

The background features a complex network of thin grey lines and dots, forming a web-like structure. Scattered throughout are various triangles of different sizes and orientations, some with solid black dots at their vertices. The overall aesthetic is technical and modern.

Exploring Portfolio Returns using Deep Learning

MGMT 590 Machine Learning

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Problem Statement

Optimize portfolio

01

Data Description

Given Dataset

02

Model 1

Sharpe Ratio

03

Agenda

04

Model 2

R-Square

05

Lessons Learned

I Love ML ♡



01

Problem Statement



Problem 1

Given the 58-year portfolio data, what is the highest sharpe ratio we can achieve?

Problem 2

What is the best performance (a.k.a highest R-square) we can achieve with the market return and predictors dataset?





02

Data Description

Model 1



data_Z_eff

Feature matrix X
with size
2219316x64



data_R_eff

Cutoff to the
output vector with
 ± 0.2 return



data_R_org_eff

Output vector with
size 2219316x1



data_group_ind

starting and ending
indices of stocks in
time $t = 1, 2, \dots, T$

Model 2



Xs

A small set of predictors
(GoyalWelch) available at
the beginning of month t



Xl

A large set of predictors
(GoyalWelch+ Macro
variables) available at the
beginning of month t



y

Value-weighted market
annual return for month t



RESULT

9.46

Sharpe Ratio

-0.287

R-Square



03

Model 1

STRATEGY

**adam, adamax,
RMSprop**

Optimizer, Learning Rate

**# nodes
layers**

Model structure

**LayerNormalization()
BatchNormalization()**

Randomize

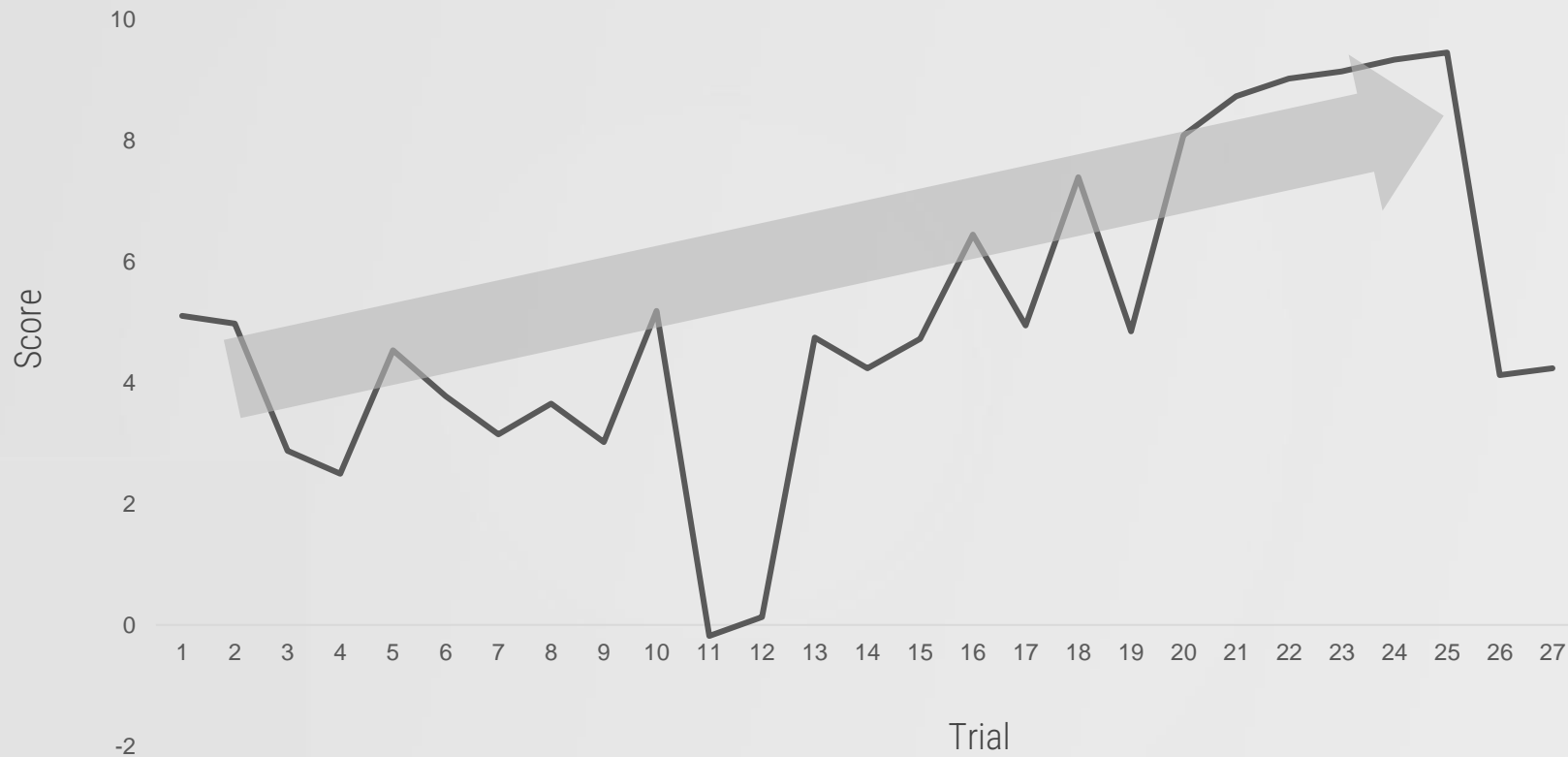
patience

Early stopping

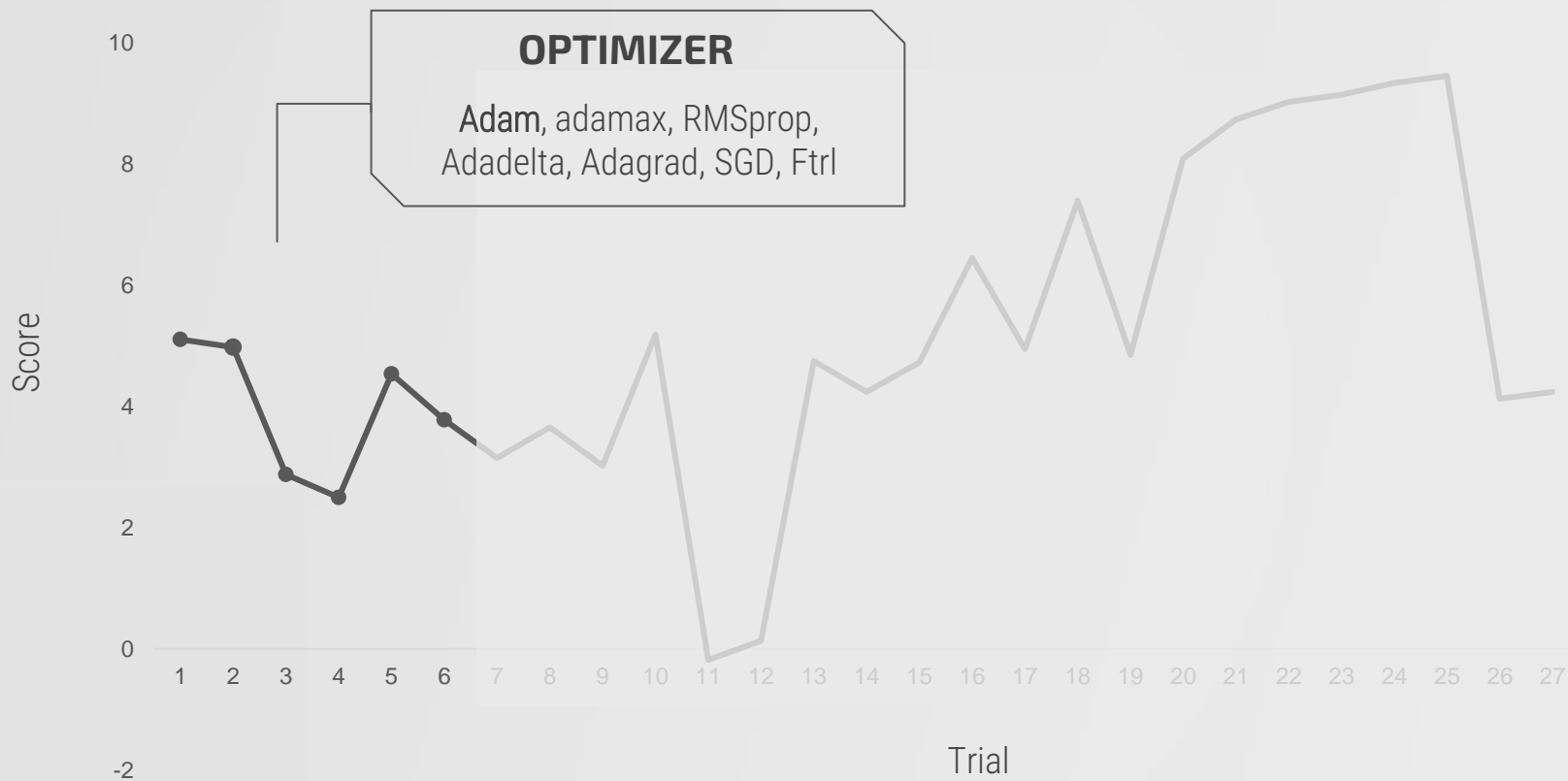
Epoch, Batch Size



