

Background

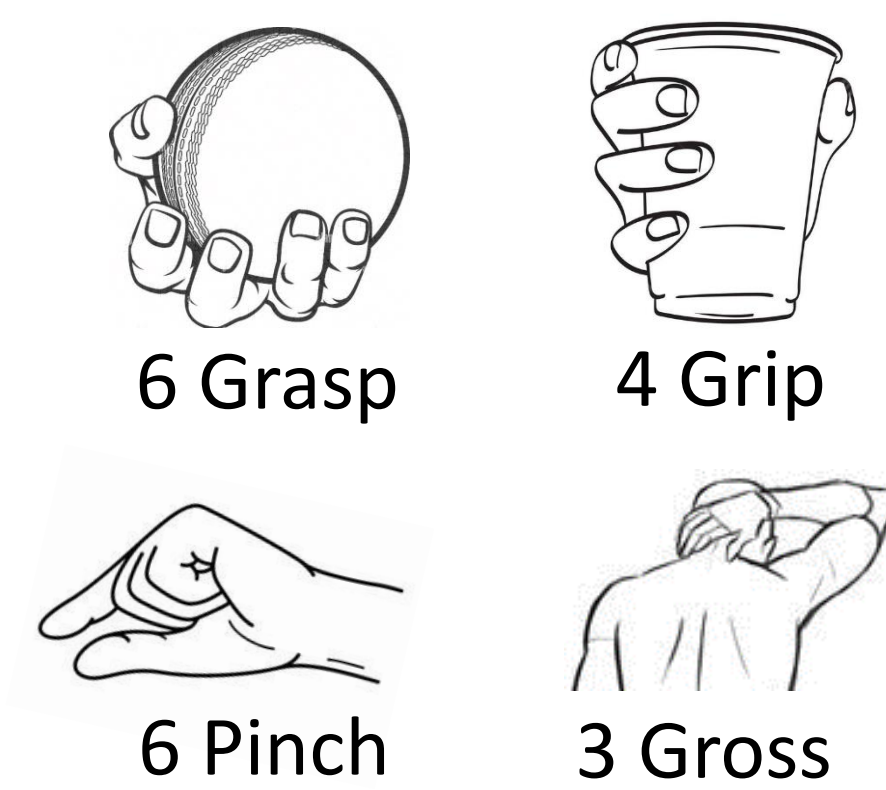
Goals

Mitigate the clinician's work by using **minimal resources** to evaluate a stroke patient's **upper limb function**.

Accurately **predict** clinical ARAT scores given **IMU sensor data** from a **single exercise** in each subcategory.

ARAT

- 19 Exercises
- Scored 0-3
- 4 Subcategories



Dataset

P2C

P2C is part of the **C-STAR Data Sharing** project.

It contains **clinical** and **IMU sensor** data taken during various tests, including the ARAT.



Number of Participants: 22

Participant Type: Stroke

Mean Total Score: 24.8 / 57

Age (Mean, SD): 61 ± 10 years

Model Framework

Specifications

Model Type: Random Forest Regression

Labels:

