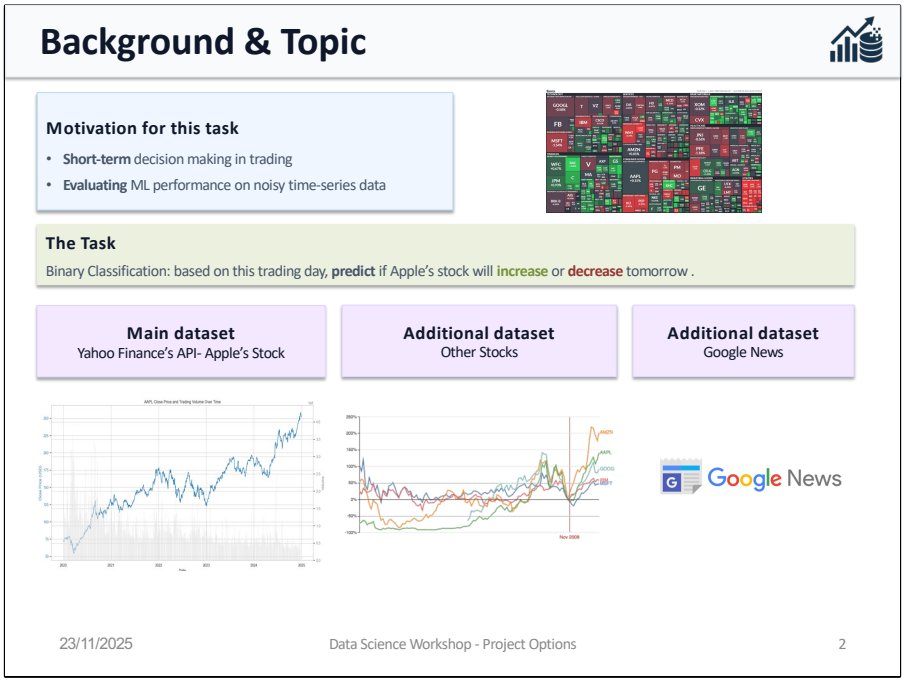
Moran

- Good afternoon. We are **Itay Mutzafi, Moran Zaks, and Shaked Schnarch**

- **Our first option** is in the financial markets: **Stocks Prediction**. The task is a Supervised Binary Classification on noisy time-series data.
- **Our second option** is in Neuroscience: **Detecting Autism Patterns in Brain Signals.**

We will now dive into the first option: Stocks Prediction.

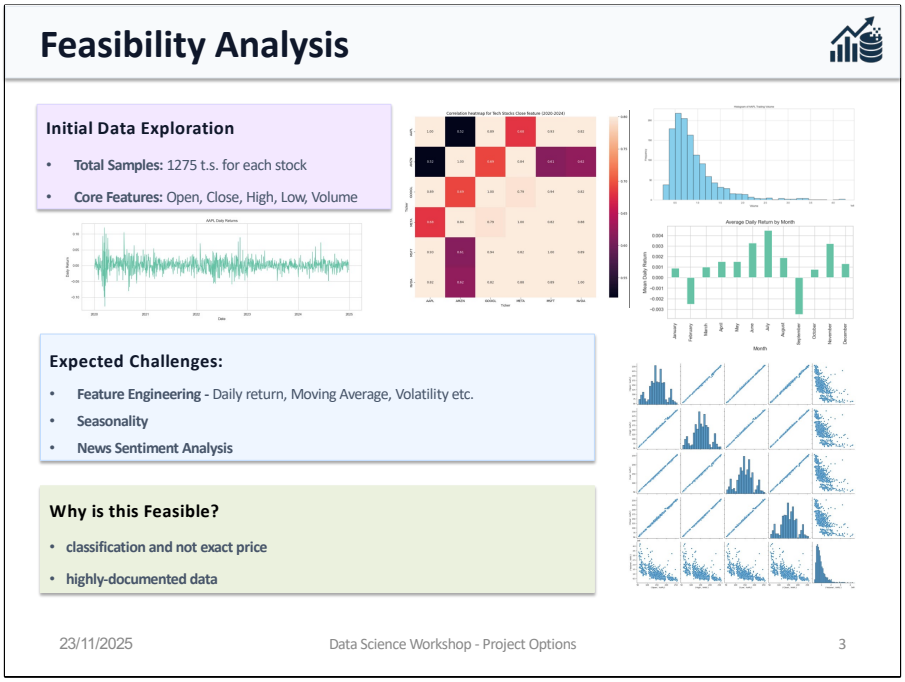


Moran

Our idea is to use public financial dataset to answer the question 'will a stock increase or decrease tommorow?'