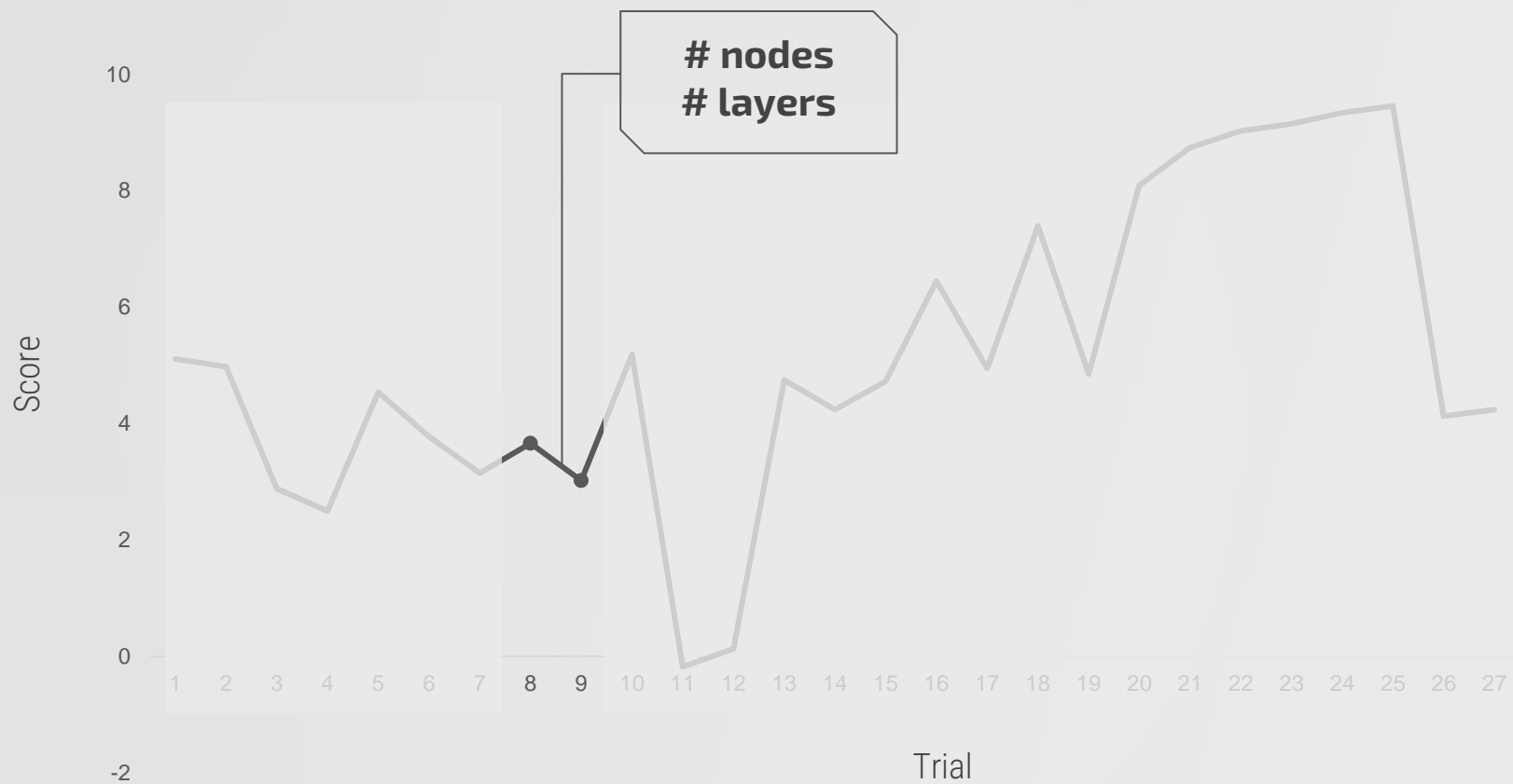
OUR JOURNEY TO SCORE THE BEST RESULT



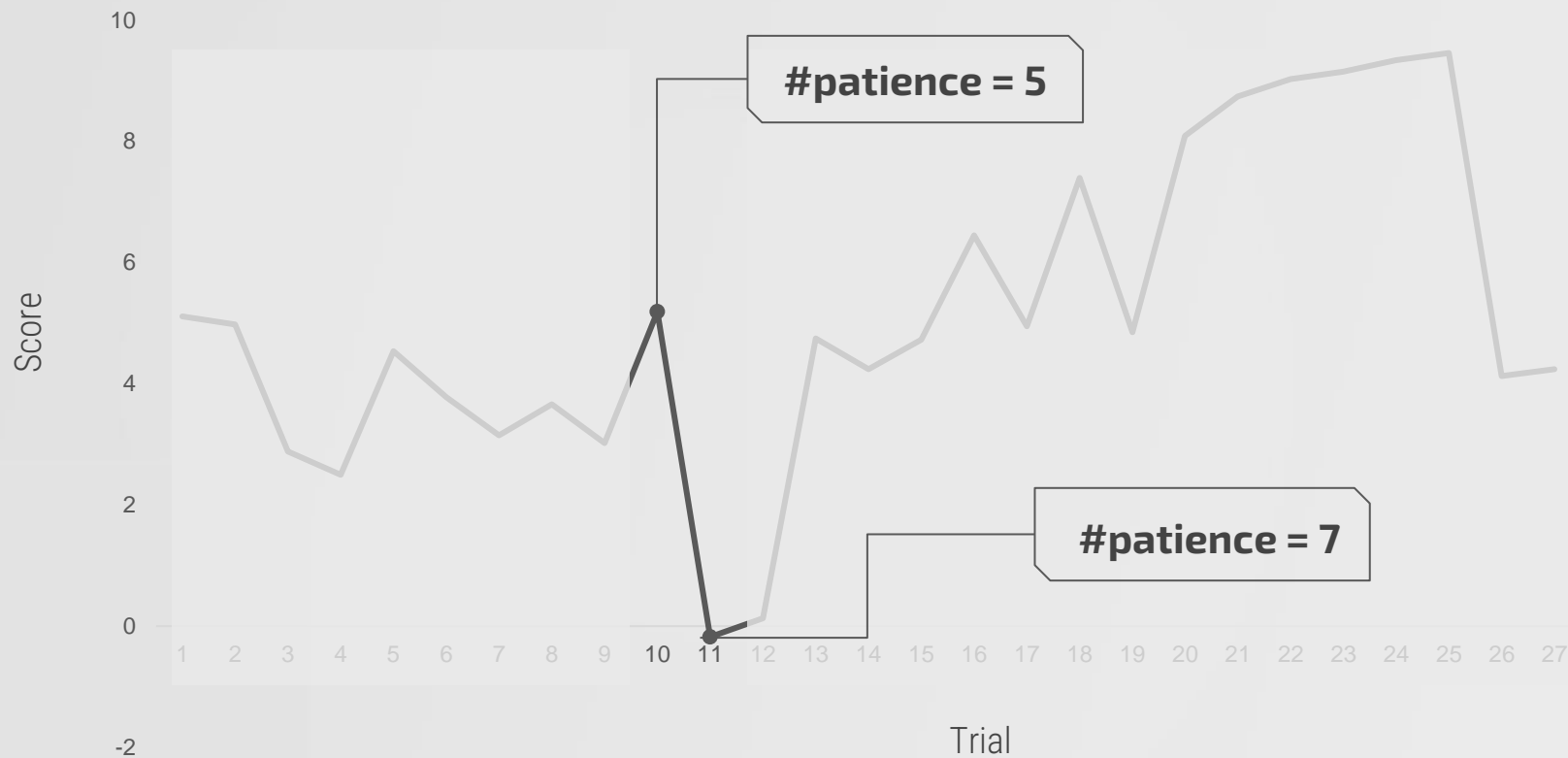
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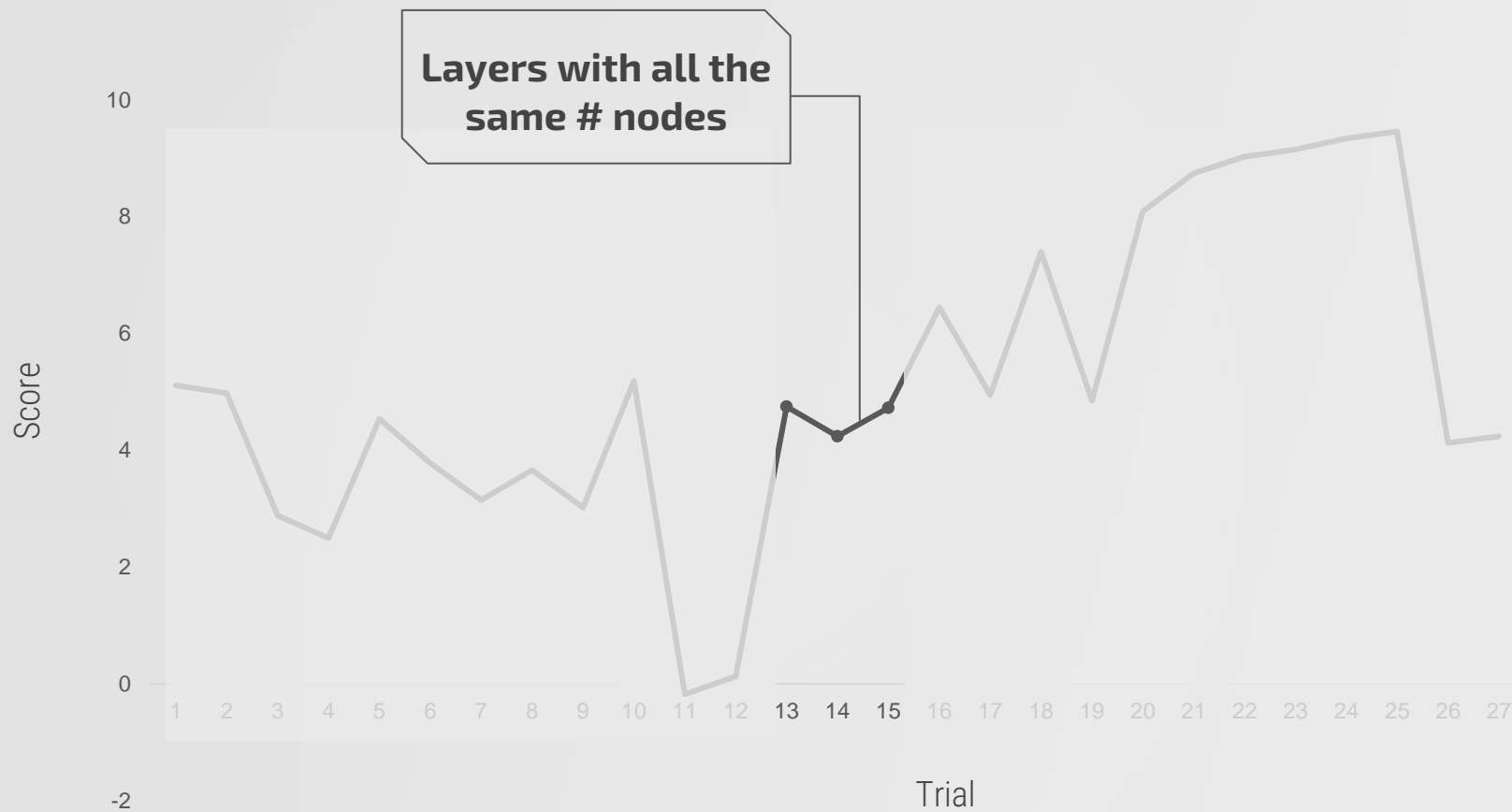
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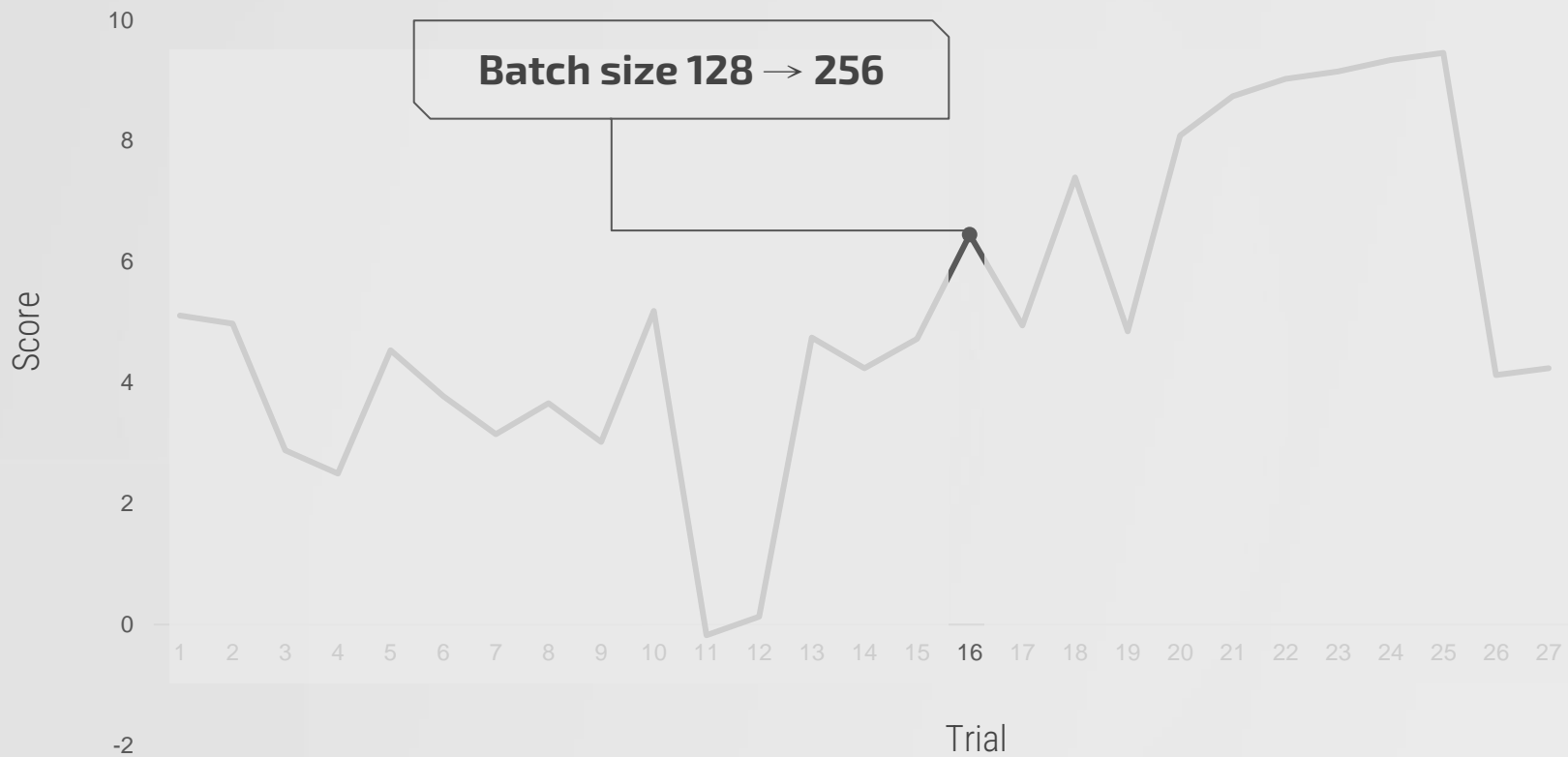
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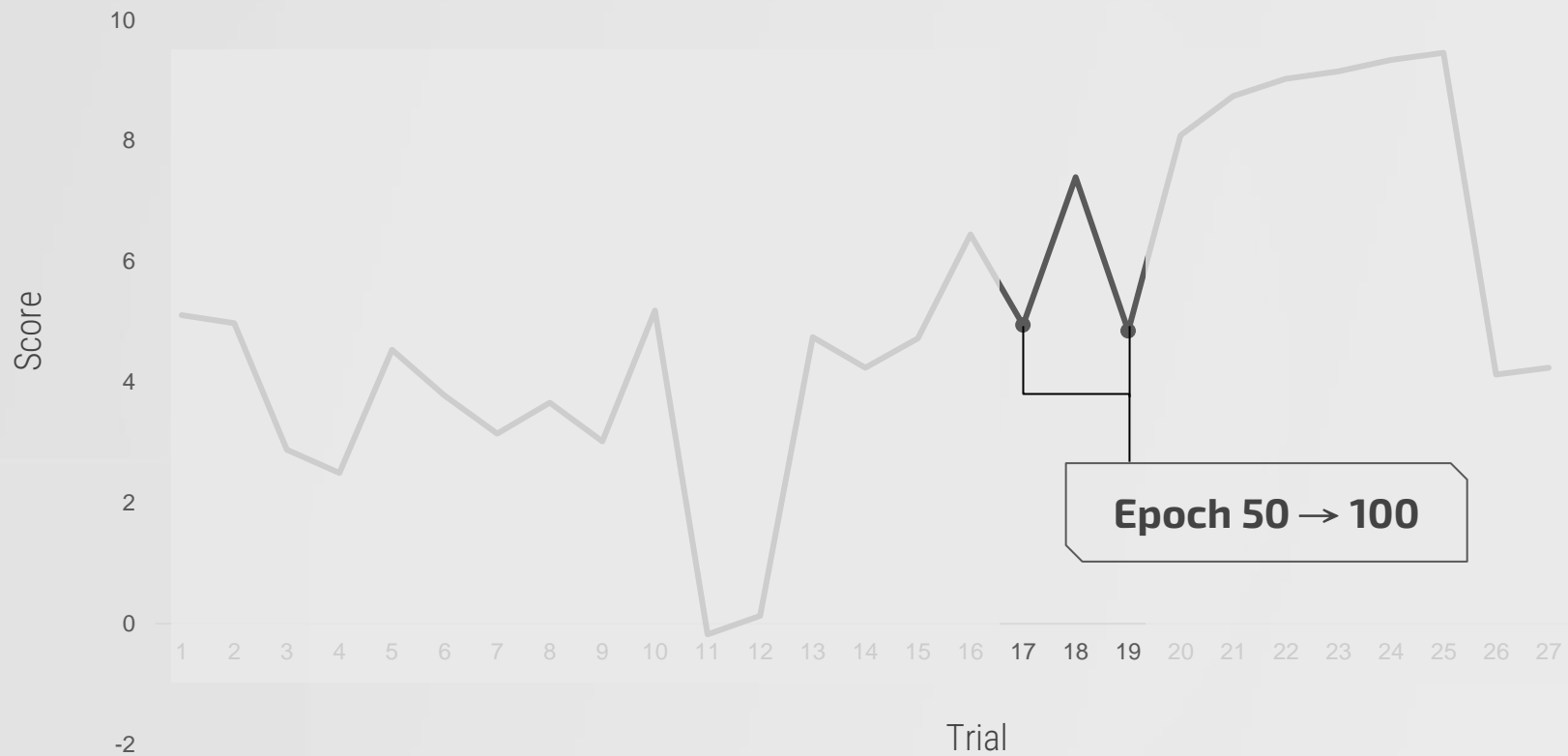
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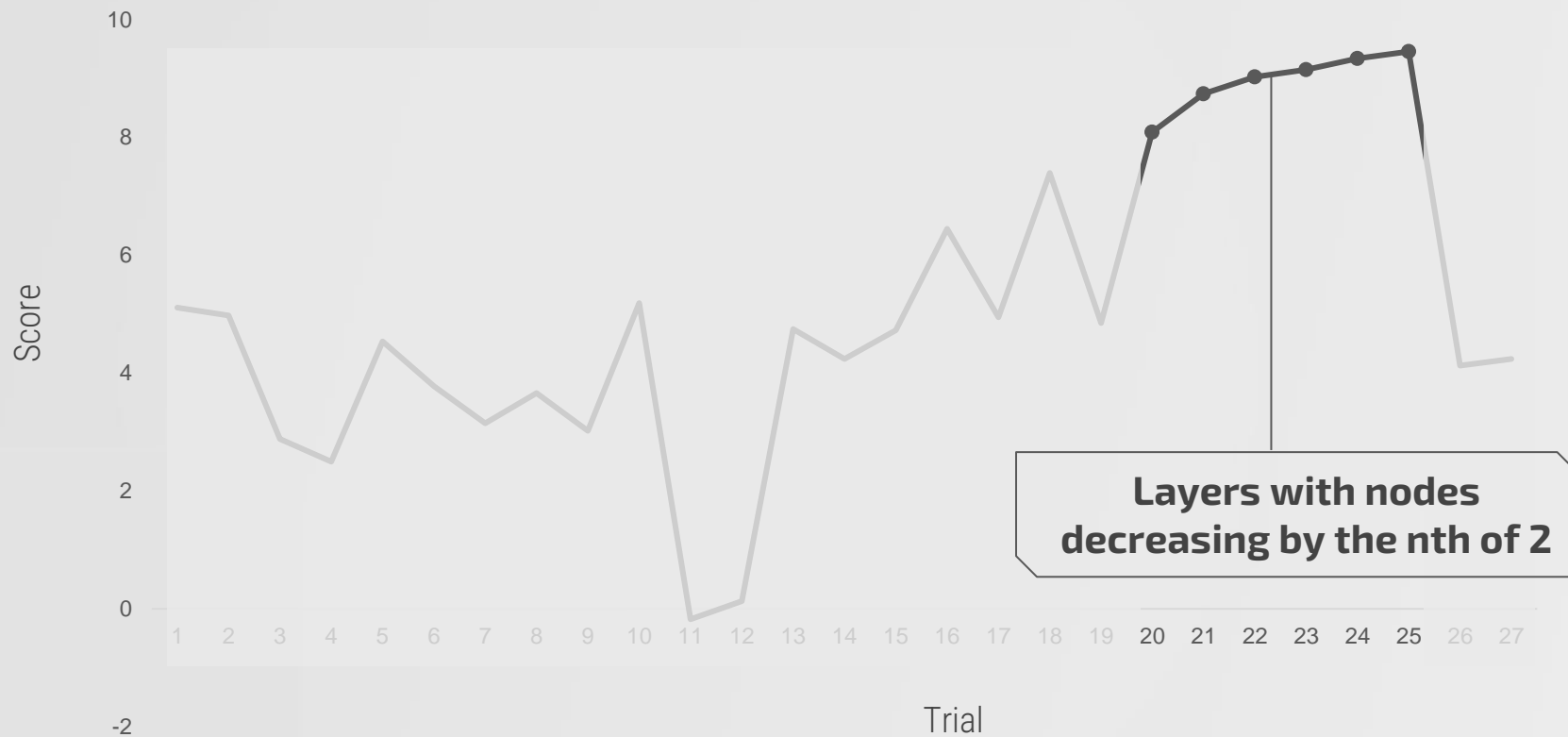
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FINAL MODEL

