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DEPARTMENT OF

Computer Science and Engineering (Artificial Intelligence)

Neural Network and Deep learning Project Report

On

"Rock Paper Scissor with RNN"

Submitted By

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CERTIFICATE

Certified that the mini project work entitled "Rock Paper Scissor with RNN" carried out by MD Sahil bearing USN 3BR22CA032 A Bonafide students of Ballari Institute of Technology and Management in partial fulfillment for the award of Bachelor of Engineering in CSE (Artificial Intelligence) of the Visvesvaraya Technological University, Belgaum during the year 2025 - 2026. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of the project work prescribed for the said Degree.

Signature of Lab Co-Ordinator's
Prof. Pavan Kumar and Mr.Vijay Kumar

12/12/25
Signature of HOD

Dr. Yeresime Suresh

ABSTRACT

This project presents an intelligent Rock-Paper-Scissors game that uses a Recurrent Neural Network (RNN) to predict the player's next move. Unlike traditional rule-based systems, the model learns directly from the user's behavior patterns by analyzing sequences of past moves. The system is implemented using Python, TensorFlow, and runs interactively in Google Colab.

The RNN processes the last five user moves as input, converting each move into a one-hot encoded vector. By learning from these sequences, the model identifies trends and habits in how the user plays. This enables the system to improve its predictions and make more strategic decisions as the game continues, resulting in a more engaging and adaptive experience.

The model trains online after every round, meaning it continuously updates and improves while the player interacts with it. This adaptive learning approach demonstrates how sequence-based neural networks can be used in simple games to model human behavior. The project highlights practical applications of RNNs in pattern recognition, real-time learning, and interactive AI.

ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of project work on the **"Rock Paper Scissors With Rnn"** would be incomplete without mentioning those who made it possible. Their noble gestures, affection, guidance, encouragement, and support crowned our efforts with success. It is our privilege to express our gratitude and respect to all those who inspired us in the completion of this project.

We are extremely grateful to our Lab Coordinators, **Prof. Pavan kumar and Mr. Vijay kumar**, and **Dr.YERISIME SURESH** , Professor and Head of the Department of CSE(AI), BITM, Ballari, for their noble gestures, support, coordination, and valuable suggestions in completing the project work.

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CHAPTER 1

INTRODUCTION

Rock-Paper-Scissors is a simple yet widely studied game in artificial intelligence because it involves prediction, strategy, and pattern analysis. Although the game appears random, human players often follow subconscious patterns that can be learned by machine learning models. This project uses a Recurrent Neural Network (RNN) to identify these patterns by analyzing previous user moves and predicting the next likely choice. By using sequence data, the system can learn behavioral trends and respond with an optimal counter-move.

The implementation uses Python and TensorFlow to build a fully interactive game that learns in real time. Each user move is converted into a one-hot encoded vector and added to a sequence of the last five moves. The RNN processes this sequence to predict future moves and is trained online after each round, improving its accuracy as the game progresses. This approach demonstrates how deep learning can be applied to simple games to model human decision-making and showcase the power of sequence learning.

CHAPTER 2

OBJECTIVES

1. **Streamlined Move Prediction:**

   The game provides instant, easy-to-understand move predictions: input five past moves and the model returns the most likely next move and the computer's counter. The interactive loop (Colab/console) and simple one-hot encoding make it usable by non-technical players.

2. **Precise Pattern Modeling:**

   Trained on live gameplay, the RNN captures player tendencies and returns increasingly accurate predictions over time. Short sequences and confusion-matrix monitoring ensure the model reliably recognizes common patterns and adapts its strategy.

3. **Automated Online Learning:**

   The system learns continuously during play—each round becomes training data, improving performance without manual retraining. Checkpointing weights and using a rolling buffer keep updates efficient while preserving long-term behavior.

