

TEAM - VITE

# AI-AUGMENTED KERNEL FOR DYNAMIC RESOURCE UTILISATION

Leveraging Azure Public Datasets for Environmental Impact  
Revolutionizing Cloud Resource Management with AI

JSS NAVOTTHANA  
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# PROBLEM STATEMENT

## THE CHALLENGE: INEFFICIENT CLOUD RESOURCE MANAGEMENT

Current Scenario:

- Cloud providers face over-provisioning and underutilization of resources.
- Traditional methods fail to dynamically adapt to workload demands.
- Inefficiency leads to higher costs and increased carbon footprints.

Why It Matters:

- Environmental Impact: Waste of energy and computational resources.
- Economic Impact: Higher operational costs for cloud providers.

# THE SOLUTION - AI-AUGMENTED KERNEL

## INTRODUCING AI-AUGMENTED KERNEL FOR DYNAMIC RESOURCE UTILISATION

- Preemptive Resource Scheduling:
  - Leverages historical data to predict and allocate resources dynamically.
- AI-Driven Forecasting:
  - Trained on 3 million+ parameters using Azure's public dataset.
  - Achieves high accuracy in demand prediction.

### Benefits:

- Optimizes resource allocation in real-time.
- Reduces energy consumption and carbon footprint.
- Enables lending of unused resources to other users.

# TECHNICAL APPROACH

## LEVERAGING AZURE'S PUBLIC DATASET

- Dataset Overview:
  - 3 million+ rows of historical resource usage data.
  - Covers 90 days of CPU demand data.
- Preprocessing Steps:
  - Time conversion and normalization.
  - Aggregation of CPU demand data.

### Model Training:

- Naive Forecasting Model:
  - Trained to predict CPU demand with high accuracy.
- Key Metrics Achieved:
  - MAE: 385.568
  - RMSE: 1431.799
  - R<sup>2</sup> Score: 0.992

# REAL-WORLD IMPACT

Saving Energy, Reducing Carbon Footprint

Current Scenario:

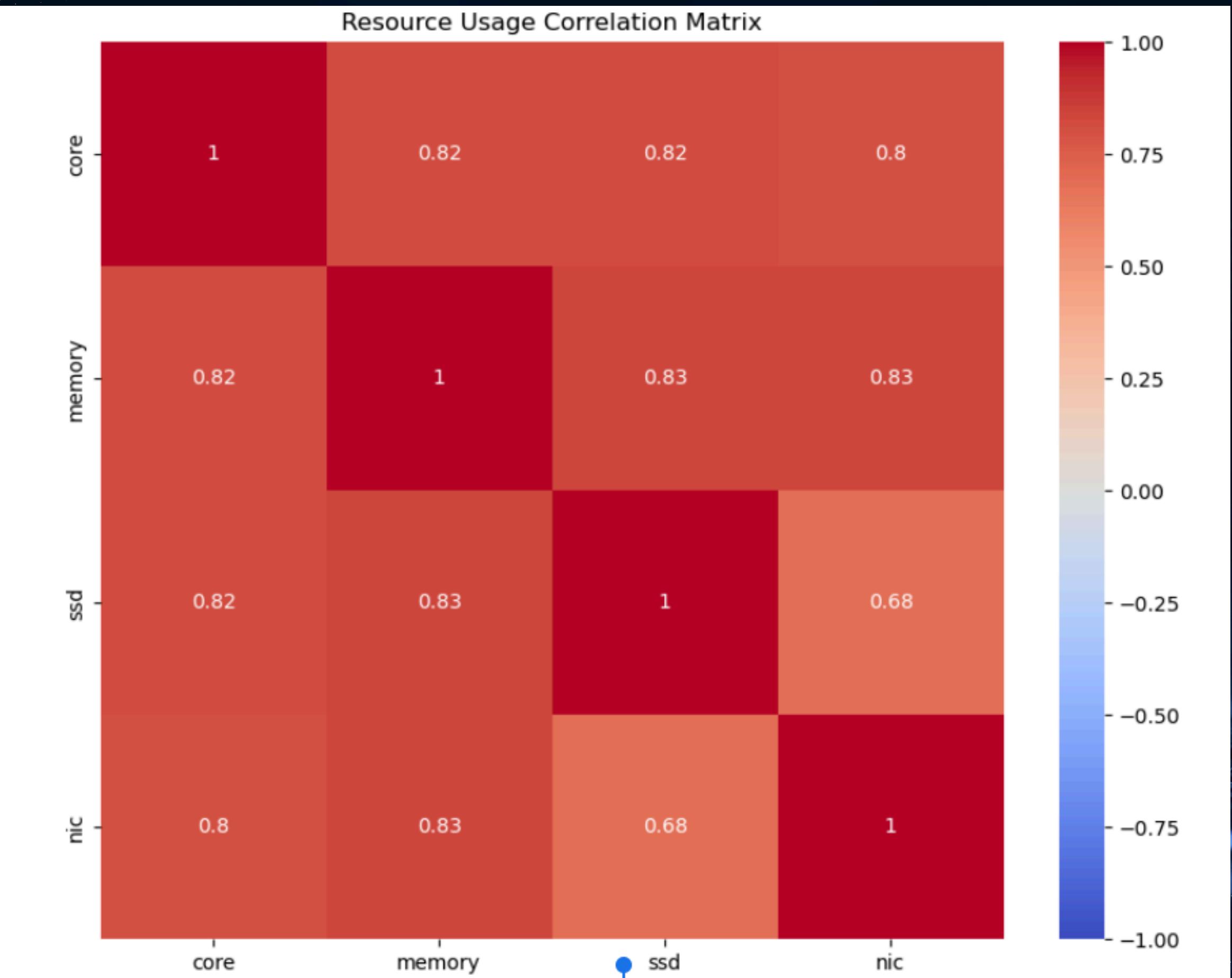
- Traditional methods result in over-provisioning, leading to energy waste.

