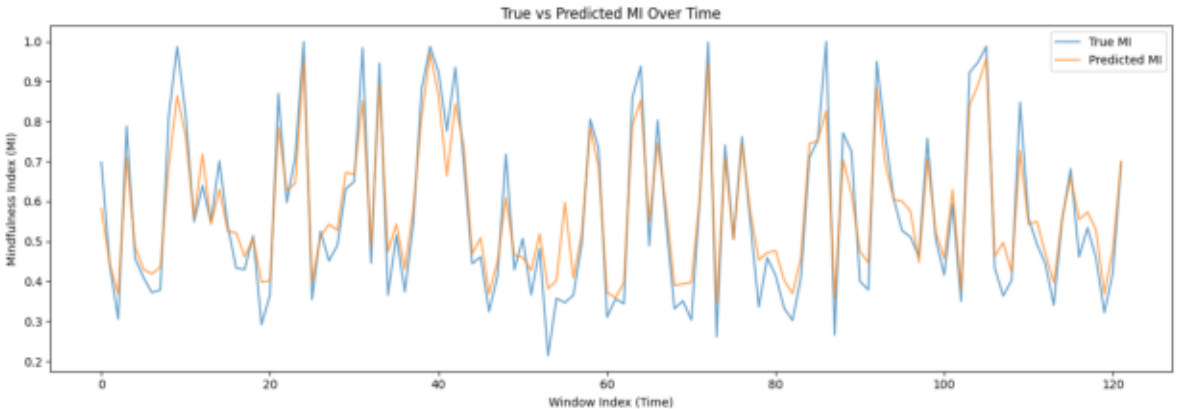
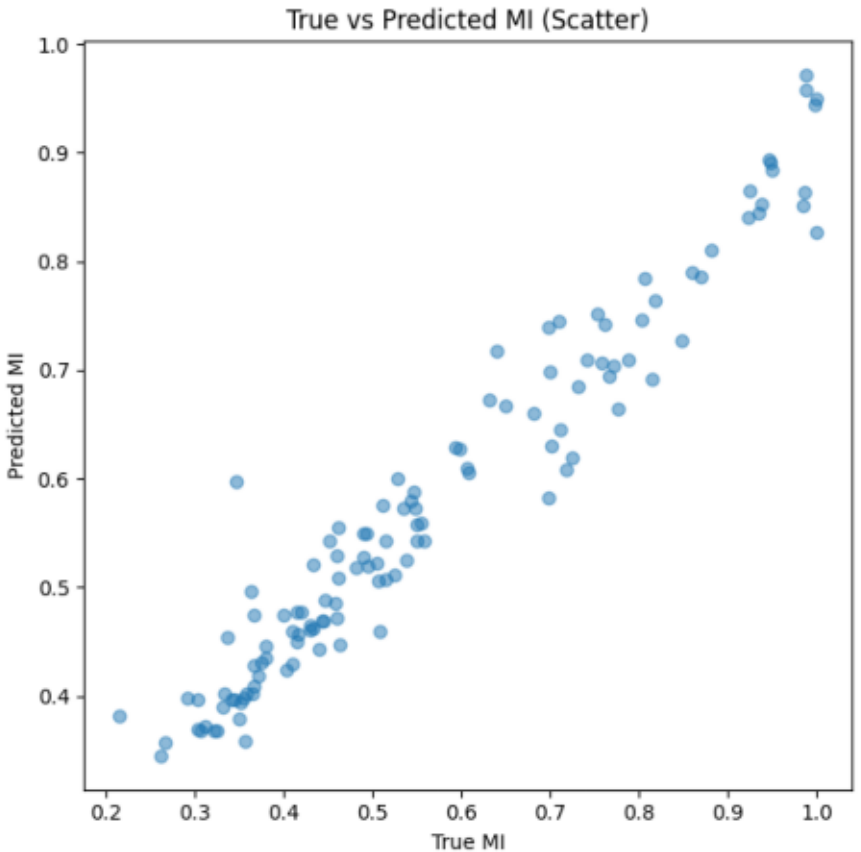
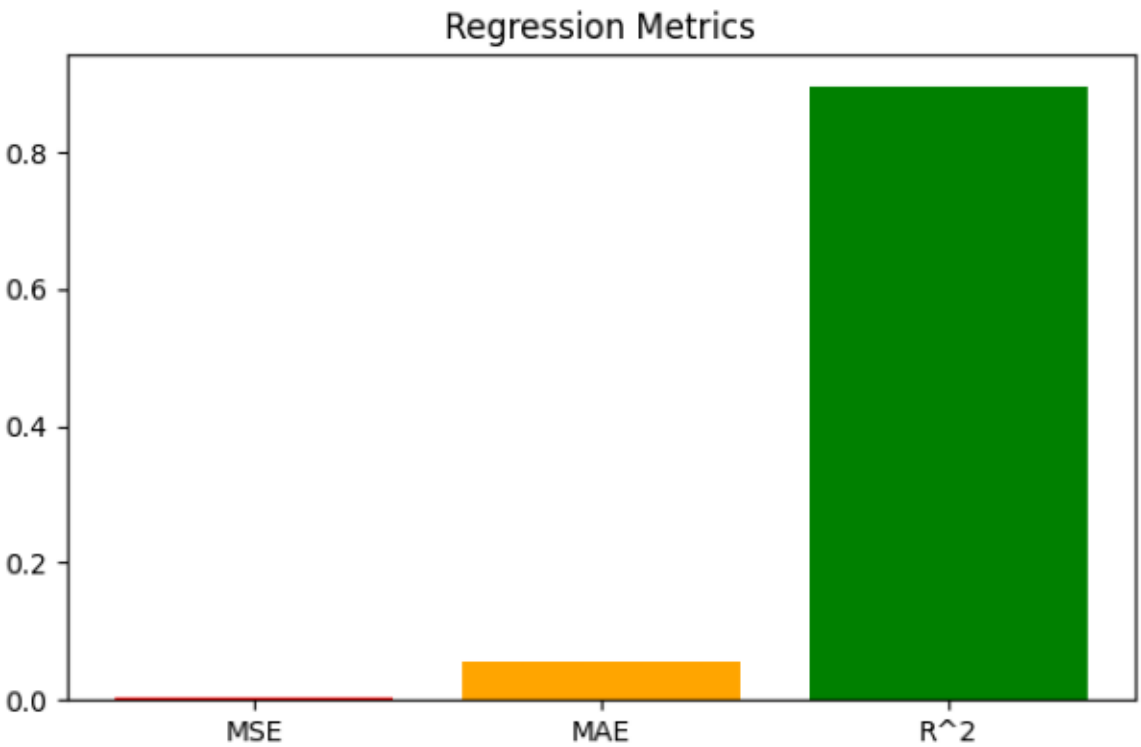

