Report on the Regularized Model

Choice of Data Augmentation:

To enhance the model's performance and generalization, data augmentation techniques were employed. These techniques include:

1. **Random Horizontal Flip:** This operation helps the model learn invariance to horizontal orientation changes.
2. **Random Rotation:** By rotating images, the model gains robustness to various orientations.
3. **Color Jitter:** Adjusting brightness, contrast, saturation, and hue introduces variability, helping the model handle different lighting conditions.
4. **Grayscale Conversion:** This simplifies the color channels, focusing on texture and shape features.

Comparison of Models:

Model without Regularization:

- **Test Accuracy:** 0.5964
- **Test Loss:** 2.4819

Model with Regularization:

- **Test Accuracy:** 0.6203
- **Test Loss:** 1.6455

Analysis:

1. **Improved Test Accuracy:** The regularized model achieved a test accuracy of approximately 62.03%, compared to 59.64% for the non-regularized model. This indicates that the regularized model performs better in classifying unseen data, likely due to the added robustness from data augmentation and dropout.
2. **Reduced Test Loss:** The test loss for the regularized model was 1.6455, which is lower than the 2.4819 loss observed in the non-regularized model. This reduction in loss suggests that the regularized model's predictions are more accurate and closer to the true labels.

Conclusion:

The introduction of data augmentation and dropout as regularization techniques has positively impacted the model's performance. The regularized model shows improved accuracy and reduced loss, indicating better generalization and reduced overfitting compared to the original model.