9.46

nodes

512,
256,
128, 64,
32, 16,
8, 4, 2, 1

Batch size

256

adamax

Optimizer

10

layers

5

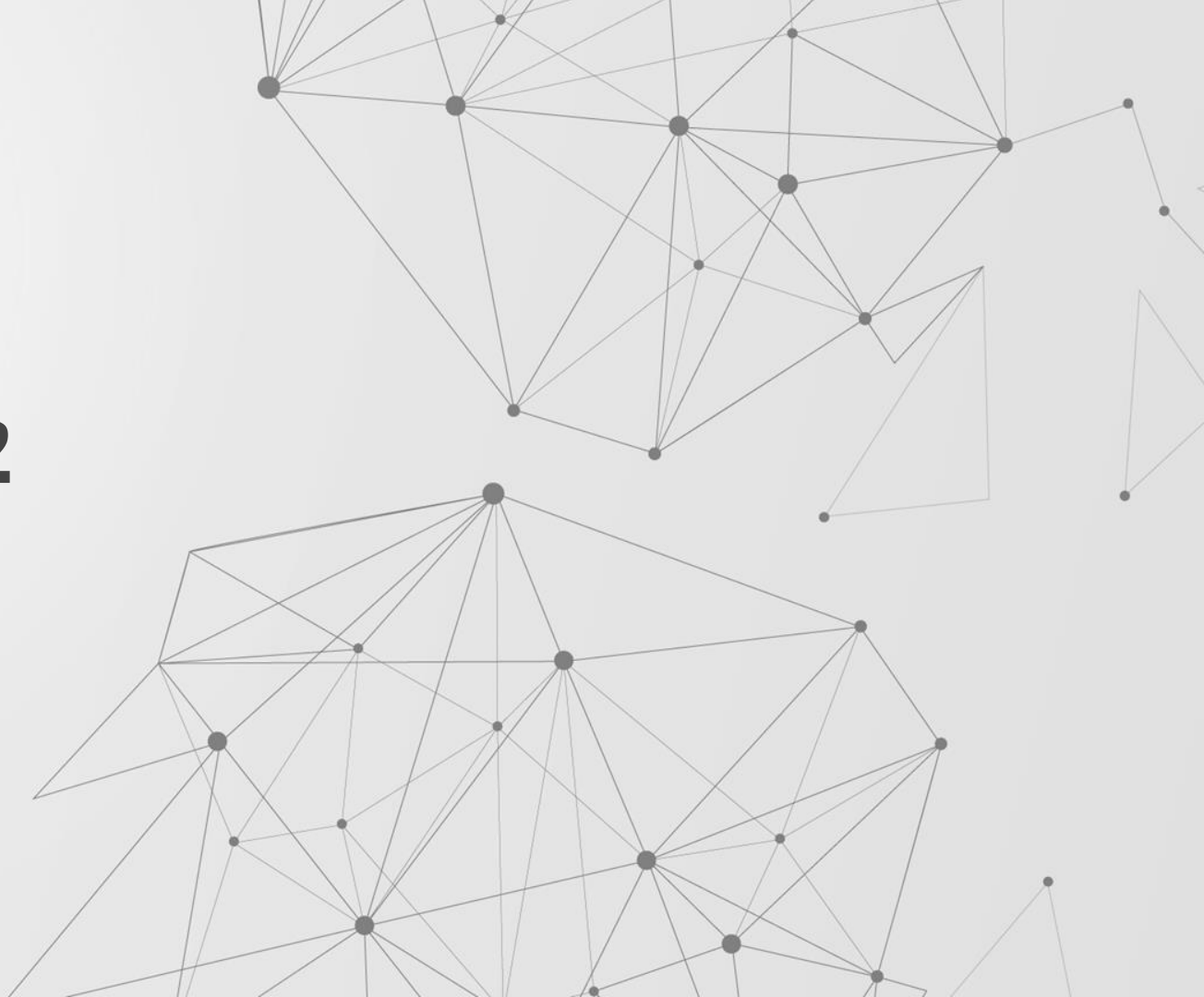
Patience

50

Epochs

04

Model 2



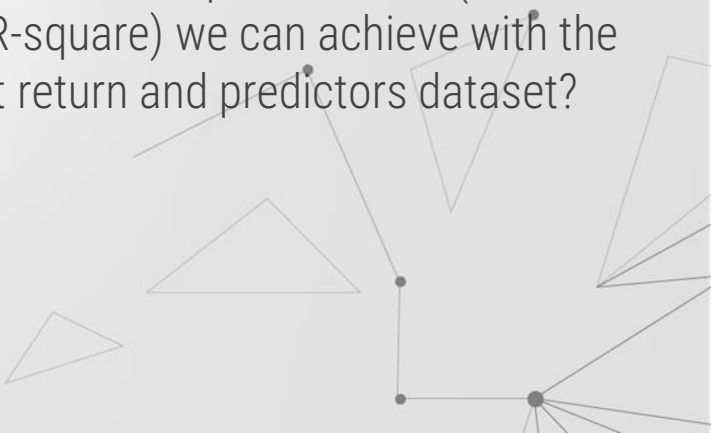


Problem 1

Given the 58-year portfolio data, what is the highest sharpe ratio we can achieve?

Problem 2

What is the best performance (a.k.a highest R-square) we can achieve with the market return and predictors dataset?



STRATEGY

adam, RMSprop

Optimizer, Learning Rate

nodes
layers

Model structure

LayerNormalization()
BatchNormalization()

