→ Sharpe Ratio

→ Max drawdown

→ Win/loss ratio

→ Hit rate (classification accuracy)

(6) Walk Forward Analysis:

→ Train the model on a rolling window (eg. last 2years), test on the next month.

→ Continue forward, updating the model periodically.

(7) Evaluation and Comparison:

Compare DNN strategy with.

* Buy and hold model.
* Moving Average Crossover.
* Other ML models (Random Forest, XGBoost).

This is how backtesting a daily DNN based strategy is executed.

BACKTESTING AN INTRADAY DNN BASED STRATEGY:

Backtesting an Intraday Deep Neural Network (DNN) - Based strategy is more complex than daily strategies due to high-frequency data, faster decision-making, and greater sensitivity to latency and transaction costs. Here's how to approach it:

Step-by-step guide:

(1) Data Collection:

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Collecting a high-frequency data for assets (stocks, crypto, etc). at intraday intervals like 1-minute, 5-minute or 15-minute candles.

→ Data Needed are OHLCV → Open, High, Low, Close, Volume.

(2) Feature Engineering:

You need to turn raw data into inputs that a model can learn from:

Examples:

Price returns: % change or log returns over 1 or more intervals.

→ Technical indicators: RSI, MACD etc.

→ Volume indicators: VWAP, volume delta, spikes.

→ Time features: Time of day (trading behaviour changes hourly).

→ Lag features: Include data from past n minutes (rolling window).

Windowing:-

Create a fixed-size sliding window of data. For example.

→ Input: Data from minute t-10 to t.

→ Predict: Price direction or return at t+1.

(3) DNN model design:

MLP (Fully connected DNN): Good for static data.

LSTM/GRU: Recurrent Neural networks for time-series forecasting.

CNN: Detects patterns in sequences like price waves.

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Architecture Example:

```
model = Sequential([
    Input (shape = (10,6), # 10 time steps, 6 features
    LSTM(64) # it adds LSTM layer with 64 units (neurons).
    Dropout (0.2) # It randomly disables 20% of neurons
                    during each training step to prevent
                    overfitting.
    Dense (1, activation = 'sigmoid') # Dense (1) means
```

a scalar output for sing neuron. sigmoid squashes the output between 0 and 1. If 1 then buy else sell (0).

(4) Training Strategy:

→ Split by time: Train → validate → test

→ Walk forward: Retrain the model regularly using most recent data.

→ Avoid data leakage: Don't let future data into training or validation.

(5) Backtesting Framework:

Simulate what would happen if you used your model to trade in the past.

(*) Feed model the latest window of features.

* Make a prediction: buy/sell/hold.
* Simulate the trade.
* Update capital and portfolio.
* Repeat for next time step.

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(6) Performance Metrics:

To measure:

* Cumulative return: Total percentage gain/loss over the period.
* Sharpe Ratio: Return relative to risk.
* Sortino Ratio: Sharpe with focus on downside volatility
* Max Drawdown: Worst capital drop from a peak.
* Hit rate: % of correct predictions
* Profit factor: Gross profit / gross loss.

The Full Workflow:

Raw Intraday Data

↓

Feature Engineering (Indicators, Lagged Returns, Volume)

↓

Create slidding Windows (Supervised format)

↓

Train DNN (LSTM, CNN, MLP)

↓

Use model to predict on Historical Data

↓

BackTest Simulation

↓

Evaluate Metrics.