True vs Predicted MI Over Time
True MI
Predicted MI
Mindfulness Index (MI)
Window Index (Time)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0
20
40
60
80
100
120


True vs Predicted MI (Scatter)
Predicted MI
True MI
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0


Regression Metrics
0.8
0.6
0.4
0.2
0.0
MSE
MAE
R^2

Mindfulness Index Regression Pipeline Using SVM

Rationale:
The Mindfulness Index (MI) is a continuous value between 0 and 1, representing the degree of mindfulness in each EEG window. Instead of classifying windows into discrete states, we use regression to predict the actual MI value. This approach preserves the granularity of the MI and allows for more nuanced feedback and analysis.

Pipeline Steps:
1. Feature Extraction: For each EEG window, extract relevant features.
2. MI Calculation: Compute the MI for each window, resulting in a continuous target value between 0 and 1.
3. Data Preparation: Construct a dataset where each row contains EEG features and the corresponding MI value.
4. Model Training: Use Support Vector Regression (SVR) to model the relationship between EEG features and MI.
5. Prediction & Evaluation: Predict MI values for the test set. Evaluate performance using regression metrics.
6. Visualization: Plot true vs. predicted MI over time, scatter plot, and regression metrics.

Advantages:
- Maintains the full information content of the MI.
- Enables subtle, continuous feedback for neurofeedback or research.
- Regression metrics provide a direct measure of prediction quality.