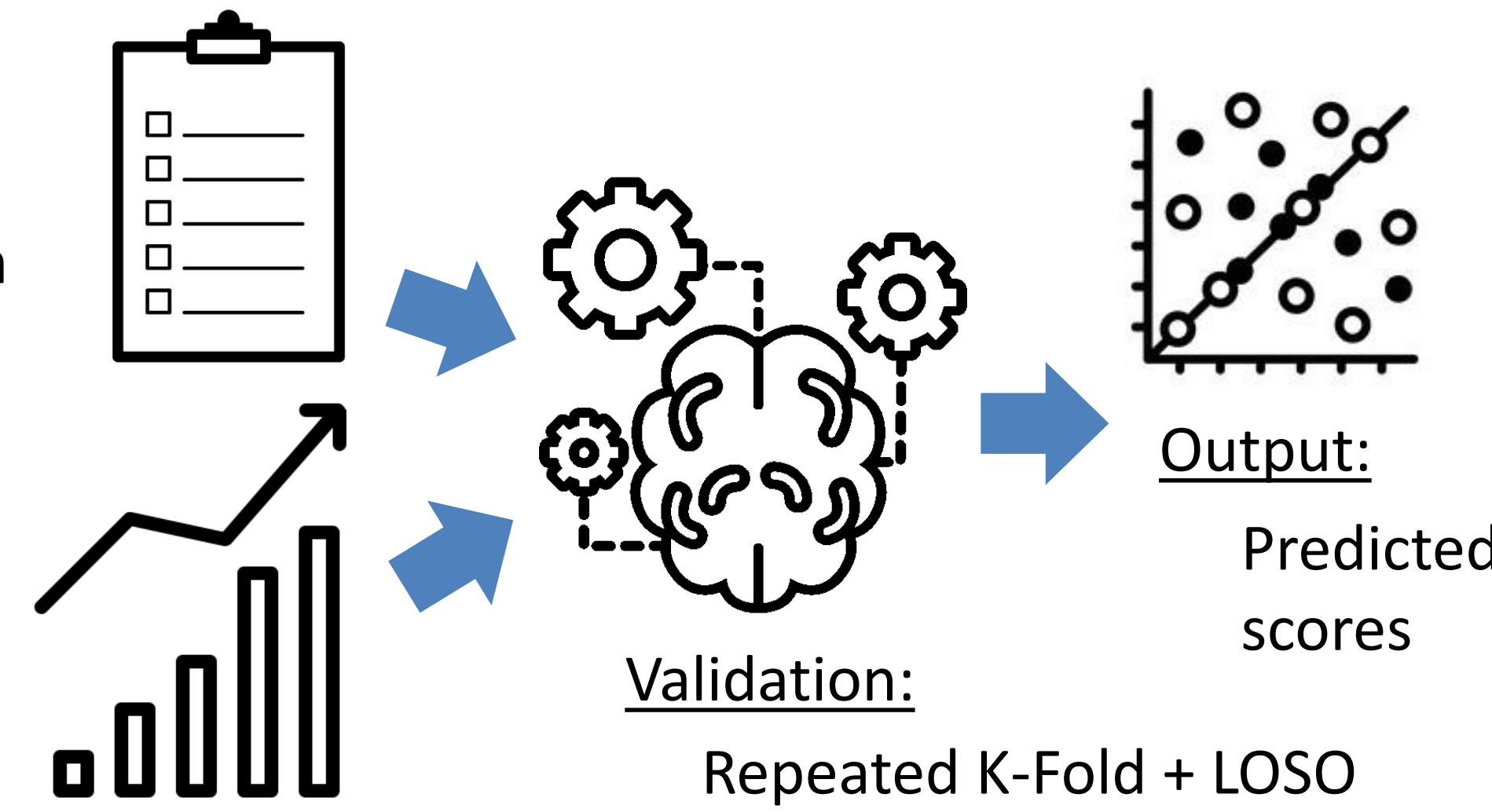
Clinical scores from therapists

Features:

