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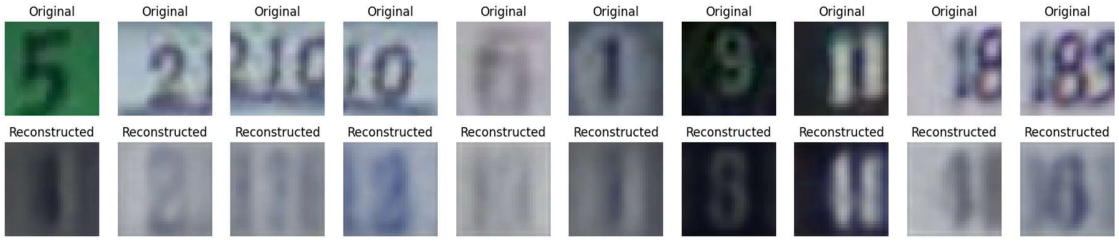
VAE Performance Analysis



Clarity

The generated images demonstrate varying levels of clarity. While some reconstructions are clear and reassemble the original digits, some outputs exhibit blurriness or loss of detail. This variability suggests that the VAE has successfully learned some aspects of the digit distribution but struggles with specific cases.

Distortion

Upon reviewing reconstructed images, it is evident that certain digits are distorted, particularly those with complex shapes or unusual styles. Significant distortions indicate potential weaknesses in the model's ability to capture intricate details, highlighting areas for future improvement.

Variability

The model maintains a reasonable performance across different styles and backgrounds. However, the model couldn’t reconstruct the green background from the original image (most left picture on the original row) which may be because the model is not complex enough to learn the nuances of color variations in the dataset. Certain fonts and orientations result in less recognizable outputs, indicating that while the VAE can generalize to some extent, it may benefit from additional training data that encompasses a broader variety of digit representations.

Generalization

Testing the VAE on unseen examples shows a mixed performance. While some generated digits are coherent and closely mirror the original inputs, others deviate significantly. This inconsistency suggests that the model has not fully captured the underlying distribution of the training data.

Conclusion

The VAE architecture has demonstrated a solid ability to reconstruct images of digits, with clear outputs in many cases. However, challenges remain regarding distortion, variability, and g neneralization, indicating potential avenues for enhancement.