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# **AI-Assisted Analysis and Enhancement of Social Media Addiction Prediction Models**

Course: Artificial Intelligence – Fall 2025  
Supervisor: Dr. Zulfikul Hasan

# PROBLEM & MOTIVATION

Social media addiction is rapidly increasing among students

## **Strong links to:**

- Anxiety & depression
- Sleep disruption
- Academic decline

Traditional research relies on linear statistical models. Human behavior is complex and non linear

**Need:** AI-based predictive modeling

# BENCHMARK STUDY

**Benchmark Paper:** Zewude et al. (2025) – IJERPH

**Method:** Structural Equation Modeling (SEM)

**Focus:** Mediation through mindfulness & social capital

## KEY LIMITATIONS

- Linear assumptions
- No AI or machine learning
- Limited predictive optimization

# OUR OBJECTIVE

## **What We Did Differently**

- Replicated benchmark findings
- Enhanced them using Artificial Intelligence

## **Shifted from:**

- Causal analysis → Predictive modeling
- Used ensemble learning to capture non-linear patterns

# DATASET & AI TOOLS

## Dataset

- **Kaggle:** Students Social Media Addiction
- 705 student records
- Demographics, usage behavior, mental health

## AI & Tools Used

Google Colab (cloud execution)

### Gemini AI:

- Code generation
- Model enhancement suggestions

Python (scikit-learn, XGBoost)  
Direct AI usage demonstrated

# MODELING APPROACH

## MULTI-STAGE MODELING

### Baseline Model

- Linear Regression (replicates SEM)

### AI-Enhanced Models

- Random Forest (bagging)
- Tuned XGBoost (gradient boosting)

### WHY AI MODELS?

- Capture feature interactions
- Learn non-linear behavior
- Improve prediction accuracy



# RESULTS

## MODEL PERFORMANCE COMPARISON

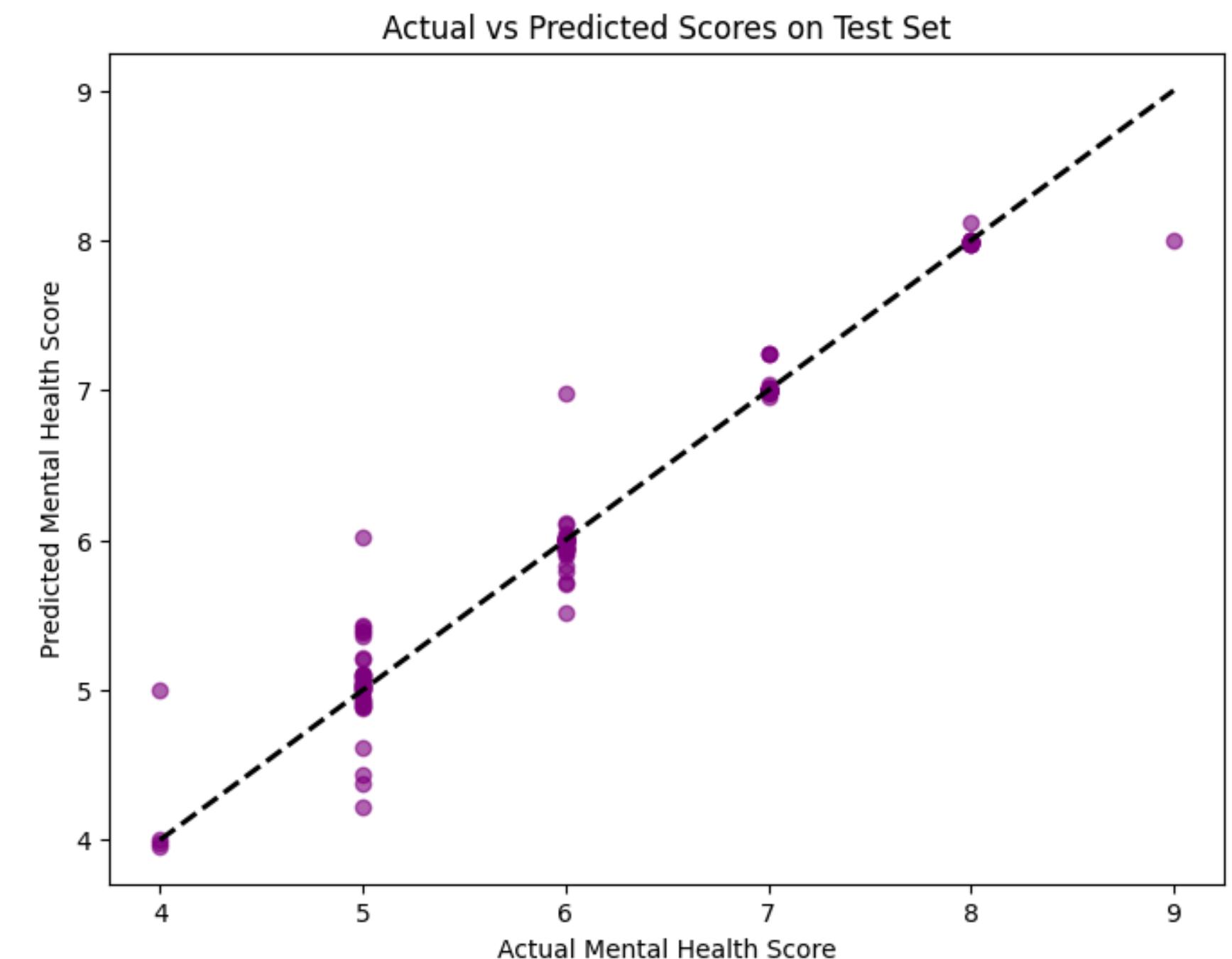
Model	R <sup>2</sup> Score	RMSE	Performance
Linear Regression	0.894	0.127	Good
Random Forest	0.955	0.054	Better
Tuned XGBoost	0.966	0.045	Best