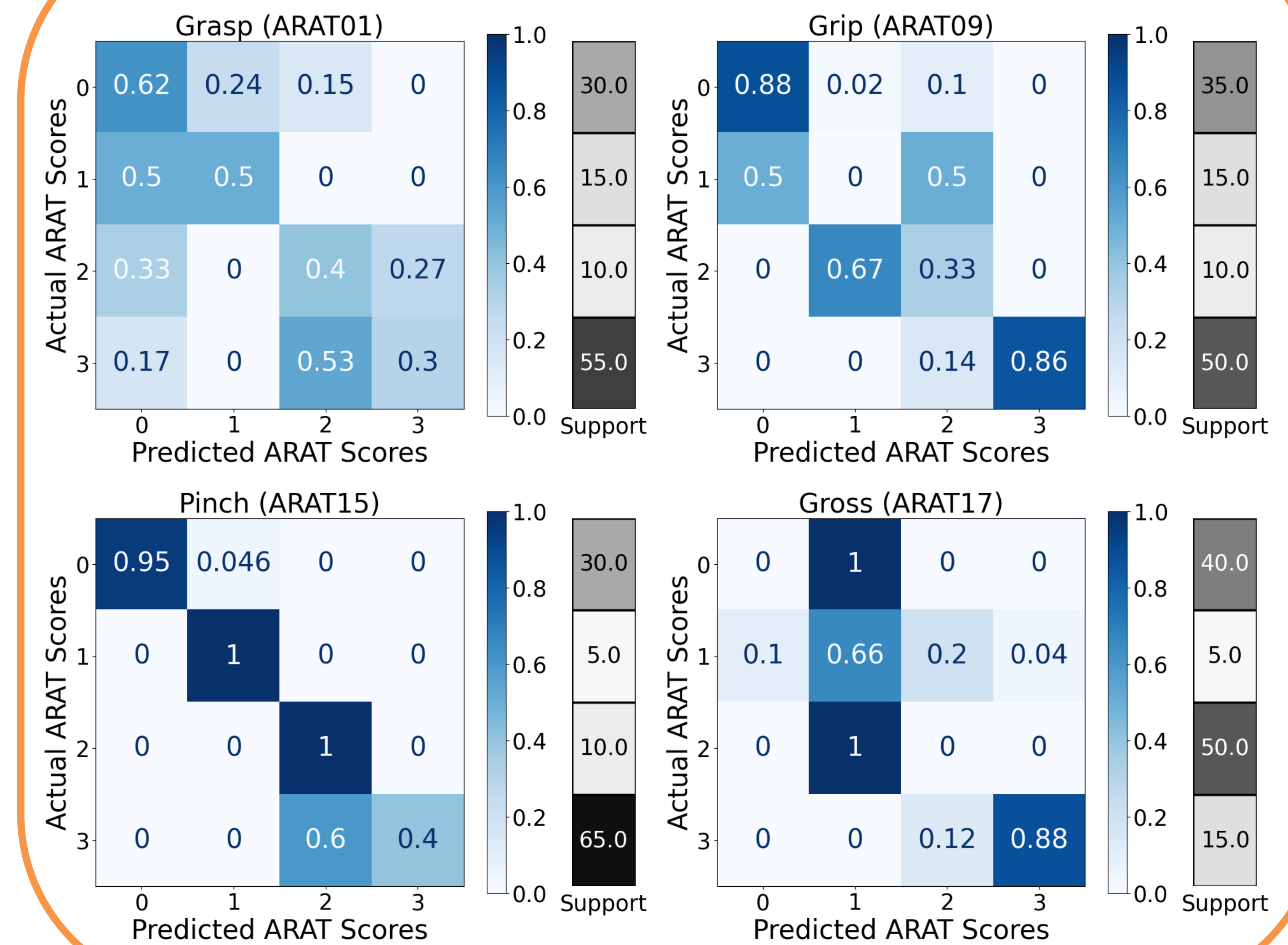
Extracted from P2C dataset

Features

Time Domain: Mean, variance, MAD, RMS, zero-crossing rate, IQR, 75th%, kurtosis, signal magnitude area, absolute range, tilt angle
Frequency Domain: Spectral energy/entropy/centroid, principal frequency