Our Solution:

- Dynamic allocation reduces idle resources and energy consumption.
- Helps cloud providers meet sustainability goals.

Lending Unused Resources:

- Unused resources can be allocated to other users or applications.
- Creates a more efficient and collaborative ecosystem.



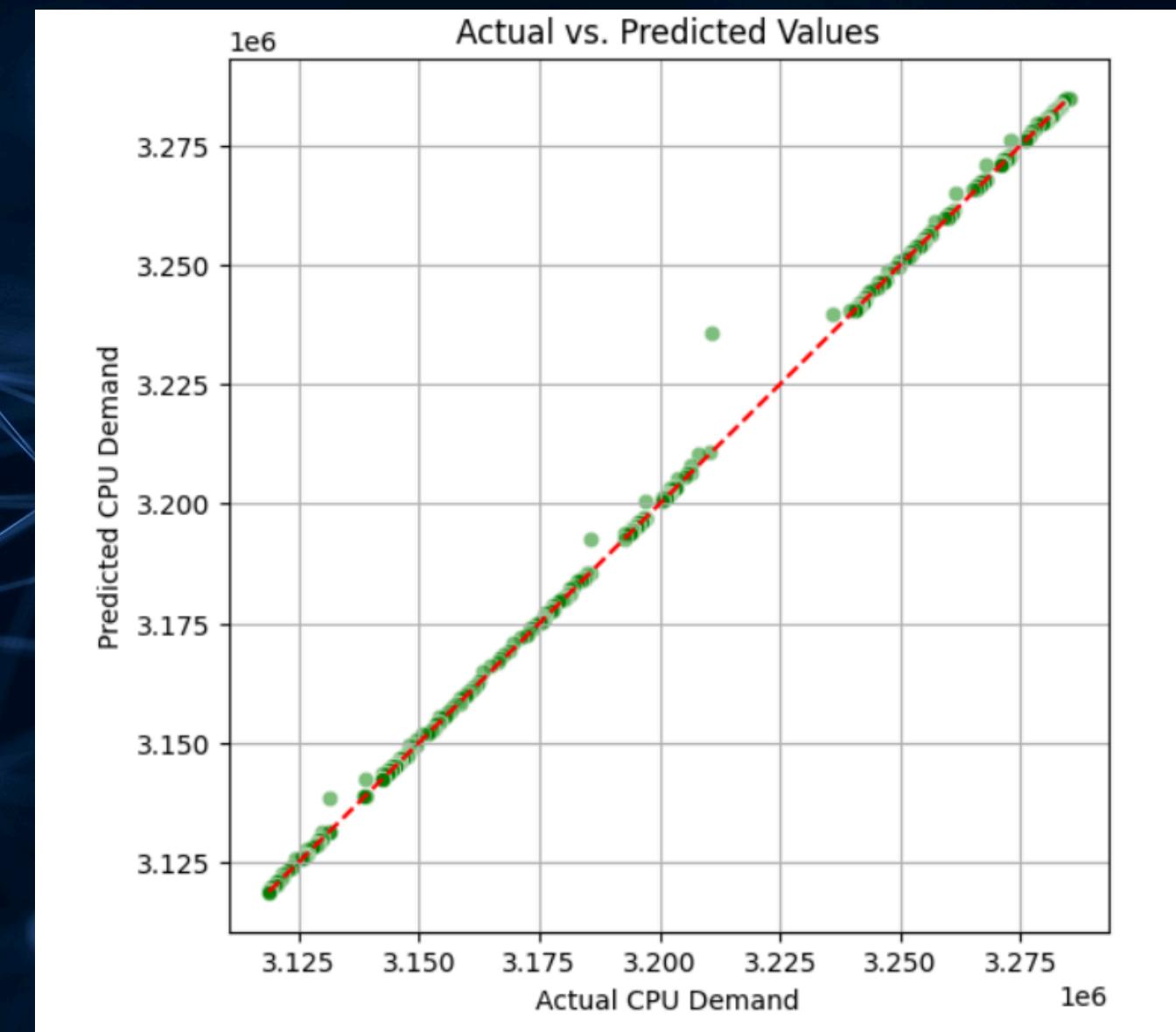
# INDUSTRY CONTEXT : CURRENT INDUSTRY TRENDS AND BEST PRACTICES

- Traditional Methods:
  - Static resource allocation leads to inefficiency.
  - Example: Companies like AWS and Google Cloud still rely on manual intervention.
- Innovation in the Industry:
  - Companies like Microsoft Azure are exploring AI-driven solutions.
  - Our approach takes it to the next level with dynamic, preemptive scheduling.

