Clothing Item Generation using GANs

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***Abstract*—The primary objective of this research is to classify and generate images of clothing items. The work is a compilation of three distinct efforts: (1) to classify fashion-mnist images and, inversely, fool it with adversarial noise; (2) to generate novel images which emulate the true fashion-mnist images; (3) to infuse the grayscale images with life-like colors. Together, these endeavours pushed the team to explore topics at the forefront of modern machine learning, most notably generative adversarial networks (GANs).**

***Index Terms*—machine learning, computer vision, neural networks, generative adversarial networks**

I. Introduction

The diverse branches of this project were made possible by the careful selection of a dataset. The fashion-mnist dataset was chosen specifically for its prevalence as a benchmark in recent research into neural networks. Its size, labels, and compatibility (with the long-established MNIST dataset) make it an ideal choice for evaluating deep neural networks (NNs) and GANs. Rather than attempt to introduce a truly groundbreaking NN architecture given the authors' limited experience, this project aims for breadth.

Each subproject explores a unique research area with industrial applications which may answer the associated questions:

1) Classification: Can we quickly identify an item of clothing to automate sorting and retrieval? Supposing such an automated system existed, how susceptible might it be to failure?
2) Generation: Can the product development lifecycle for clothing be accelerated by avoiding physical prototyping?
3) Colorization: Can grayscale clothing imagery be augmented with colors to enable A/B testing of styles to increase customer satisfaction?

To aid comprehension, each subproject is explored independently.

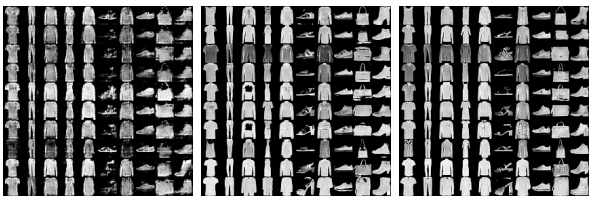
II. Data

The fashion-mnist dataset is composed of 60,000 training images and 10,000 testing images. In keeping with the legacy of the traditional MNIST, fashion-mnist images are 28x28 grayscale pixels. Each image is labeled as one of the ten classes enumerated below:

0) T-shirt/top
1) Trouser
2) Pullover
3) Dress
4) Coat
5) Sandal
6) Shirt
7) Sneaker
8) Bag

Fig. 1: ACGAN Learning to Generate Clothing Images

(a) Epoch 1 (b) Epoch 25 (c) Epoch 50



III. Implementation

A. Classification

B. Generation

https://github.com/AndrewSelviaSJSU/pytorch-generative-model-collections

C. Colorization

IV. Results

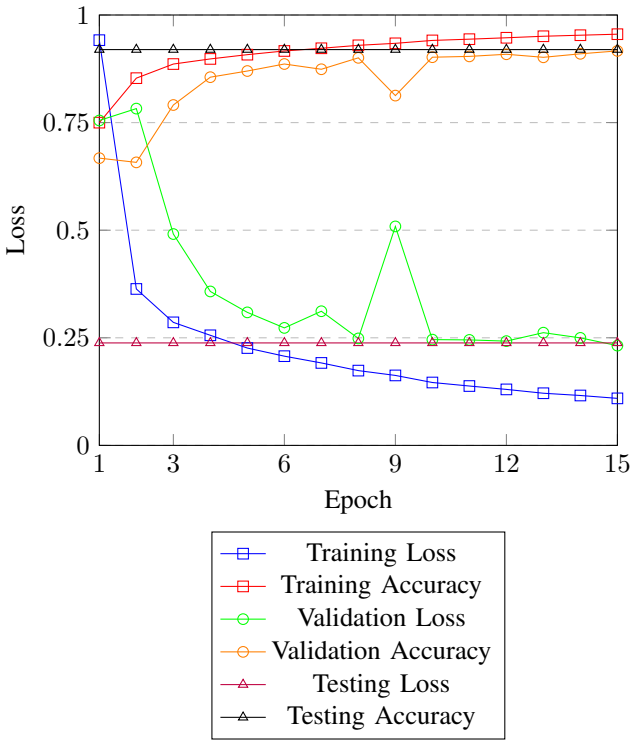
A. Classification

B. Generation

C. Colorization

Here is an example of how we should cite our references [1]. Here is another example of citing a reference [2].

Fig. 2: Loss and Accuracy



Here is an example of how we should reference our figures Figure 2.

Here is an example with multiple images Figure 1

V. Conclusion

References

[1] C. Brayton, M. Patel, A. Selvia, and D. Zhang, "e-in-style," 2020. https://github.com/AndrewSelviaSJSU/e-in-style.

[2] C. Brayton, M. Patel, A. Selvia, and D. Zhang, "pytorch-generative-model-collections," 2020. https://github.com/AndrewSelviaSJSU/pytorch-generative-model-collections.