Clear improvement over benchmark

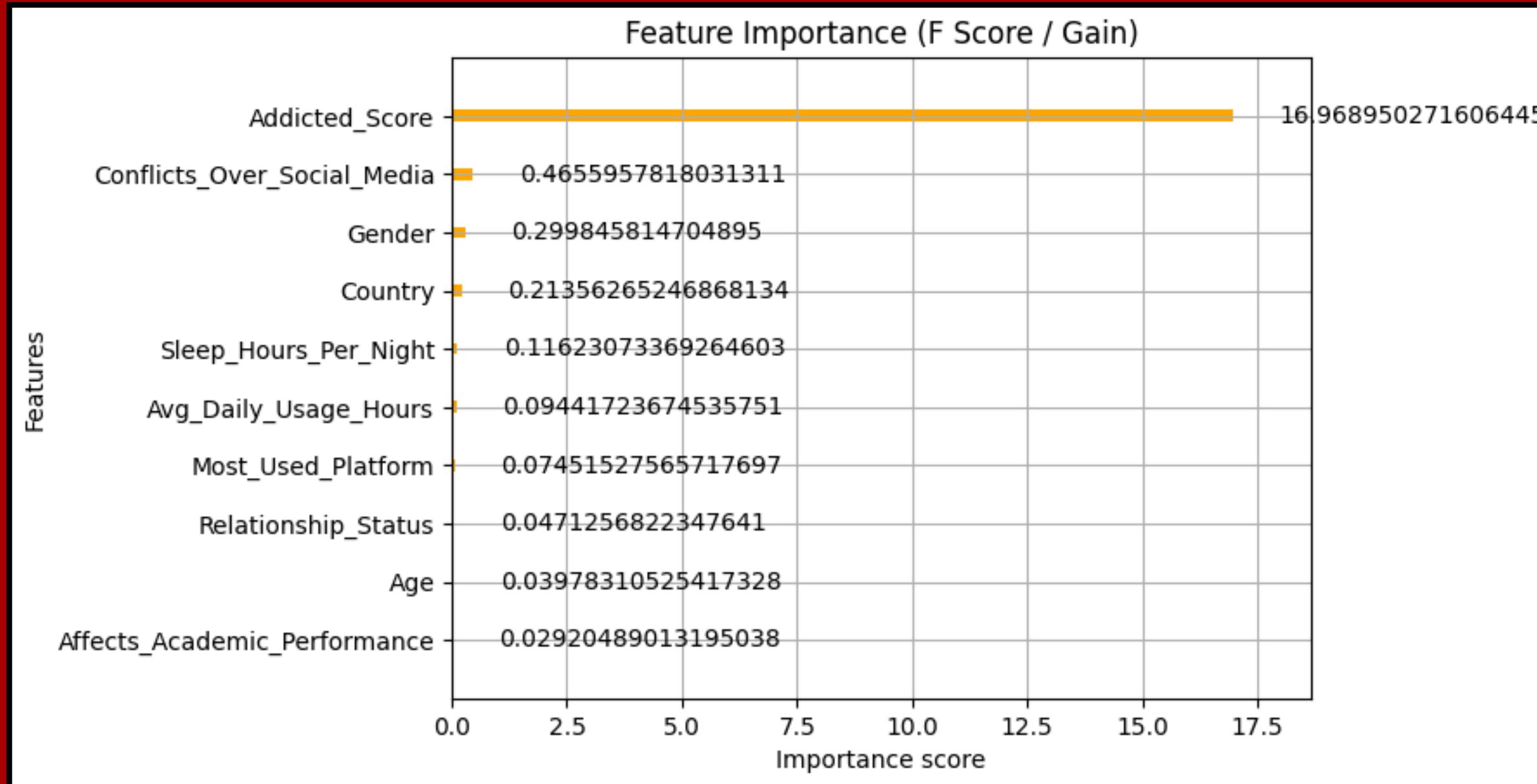
# KEY VISUAL EVIDENCE

## ACTUAL VS PREDICTED MENTAL HEALTH SCORES

- Predicted values closely follow actual values
- Shows strong generalization
- Confirms model reliability



# FEATURE IMPORTANCE



## Top Predictors

- Addicted\_Score
- Avg Daily Usage
- Sleep Hours
- Confirms benchmark conclusions
- Adds predictive strength

XGBOOST FEATURE IMPORTANCE

# HOW AI IMPROVED THE BENCHMARK

## COMPARISON SUMMARY

Aspect	Benchmark (SEM)	Our Study (AI)
<b>Model Type</b>	Linear	Non-Linear
<b>Prediction</b>	Limited	High Accuracy
<b>AI Usage</b>	✗	✓
<b>Error Reduction</b>	✗	✓

# CONCLUSION

## FINAL TAKEAWAYS

- AI significantly improves behavioral health prediction
- XGBoost achieved the best performance
- Ensemble models capture complex human behavior
- AI bridges the gap between psychology & predictive analytics

# FINAL STATEMENT

“This project demonstrates how Artificial Intelligence can enhance traditional psychological research by improving prediction accuracy, interpretability, and real-world applicability.”

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