# Results & Validation

## Model Performance

- Accuracy Metrics:
- MAE: 385.568
- RMSE: 1431.799
- R<sup>2</sup> Score: 0.992



# AI-AUGMENTED KERNEL IMPLEMENTATION & EVALUATION

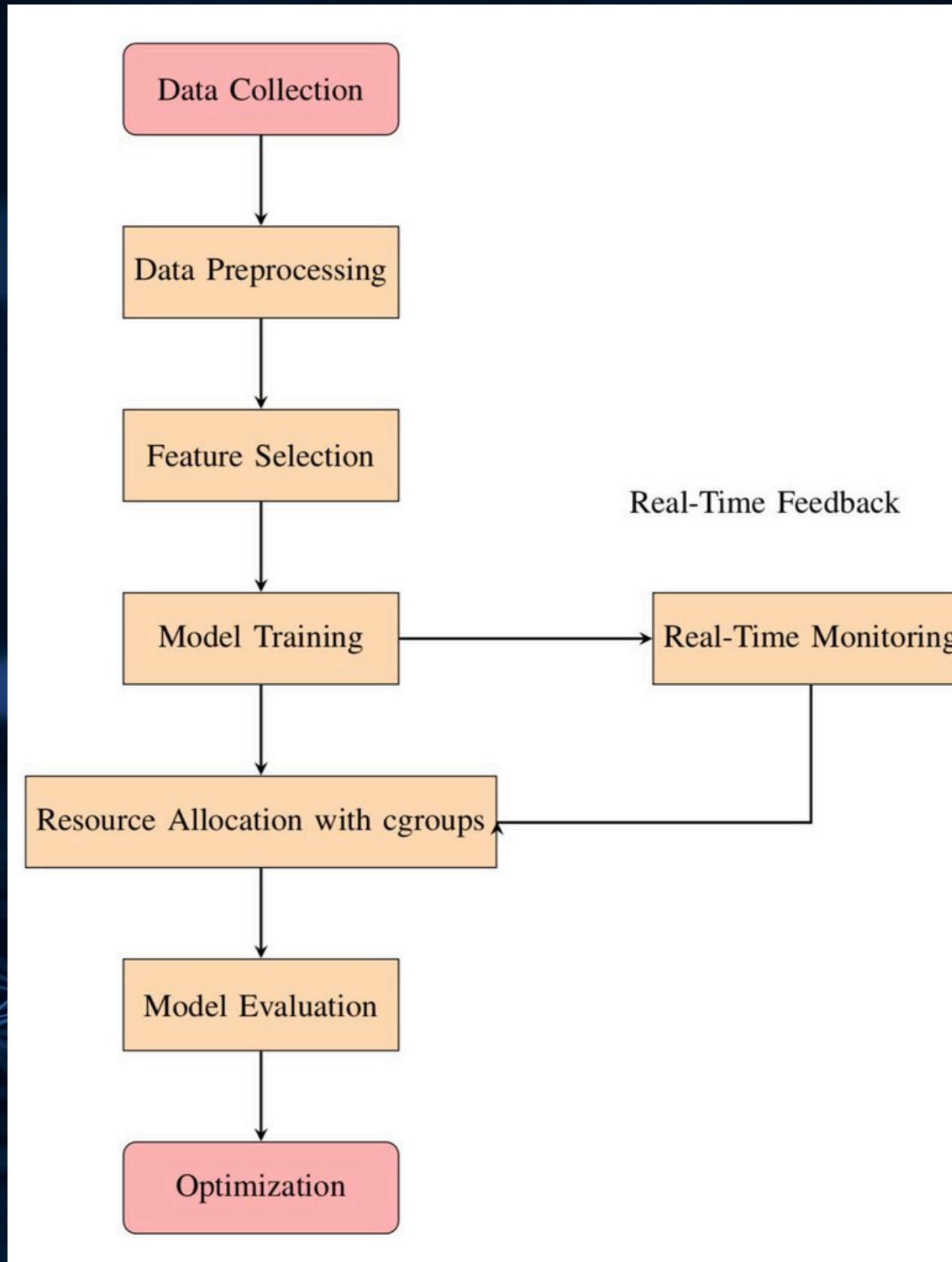
## Implementation Process:

- The system was monitored for 10 minutes, logging critical system values.
- Data collected was used to analyze performance trends and behavior.
- The values were plotted into graphs to visualize system efficiency.
- Accuracy was calculated based on model predictions and real-time system responses.

