**Customer Purchase Propensity Model**

**1. Overview:**

Deep learning model predicting a customer's likelihood to make a purchase.

**2. Data:**

User Data: Contains around 9000 entries detailing user information.

Usage Logs: Comprises over 2.3 million entries recording user interactions.

Data Processing: Joined both datasets, parsed dates, and calculated the duration since customer registration in a new column.

**3. Target Variable & Preprocessing:**

Target: Predicts the 'outcome', whether the customer has made a purchase.

Feature Engineering: Created weekly usage logs to analyze customer behavior patterns over time.

**4. Data Transformation:**

3D Tensors: Created for model inputs, representing user behavior sequences over time.

**5. Model Architecture:**

LSTM Model: Implemented and trained, achieving an accuracy of 71%.

Evaluation Metrics: Utilized confusion matrix with 2245 samples and plotted ROC curve with an area under the curve of 78%.

**6. LSTM with Attention Model:**

Implementation: Created a variant of the LSTM model incorporating attention mechanisms for long-term dependencies.

Performance: Achieved an accuracy of 68%.

Evaluation Metrics: Confusion matrix and ROC curve with an area under the curve of 73%.

**7. Analysis of Weights:**

Weight Distribution: Examined how the model assigned weights to different stages of the customer journey.

Graphical Representation: Showed that 113 weights were utilized for each of the 2245 users, with higher weight emphasis at the initial stages, gradually decreasing over time.

**8. Insights:**

Derived insights from the analysis of model performances and weight distributions regarding customer purchase behavior over time.

**9. Usage & Application:**

Application: Insights from this model could assist in targeted marketing or customer engagement strategies to encourage purchases based on user behavior patterns.