We will compare our resoults between training over
only the specific stock's past -
other companies in the market's change -
news titles like 'new iphone is coming out -

motivation is both trading decisions for investors etc., and for evaluating ML over noisy time-series data



Moran

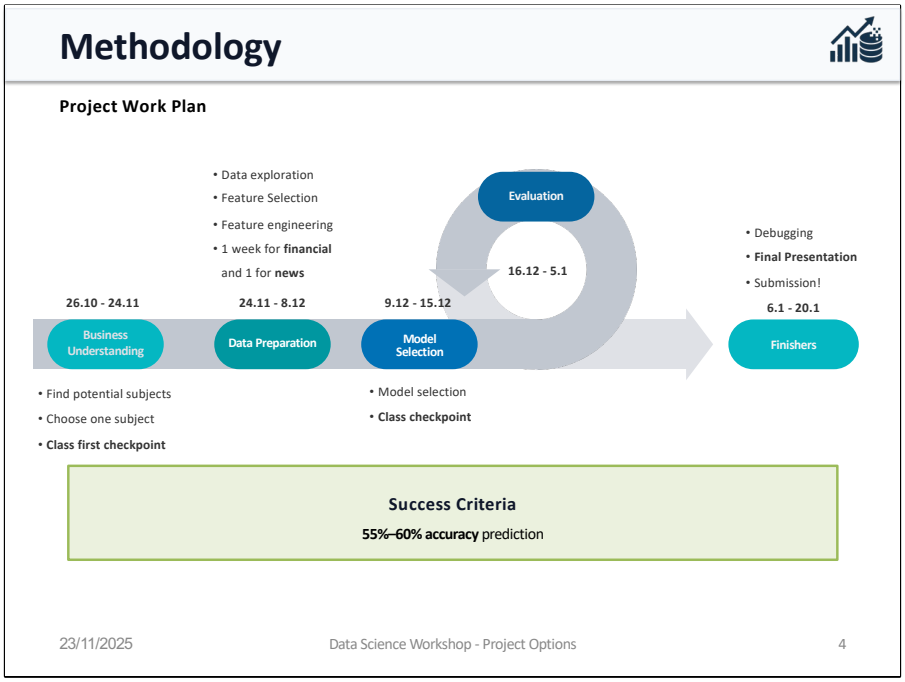
By starting to look at the data we see we have basic features and will need to do feature engineering for more like daily return

daily return - predicts the percentage change in stock price from one day to the next

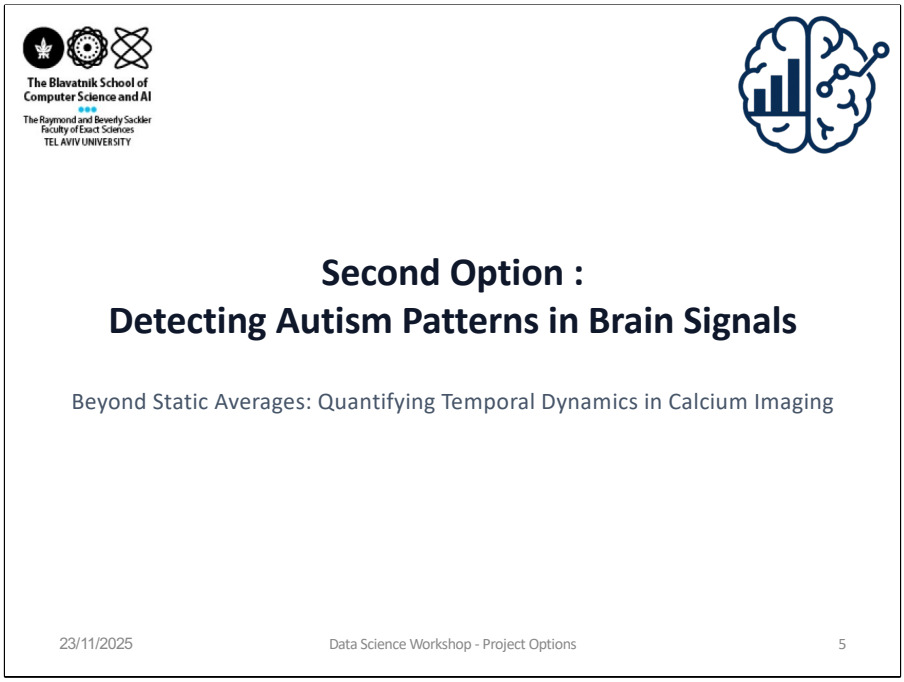
We will need to address the seasonality of the data (Holidays, Options expiry day)

supporting dataset will add the titles from the news. Using NLP method for sentiment analysis.