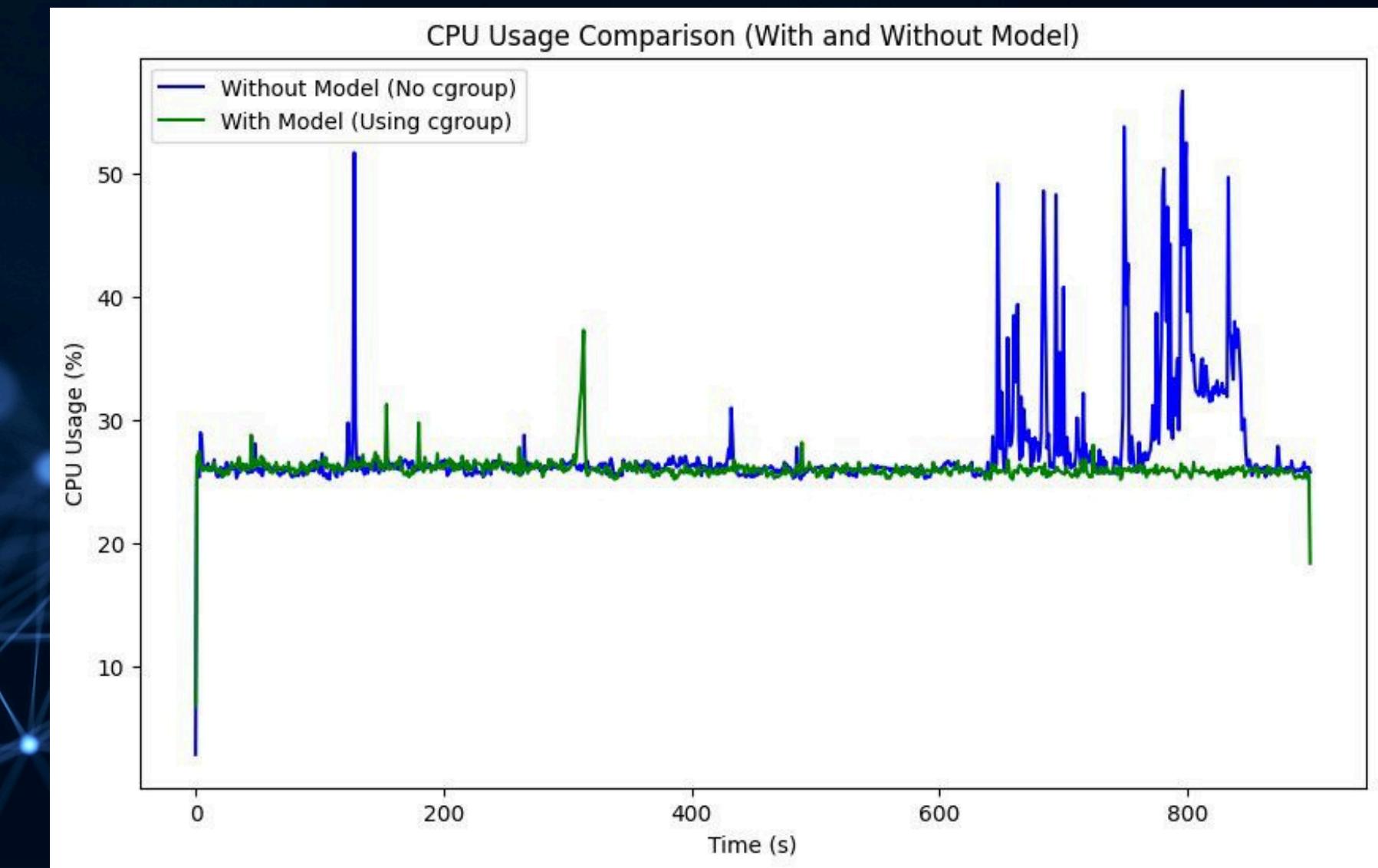
