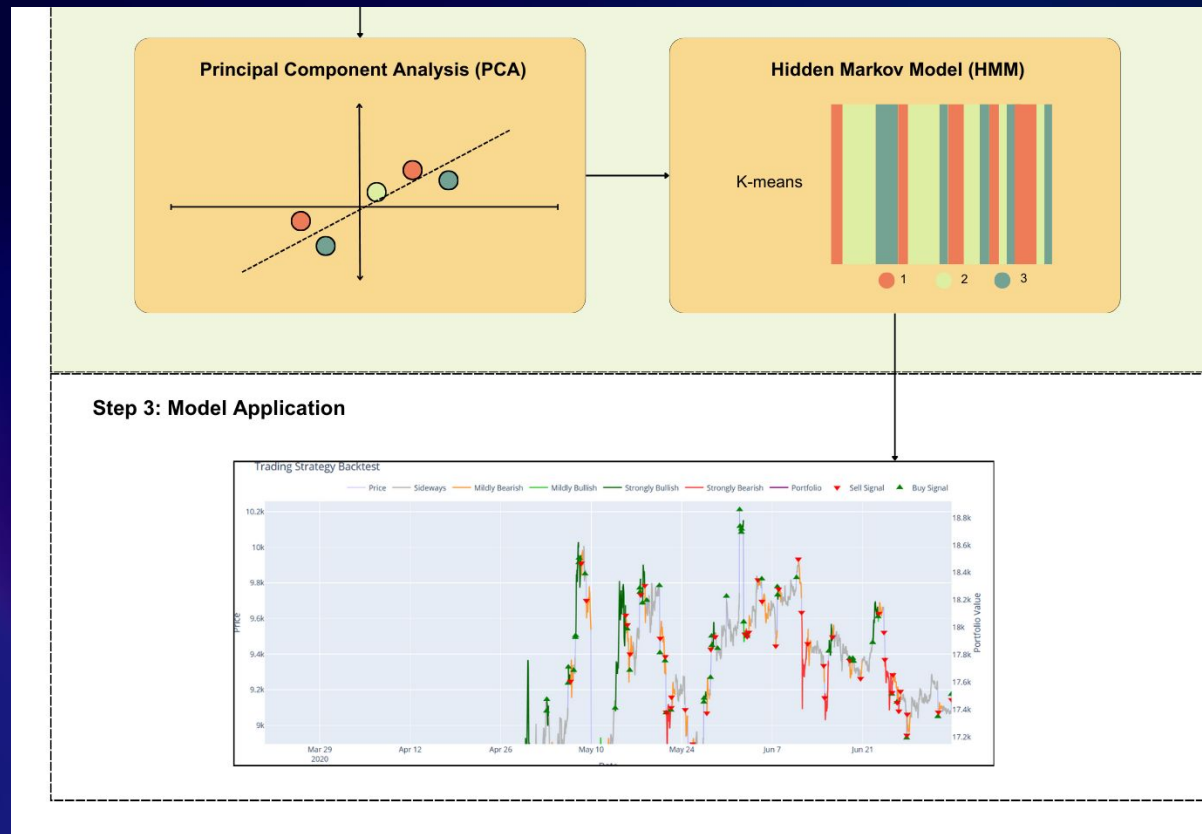- Whale Data

On-Chain Features → Derived into → Technical Indicators

Train Dataset
2018 - 2021

Test Dataset
2022

Model & Strategy Design

Let's have a look

Trading Signal?

When to buy & When to sell

Eco Fixer

Flat Position

Sideways?

- Use **Bollinger Bands** to determine upper and lower price range levels.

- Sell at **resistance level**.

- Buy at **support level**.

Flat Position

Discover a Trend?

- Buy when transitioning to bullish trend.

- Sell when transitioning to bearish trend.

Long Position

When to Enter & Exit

- Buy when discover a bullish trend.

- Sell when the return is greater than invested or found a bearish trend.

Short Position

When to Enter & Exit

- Borrow and sell when discover a bearish trend.

- Buy back when the price falls to a level where the return is sufficient to cover the loan

Trade Execution

Trade Execution

1

Buy Signal & Flat Position

Buy Amount < Cash's 50%
Calculate 6% trading_fee

2

Sell Signal & Long Position

Sell Amount >= Portfolio's 20%
Calculate 6% trading_fee

3

Sell Signal & Short Position

Sell Amount < Portfolio's 20%
Calculate 6% trading_fee

4

Buy Signal & Short Position

Buy Amount >= Loan
Calculate 6% trading_fee

Thanks!