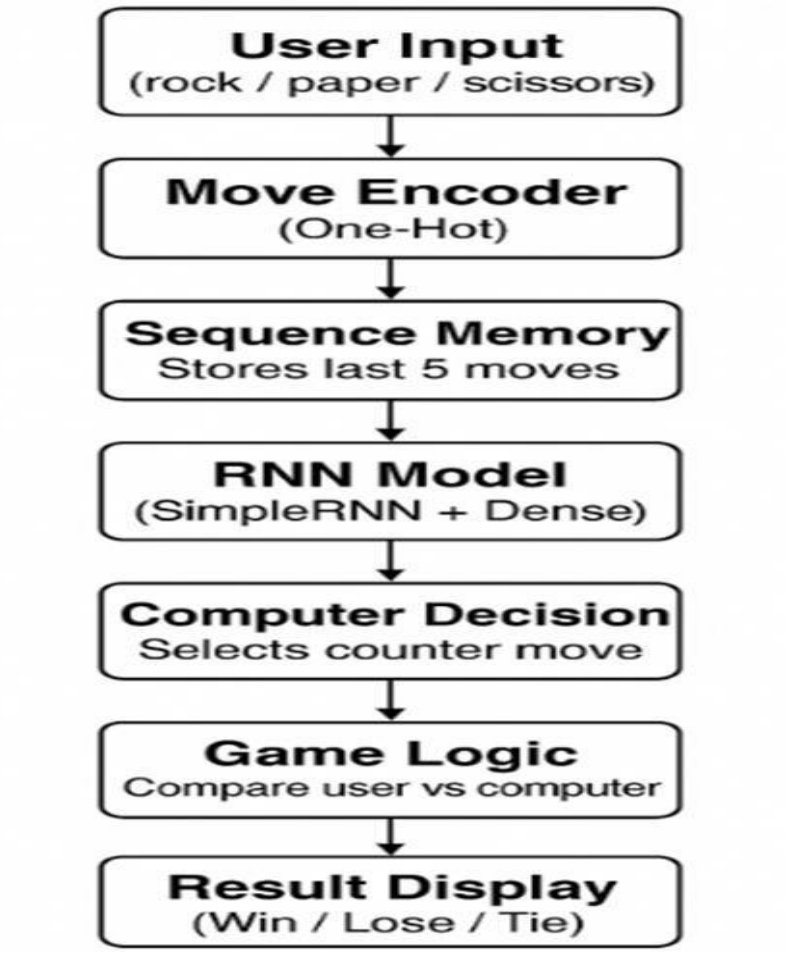
CHAPTER 3

PROBLEM STATEMENT

To develop an intelligent Rock-Paper-Scissors game that can learn and adapt to player behavior using deep learning techniques. It focuses on analyzing the player's previous moves through a Recurrent Neural Network (RNN) to identify hidden patterns. By predicting the player's next move in real time, the system enhances interactivity and demonstrates adaptive decision-making

CHAPTER 4

METHODOLOGY



4.1 Block Diagram of Color Prediction System

The system takes the user's move and converts it into a one-hot encoded vector, which is stored in a sequence memory holding the last five moves. This sequence is fed into an RNN model that analyzes the pattern and predicts the user’s next move. Based on this prediction, the computer selects the best counter move. Finally, the game logic compares both moves and displays the result as a win, loss, or tie.

CHAPTER 5

REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENTS

User Move Input: Allow the player to enter their move (rock, paper, or scissors) through an interactive interface for each round of gameplay.

RNN - Based Prediction: Utilize a Recurrent Neural Network (RNN) to analyze the player's last five moves and predict the next move based on learned behavioral patterns.

Real-Time Learning: Enable the model to train and adapt continuously during gameplay, improving prediction accuracy over time.

Performance Evaluation: Evaluate the system's prediction accuracy and gameplay outcomes to measure its learning efficiency and responsiveness.

NON-FUNCTIONAL REQUIREMENTS

- **Performance:** The system should quickly process user inputs and generate predictions in real time.
- **Accuracy:**Track accuracy using prediction logs and confusion matrix.
- **Scalability:** Handle growing gameplay data without slowing the system.