We believe this is feasible since we only predict the change and not the exact price, and we have a lot data to train on

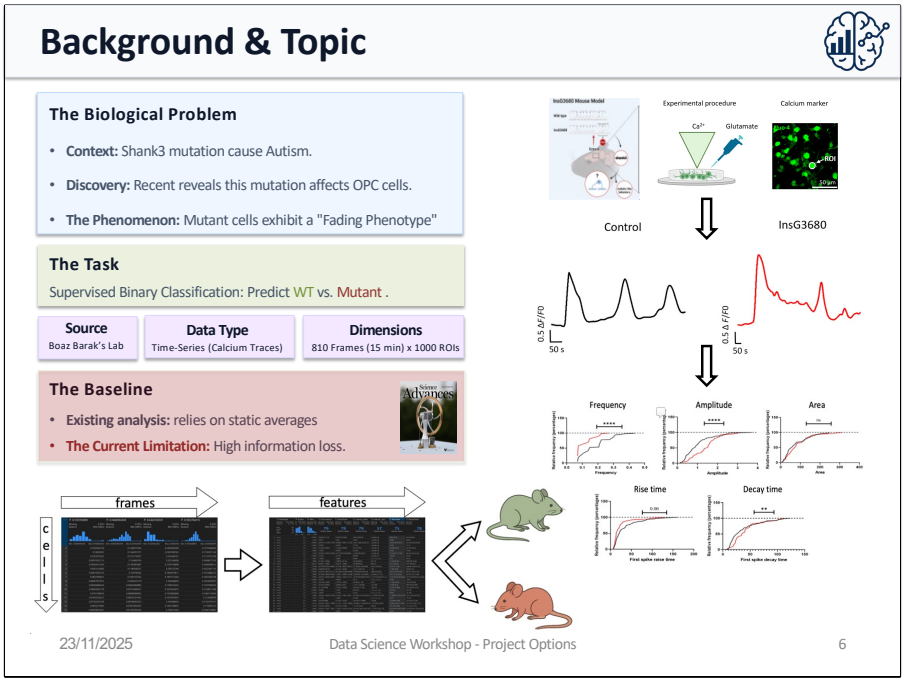

Methodology
Project Work Plan
• Data exploration
• Feature Selection
• Feature engineering
• 1 week for financial and 1 for news
Evaluation
16.12 - 5.1
• Debugging
• Final Presentation
• Submission!
26.10 - 24.11
24.11 - 8.12
9.12 - 15.12
6.1 - 20.1
Business Understanding
Data Preparation
Model Selection
Finishers
• Find potential subjects
• Choose one subject
• Class first checkpoint
• Model selection
• Class checkpoint
Success Criteria
55%–60% accuracy prediction
23/11/2025
Data Science Workshop - Project Options
4

Itay



Shaked

- Now, we will move on to our second project option.
- While the first option dealt with financial markets, this project focuses on **Neuroscience**.
- Here, we aim to use Time-Series Classification to distinguish between healthy brain cells and those carrying an Autism-related mutation.