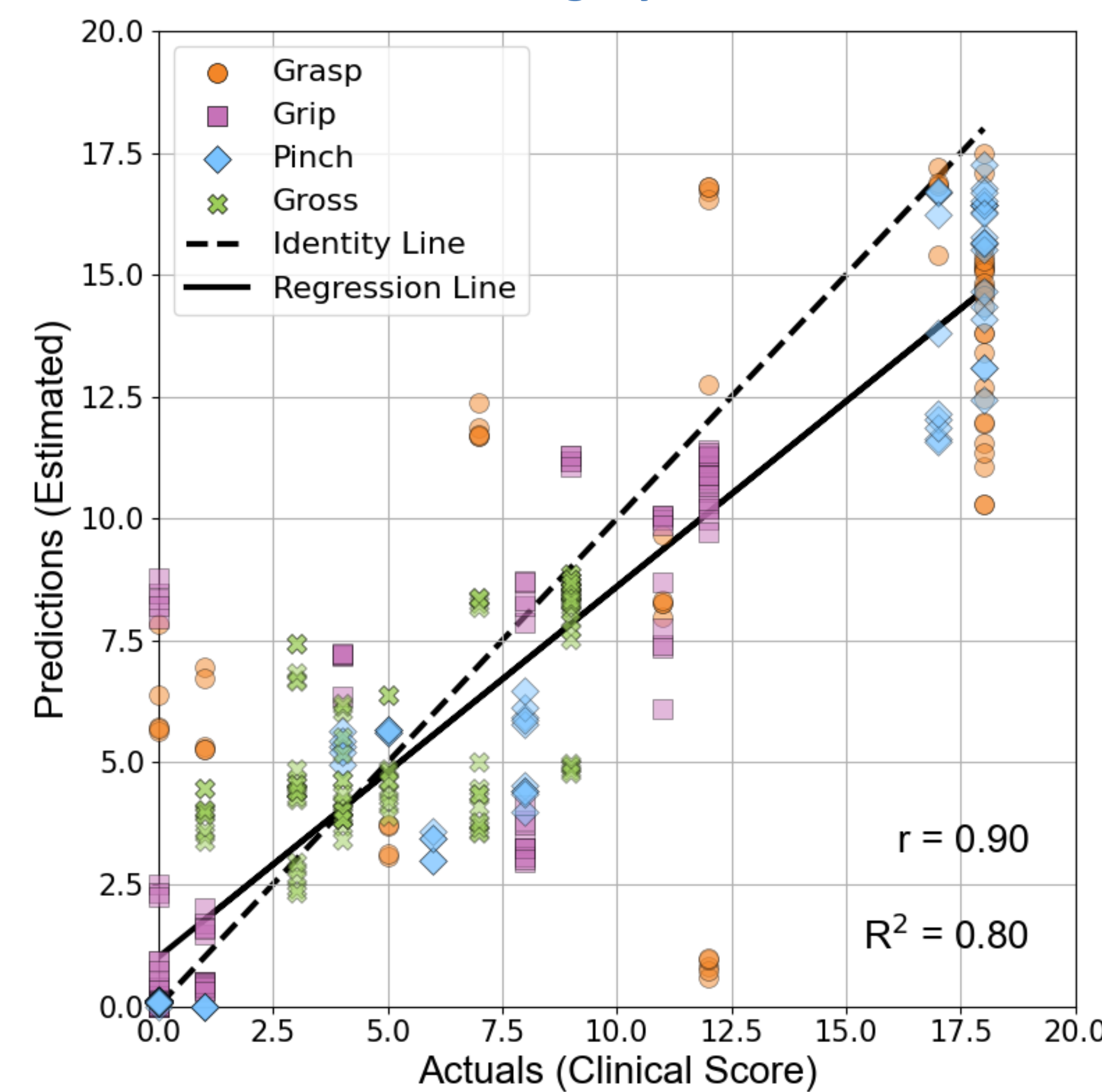
Individual Exercise Prediction



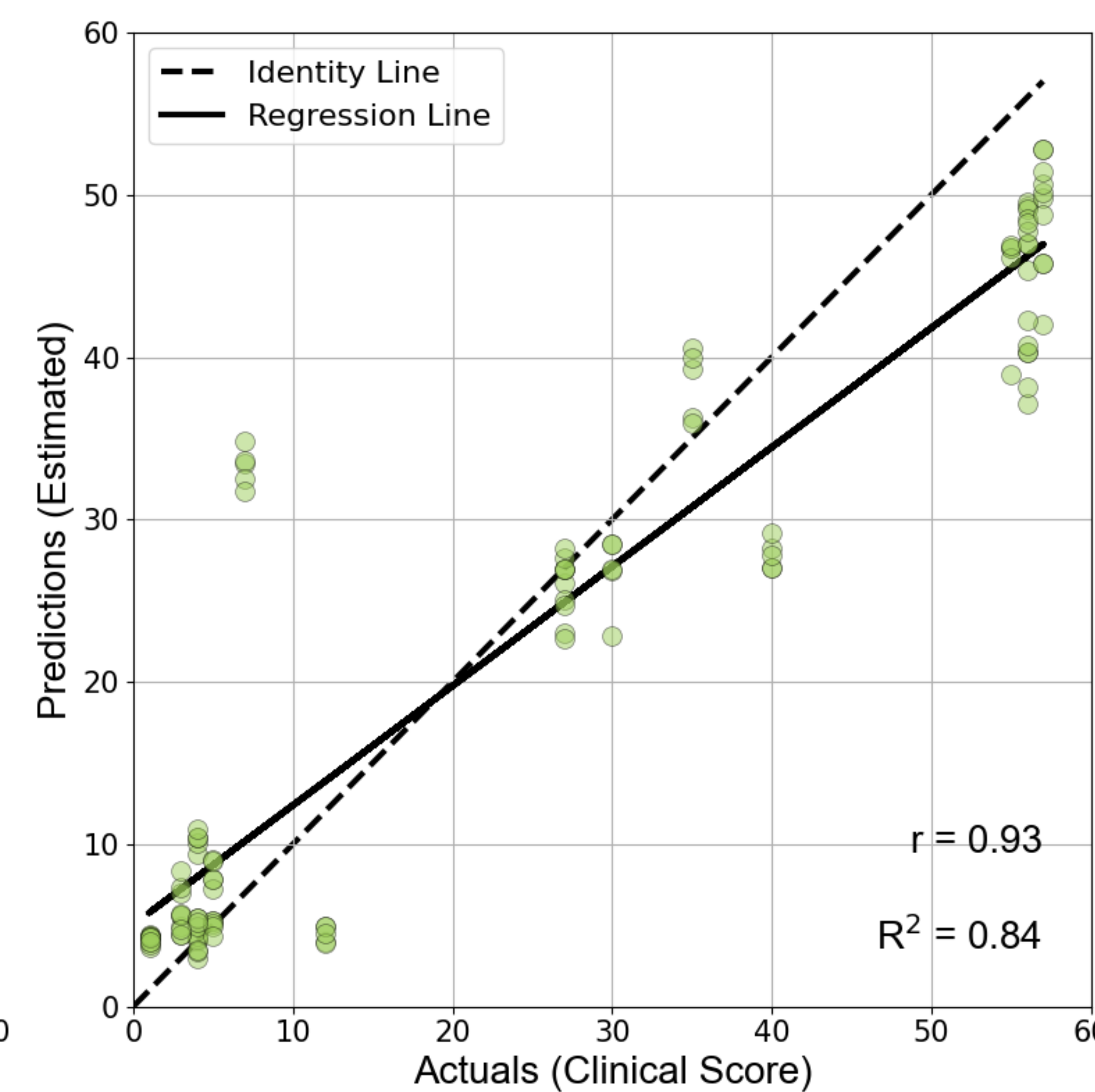
Full Score Prediction

Metric	Subcat	Full
MAE	1.78	6.30
MedAE	0.93	4.23
RMSE	2.79	8.84
r	0.90	0.93
R ²	0.80	0.84