CHAPTER 6

DESIGN

FLOW CHART

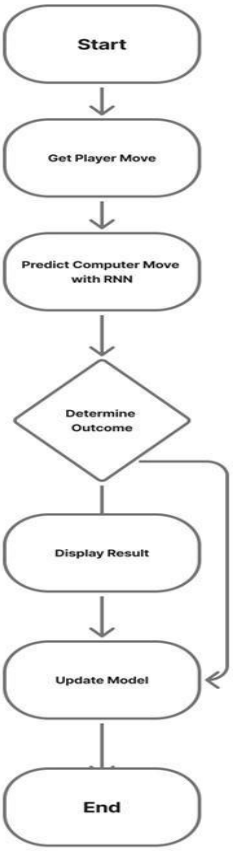


Fig 6.1 Flow Chart

USE CASE DIAGRAM

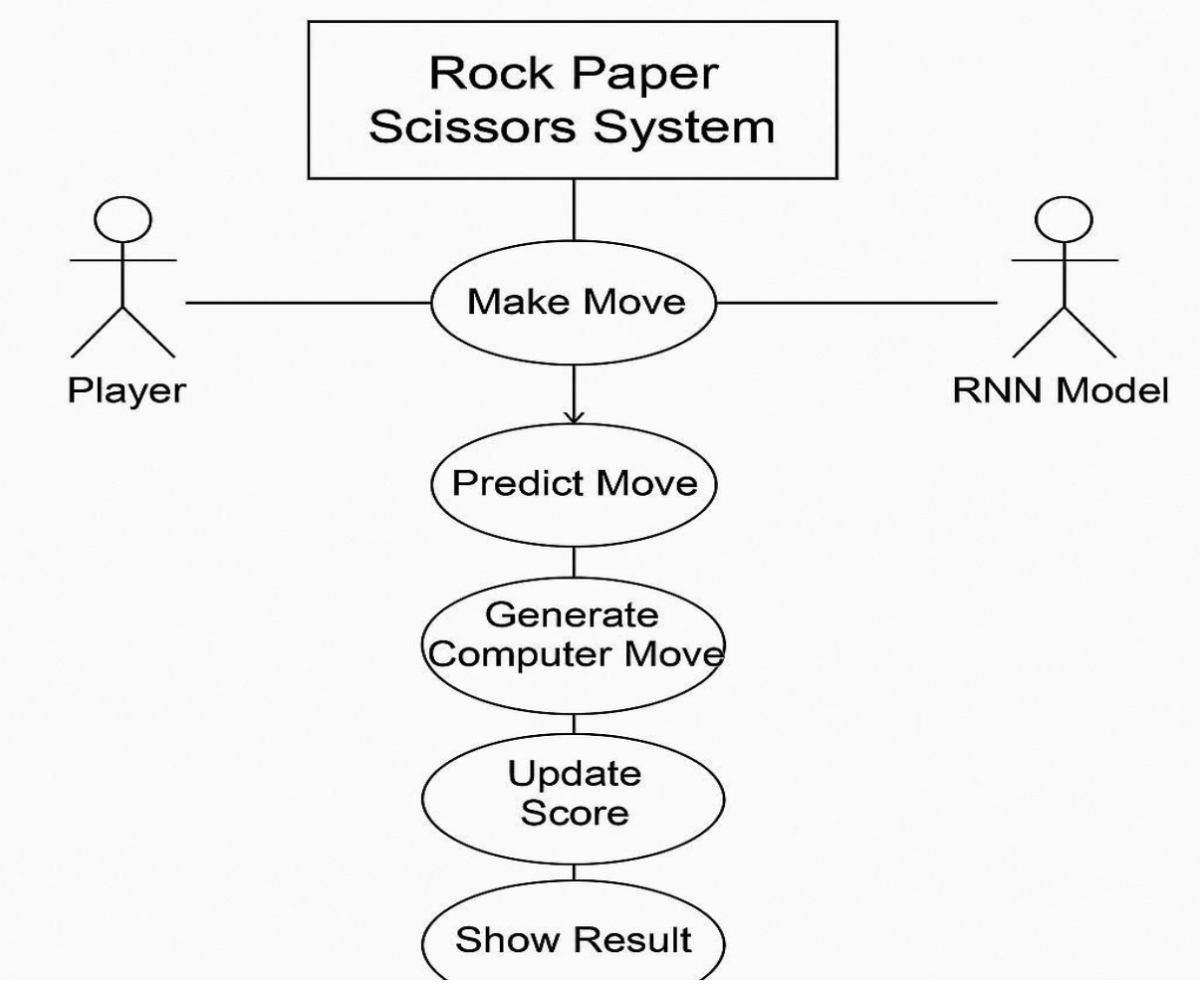


Fig 6.2 Use Case Diagram

SEQUENCE DIAGRAM

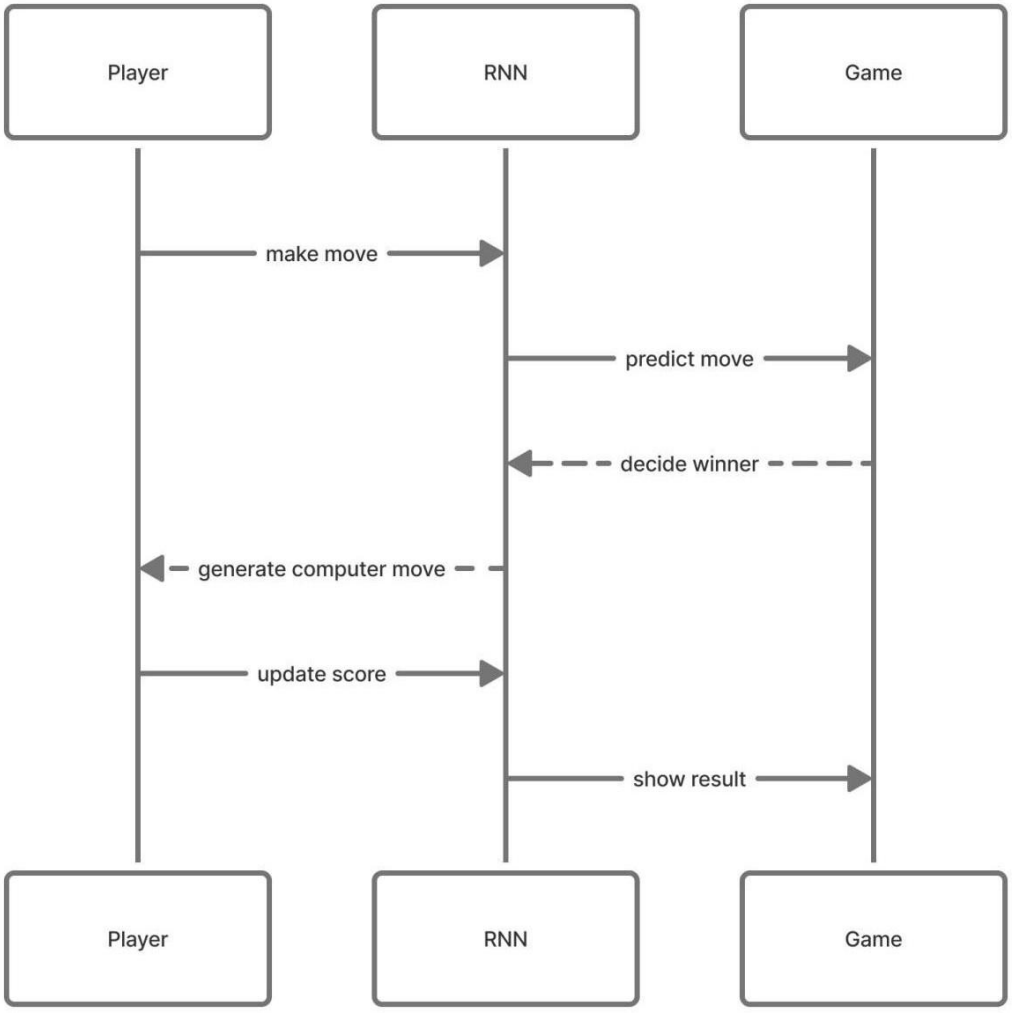


Fig 6.3 Sequence Diagram

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CHAPTER 7

IMPLEMENTATION

Phase 1: Data Preparation

- Record user moves and create sequences of the last 5 moves.
- Convert moves into one-hot vectors (rock, paper, scissors).

Phase 2: Model Development

- Build an RNN model (SimpleRNN → Dense layers with softmax output).
- Compile using Adam optimizer and categorical cross-entropy loss.

Phase 3: Deployment and Testing

- Save and load model weights for continuous learning.
- Predict the next user move using the last 5 moves.
- Test by playing the game and track accuracy/win rate for evaluation.

CHAPTER 8

RESULTS AND DISCUSSION

```
Your move (rock/paper/scissors): scissors
Computer chose: scissors
It's a tie!

Your move (rock/paper/scissors): rock
Computer chose: scissors
You win!

Your move (rock/paper/scissors): paper
Computer chose: paper
It's a tie!

Your move (rock/paper/scissors): quit
```

CHAPTER 9

CONCLUSION

This project successfully implements an intelligent Rock-Paper-Scissors game using a Recurrent Neural Network (RNN) that learns and adapts to player behavior. The model effectively predicts the player's next move based on previous patterns, improving with continuous training. It demonstrates the practical use of deep learning for real-time prediction and adaptive decision-making.

CHAPTER 10

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