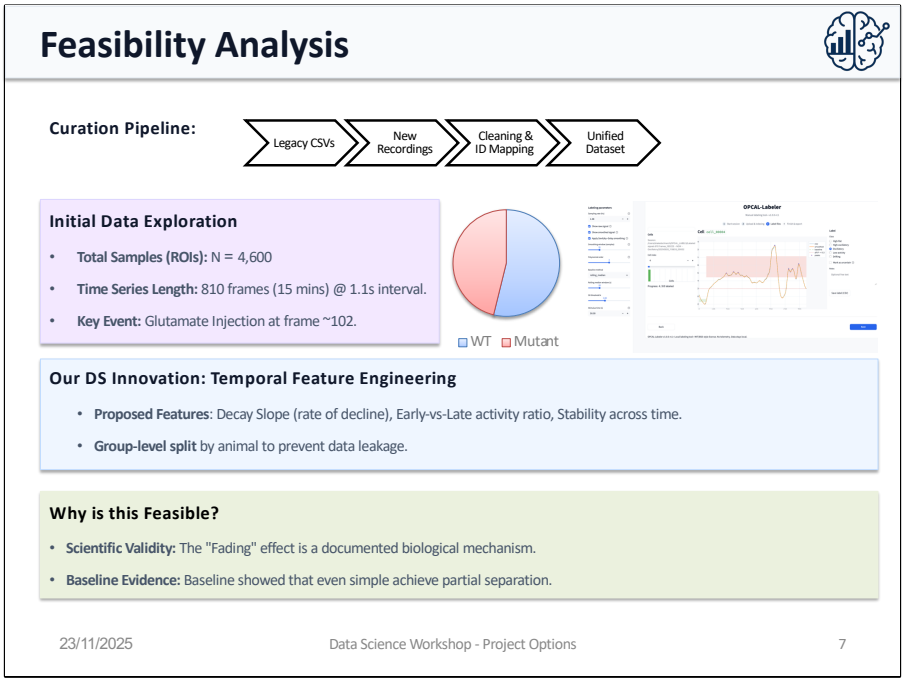
Shaked

- The Biological Problem is that a genetic mutation called Shank3 causes specific brain cells (OPCs) to exhibit what we call the 'Fading Phenotype.'

- If you look at the graphs on the right, the Control cell (black) shows stable activity, but the Mutant cell (red) starts strong and then collapses.

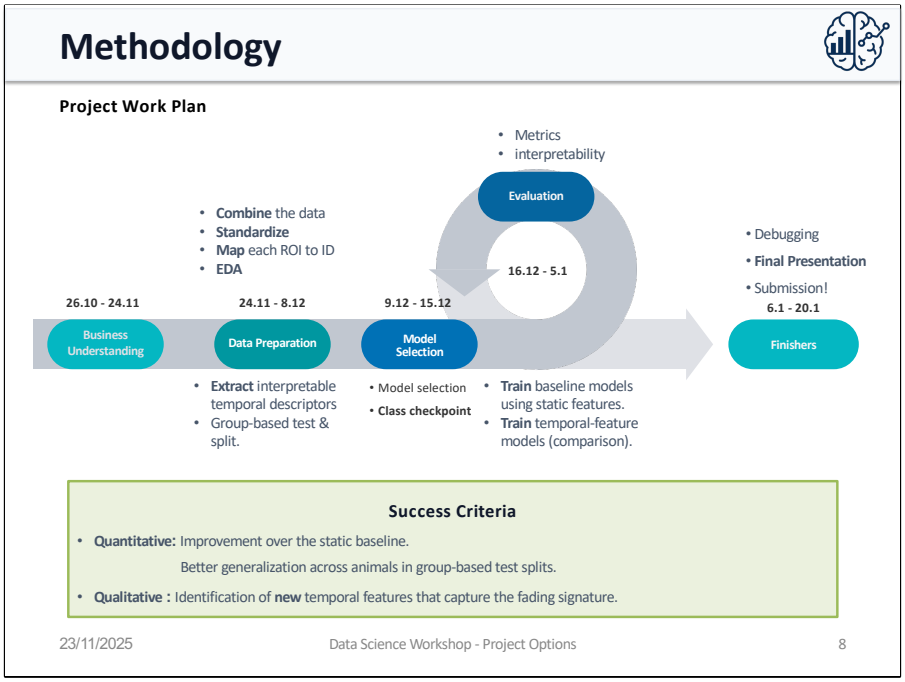
- Here is the Data Science Gap: The existing analysis, the baseline, relies only on static averages. This is a major limitation because a 'crashed' signal and a 'stable' signal can have the exact same average, leading to significant Information Loss.

- Our Task is Supervised Binary Classification: we need to predict if a cell is 'Wild Type' (Healthy) or 'Mutant'. We aim to capture the temporal shape—the actual dynamics of the signal—rather than just its static average"



Shaked

- **Our Hypothesis** is that by using Machine Learning to capture the *rate of decay* and *stability over time*, we can significantly outperform the current baseline methods
- **Why is this project feasible?** First, the data is real and biologically validated. The 'Fading' effect is not random noise; it is a documented mechanism. Second, even simple manual analysis in the past showed some separation.



Itay

- Our methodology follows a standard and realistic DS pipeline.

- Success for us means three things:
  Quantitatively, showing clear improvement over the static baseline.
  Qualitatively, identifying temporal features that reflect the fading pattern.
  Comparatively, reproducing the original analysis and demonstrating what additional information our temporal features capture.

Stocks vs. Brain Signals

Stocks

- ✓ Excellent documentation and reliable API
- ✓ Include data integration between two data sources
- ✓ Feasible and intuitive
- ✗ Hard to achieve strong results
- ✗ Complex feature engineering
- ✗ Train-test split

Brain Signals

- ✓ Clear and well-justified scientific value
- ✓ Highly feasible classification task
- ✓ Chance of clear and strong results
- ✗ Domain-specific challenge
- ✗ Hard to visualize for general audience
- ✗ Train-test split

Preference: focus on stocks

Itay