### Business Objective

\*\*Enhance Model Efficiency and Performance through Dimensionality Reduction\*\*

The goal is to optimize the performance of classification models by applying dimensionality reduction techniques to the CIFAR-10 dataset, thereby improving computational efficiency and model generalization.

### Business Constraints

1. \*\*Data Integrity:\*\* Ensure that the dimensionality reduction techniques used do not significantly distort the underlying data representation, preserving essential features necessary for accurate classification.

2. \*\*Computational Resources:\*\* Consider limitations in computational power and time when training models on both high-dimensional and reduced datasets.

3. \*\*Model Complexity:\*\* Maintain a balance between reducing dimensionality and retaining enough complexity in the model to accurately capture the variability in the data.

### Success Criteria

1. \*\*Model Performance Success Criteria:\*\* Achieve comparable or improved classification accuracy on the reduced dataset compared to the original high-dimensional dataset, with a target of maintaining at least 85% accuracy.

2. \*\*Computational Efficiency Success Criteria:\*\* Demonstrate a significant reduction in training time and resource usage with the reduced dataset, aiming for at least a 30% decrease in training time.

3. \*\*Trade-off Analysis Success Criteria:\*\* Provide a detailed written report analyzing the trade-offs between dimensionality reduction and model performance, discussing factors such as accuracy, training time, and complexity.