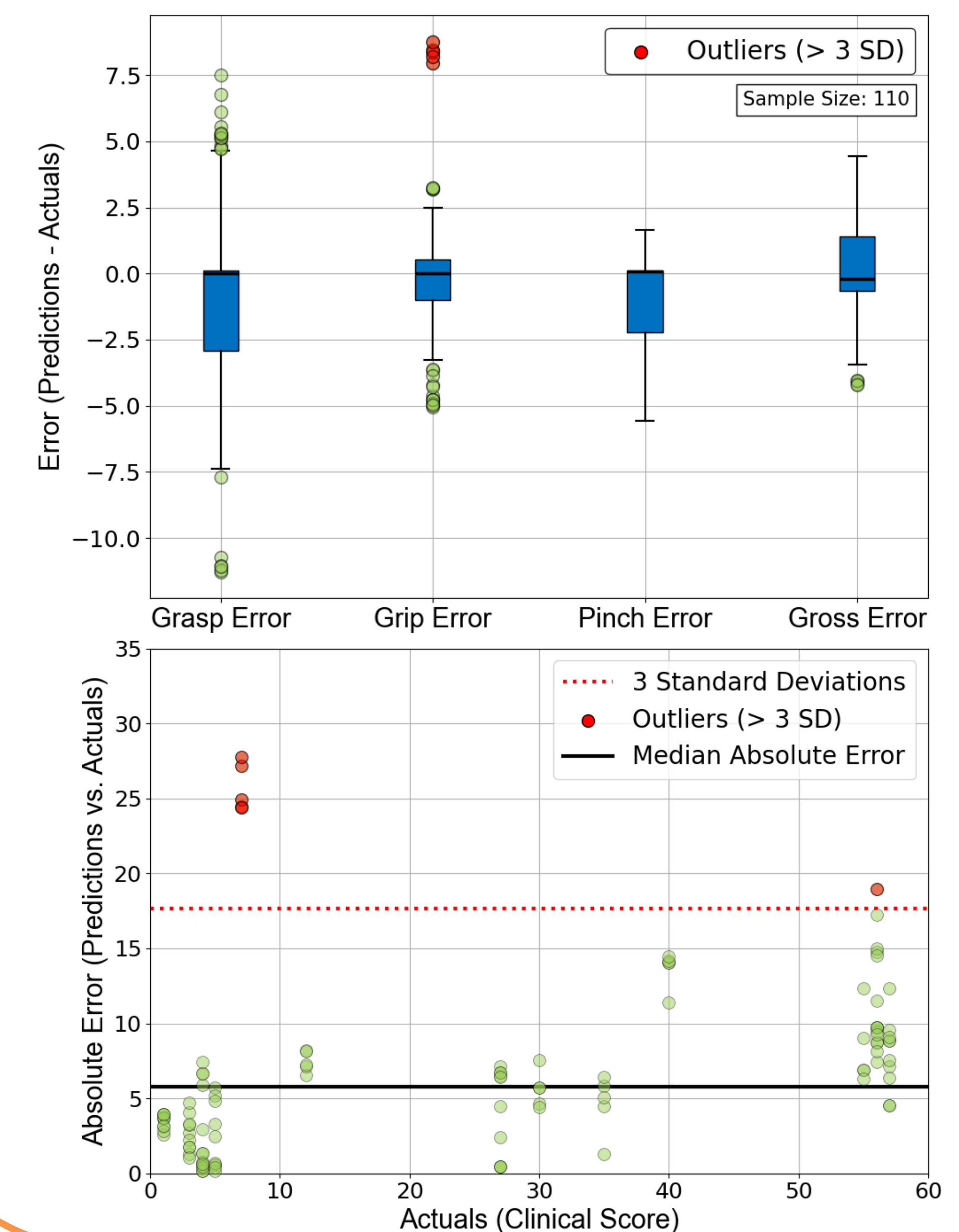
Subcategory Model



Full Score Model



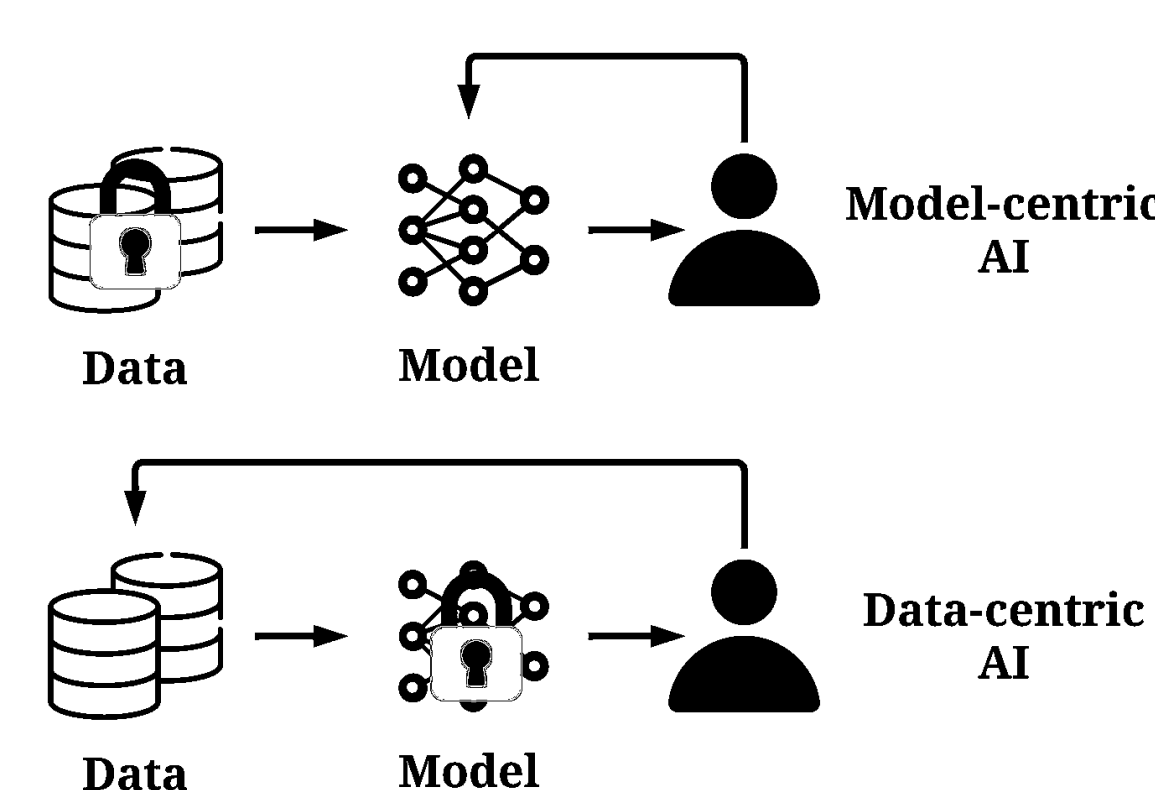
Model Performance



Future Work

Potential Improvements

- Improve data/featureset
- Hyperparameter tuning
- Interface + ease of use



Abbreviations

LOSO: Leave one subject out

IQR: Interquartile range

MAE: Mean absolute error

RMSE: Root mean squared error

R²: Coefficient of determination

MAD: Mean absolute deviation

RMS: Root mean square

MedAE: Median absolute error

r: Correlation coefficient

SD: Standard deviation