Randomize

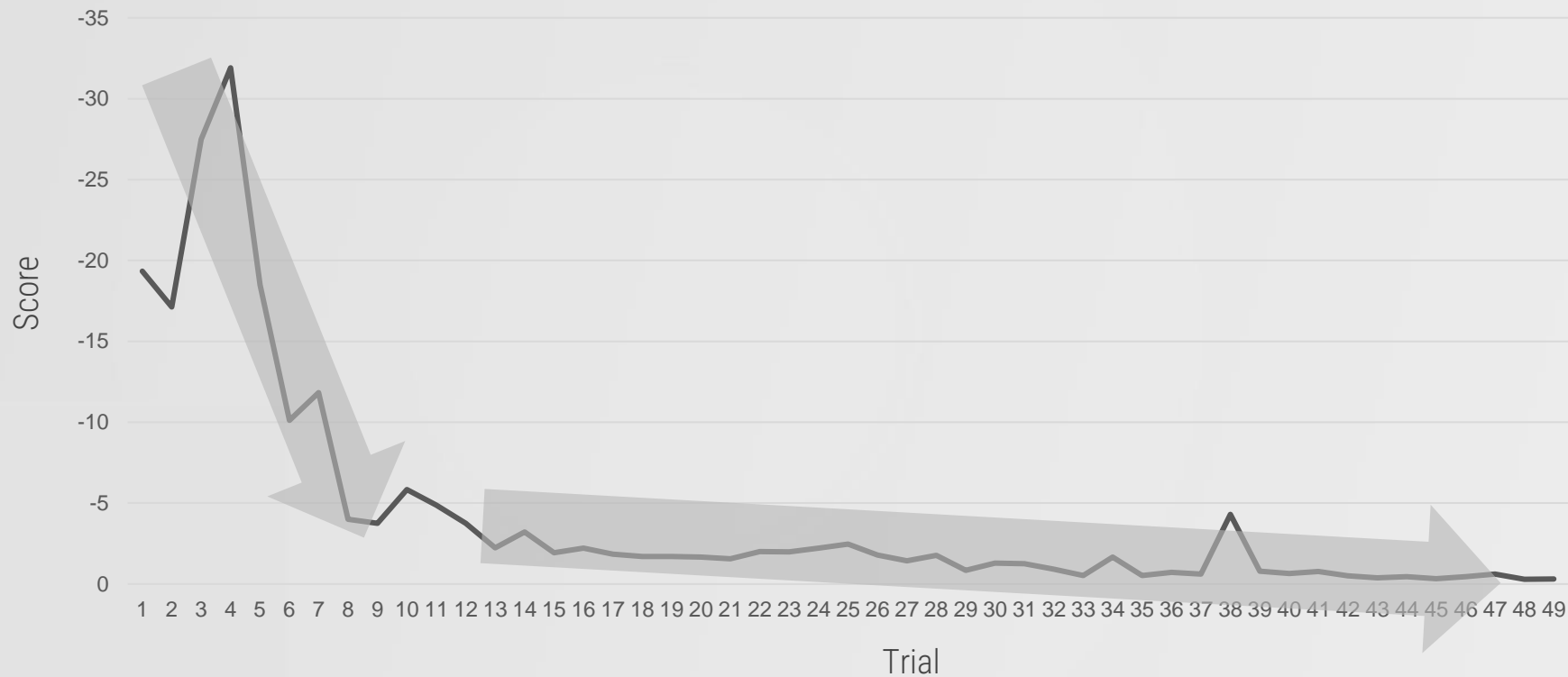
patience

Early stopping

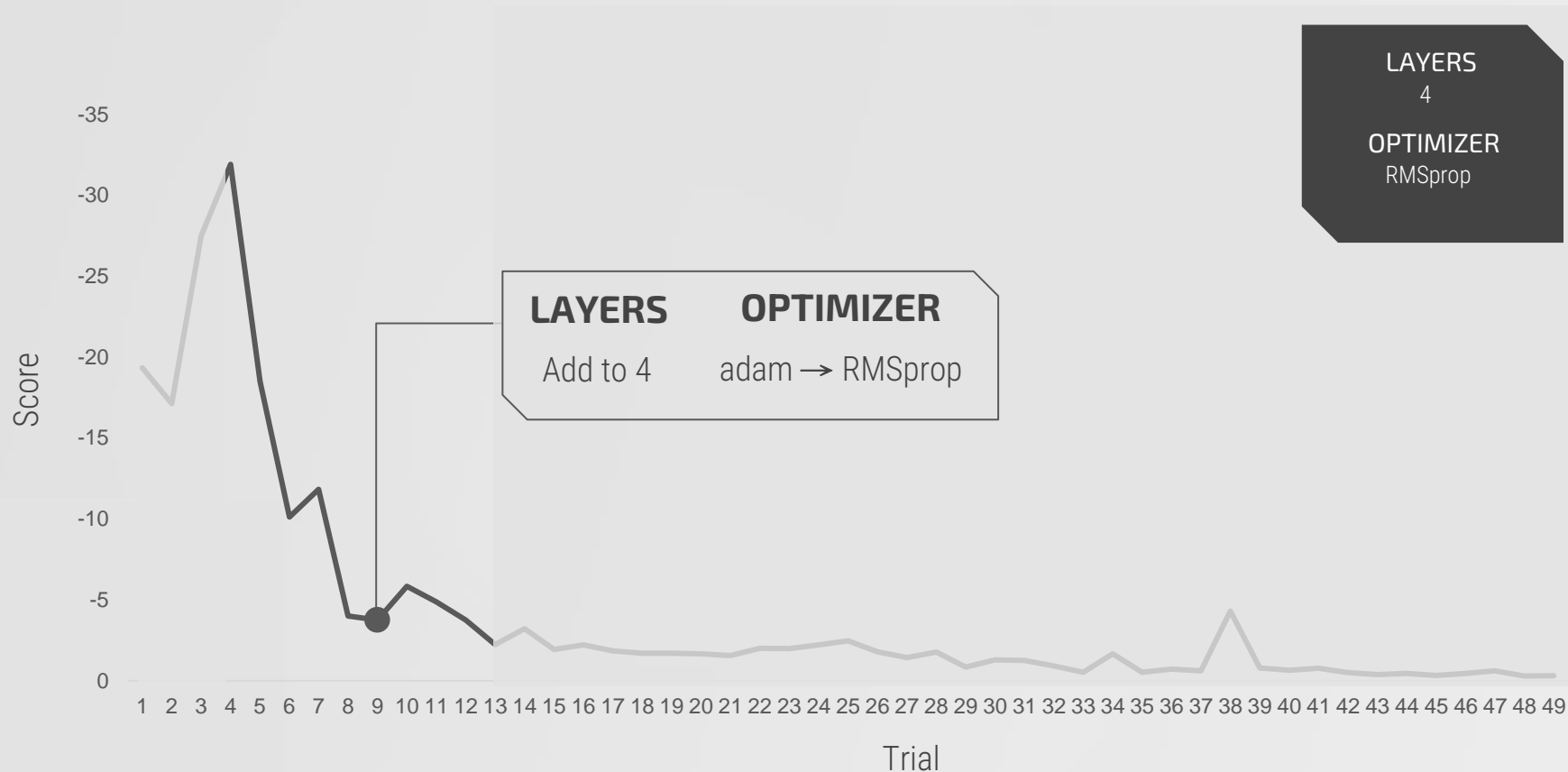
Epoch, Batch Size



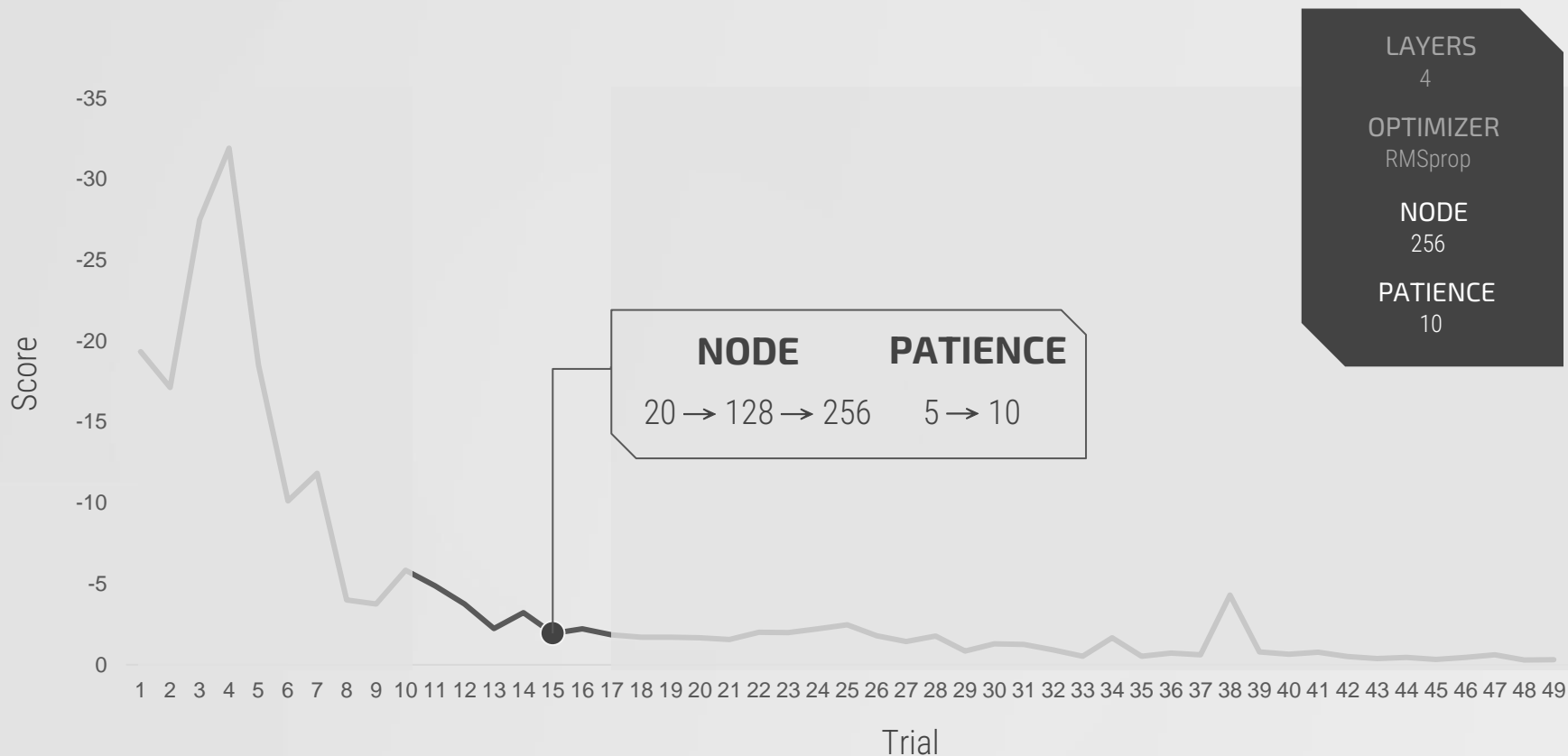
OUR JOURNEY TO SCORE THE BEST RESULT



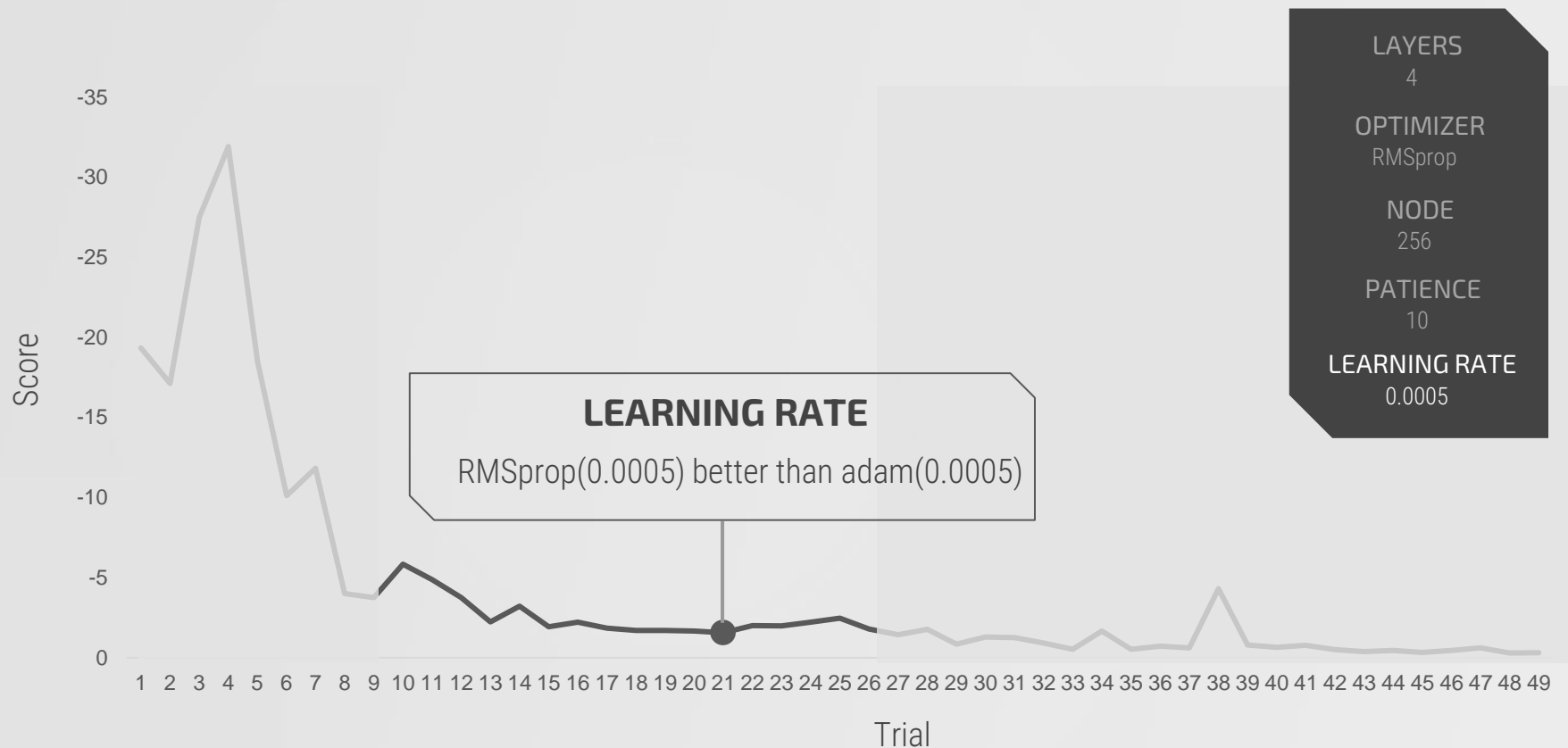
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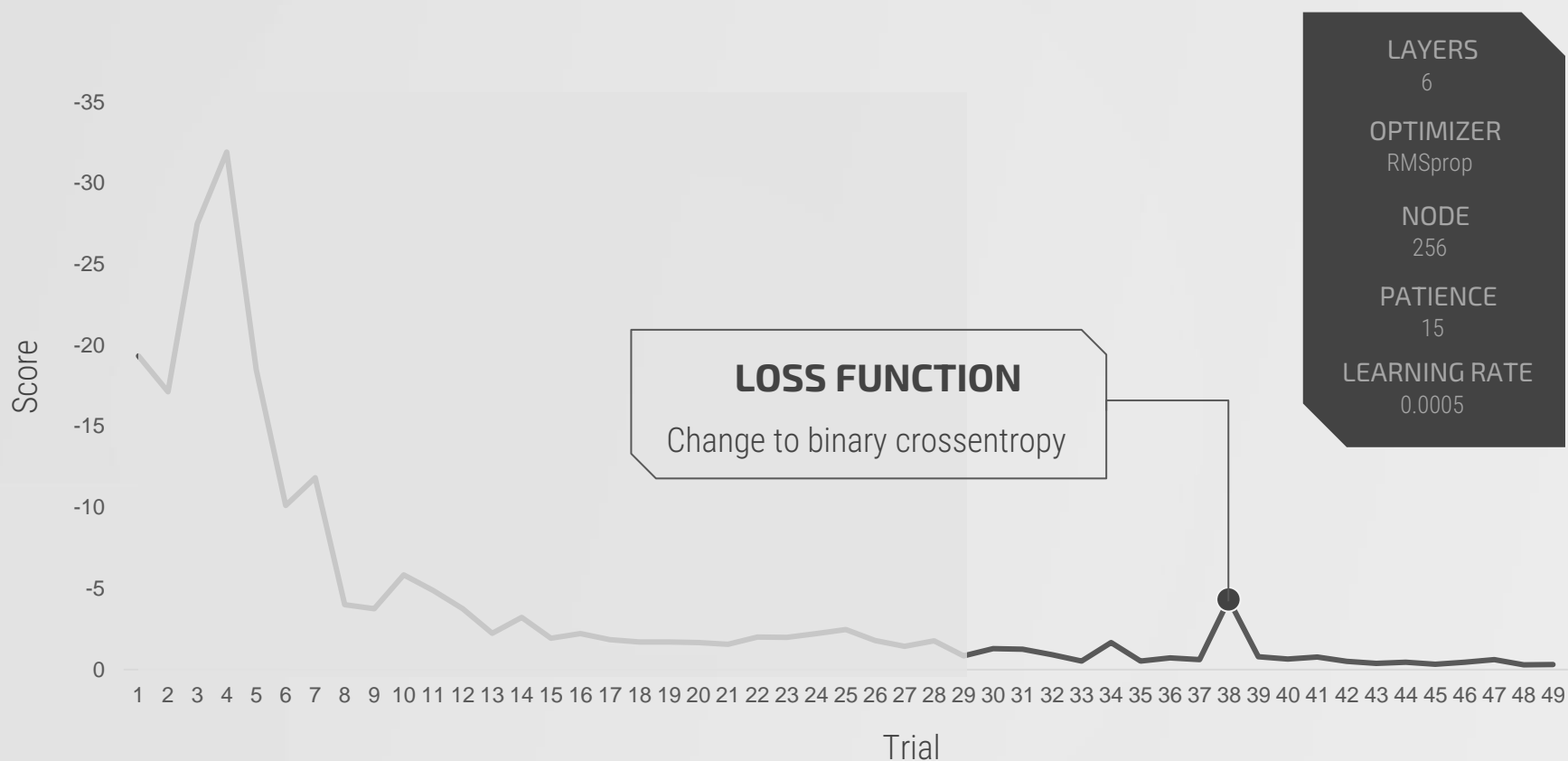
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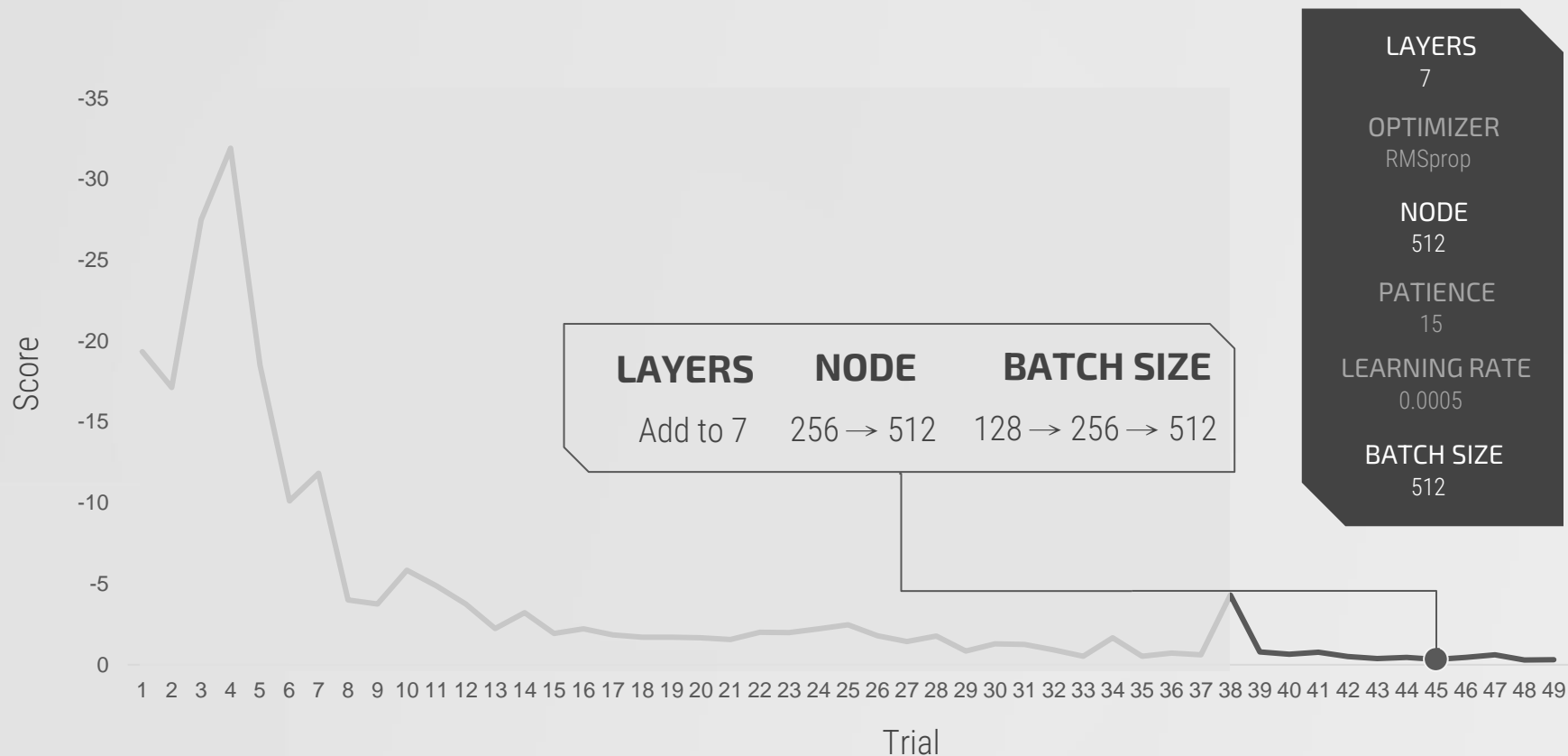
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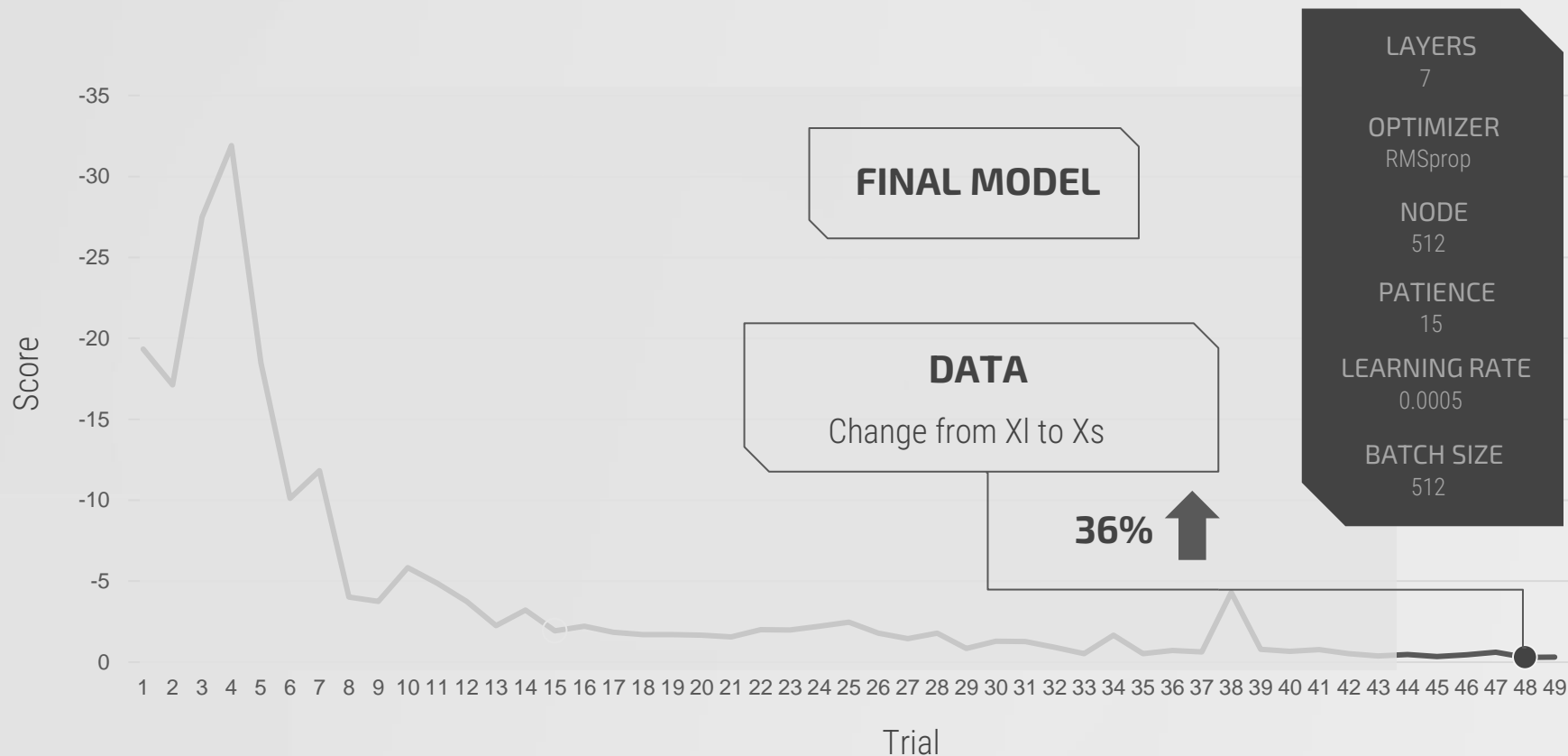
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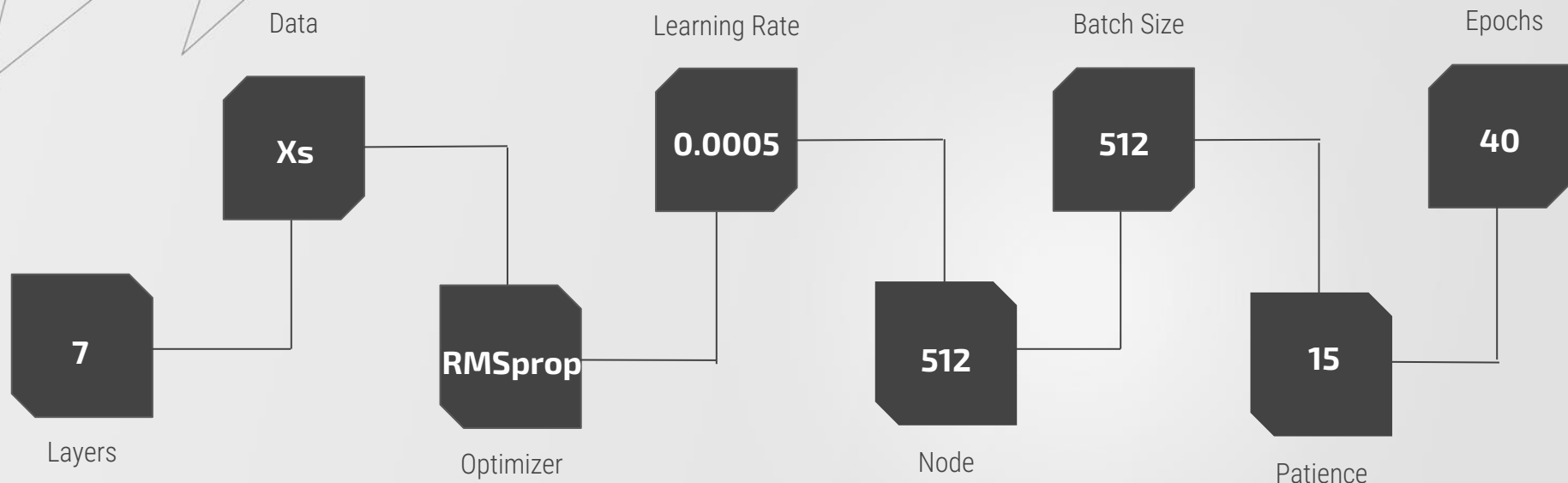


OUR JOURNEY TO SCORE THE BEST RESULT



FINAL MODEL AND RESULT

-0.287



The background features a light gray geometric pattern. It consists of a network of thin gray lines connecting various-sized dark gray circular nodes. These nodes are scattered across the frame, with a higher concentration in the upper right and lower right areas, creating a complex, web-like structure. The overall aesthetic is modern and minimalist.

05

Lessons Learned



FINDINGS

Best performance with 'adam' when in a simple-layer model, but 'adamax' and 'RMSprop' outperforms in a more complicated model

Model 1

- Larger batch size seems to perform better
- Consistency in # nodes is good (opposite case in model 1)
- Consistency in # nodes and batch size is good

Model 2






LESSONS LEARNED

Different Combinations

step-by-step
Organized way

Time Management

Running Time



The background features a complex network of thin, light gray lines connecting various-sized dark gray dots. These dots are scattered across the frame, with some acting as central hubs for multiple lines. The overall effect is a sense of interconnectedness and geometric structure. The text "THANK YOU" is centered in the middle of the image, rendered in a bold, dark gray, sans-serif typeface.

THANK YOU