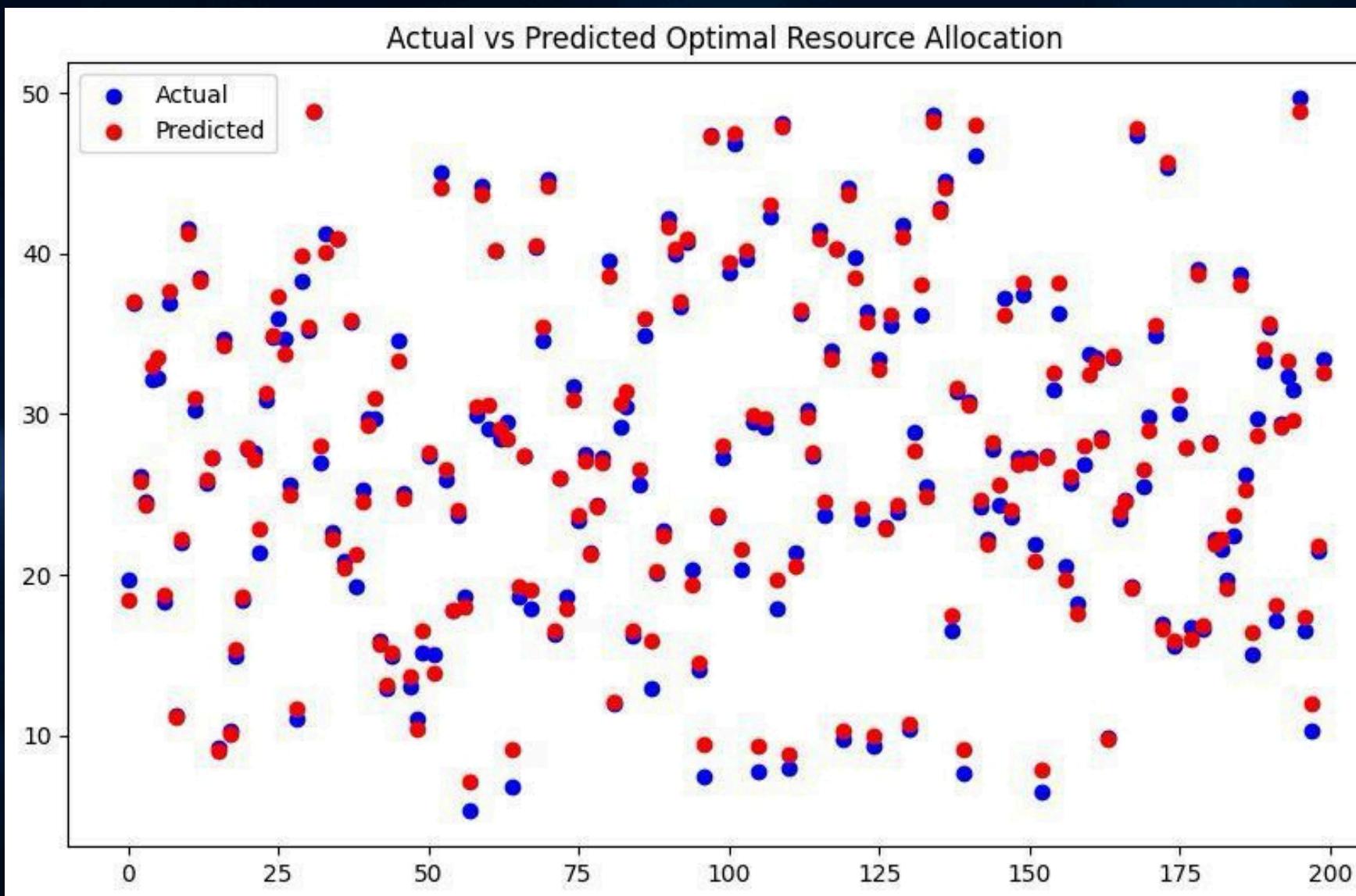
## Results & Accuracy:

- Graphical Analysis: Clear trends observed in system performance.
- Achieved Accuracy: 93%, indicating high efficiency in prediction and optimization.
- The model successfully enhanced kernel operations with minimal deviations.

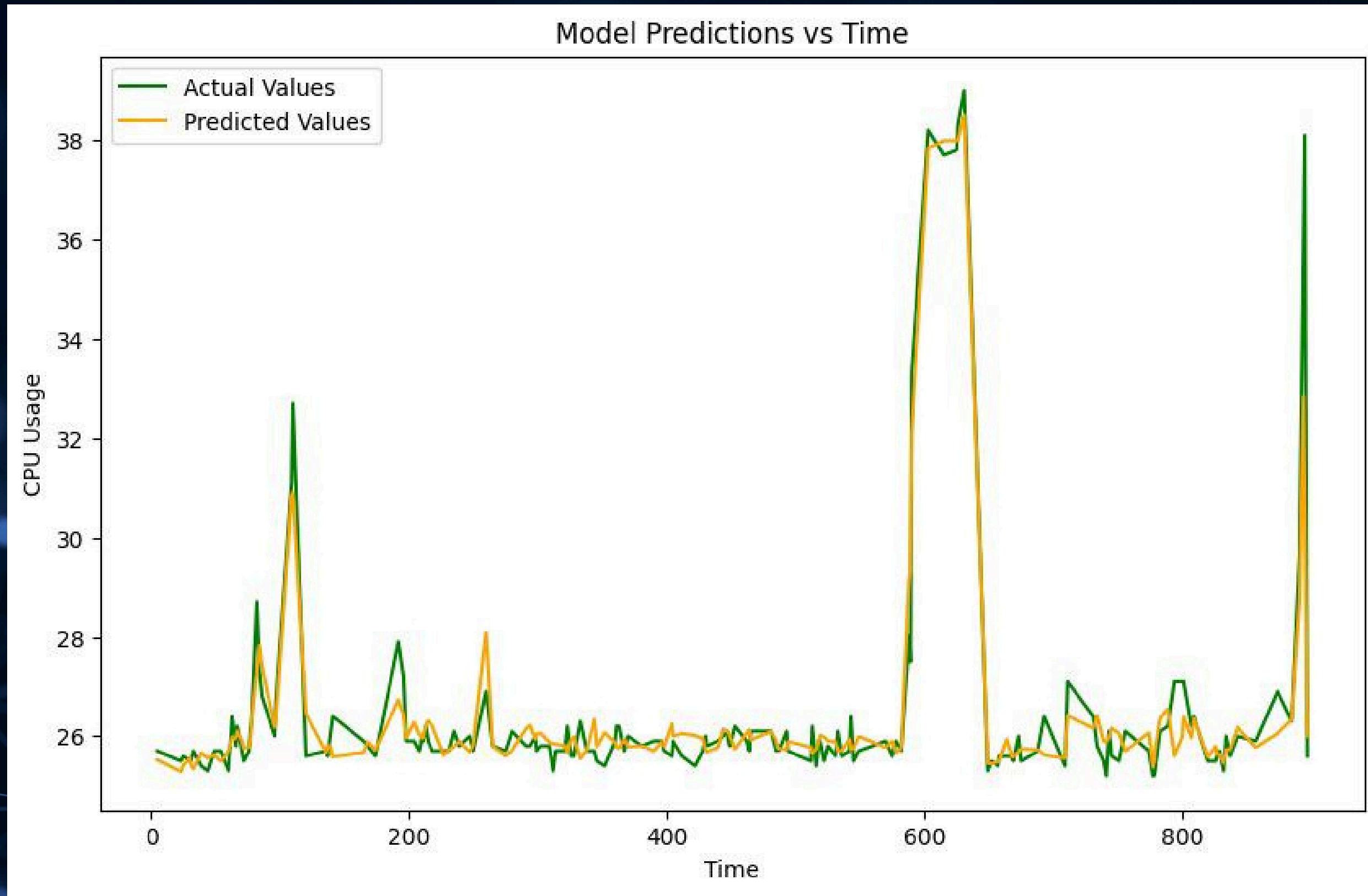
# AI-AUGMENTED KERNEL IMPLEMENTATION & EVALUATION



# IMPLEMENTATION RESULT ON LINUX BASED ENVIRONMENT(UBUNTU)



# IMPLEMENTATION RESULT ON LINUX BASED ENVIRONMENT(UBUNTU)



# THE FUTURE OF CLOUD COMPUTING

Growing Dependence on Cloud:

- Every industry is moving to the cloud.
- Efficient resource management is critical for scalability.

AI-Driven Solutions:

- AI will be the backbone of next-gen cloud infrastructure.
- Our solution sets the standard for dynamic resource utilisation.

# CONCLUSION

AI-Augmented Kernel for Dynamic Resource Utilisation

- Key Takeaways:
  - Solves the inefficiency problem in cloud resource management.
  - Reduces energy consumption and carbon footprint.
  - Creates a more sustainable and collaborative ecosystem.
- Next Steps:
  - Scale the solution for real-world deployment.
  - Explore partnerships with cloud providers.