Model Engineering – Dropout Layers

Explainable Machine Learning - Deep Learning Life Cycle

Jonas Amling   Baptiste Bony   Benedikt Marsiske

January 12, 2023

University of Bamberg

Table of contents

Research Question

Research Question and Introduction

Our main Model Engineering challenges:

- Accuracy performance
- Prevent overfitting for the model to be generalizable to new data

Research Question: **Do dropout layers prevent overfitting and what's the ideal position for them in the model?**
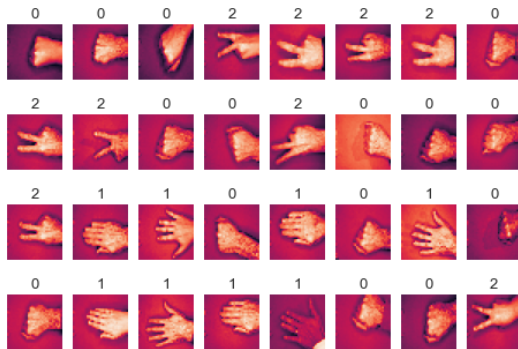
Model Engineering Process
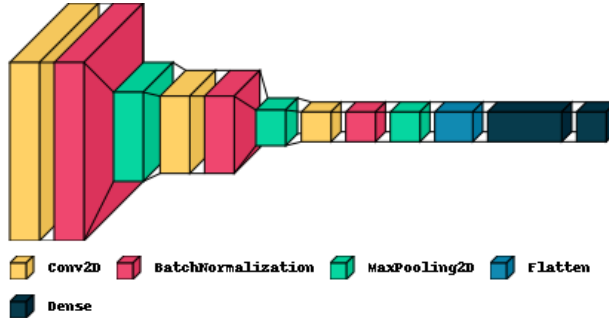
Figure 1: Labeled Training Data from the Green Background Dataset

Figure 2: Visualization of the Convolutional Neural Network without Dropout Layers
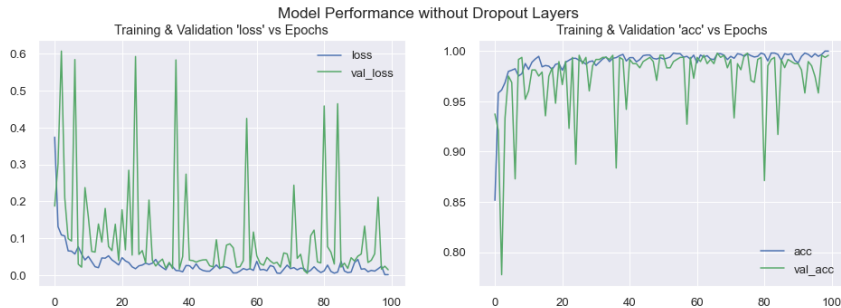
Figure 3: Model Performance without Dropout Layers

(a) Standard Neural Net   (b) After applying dropout.
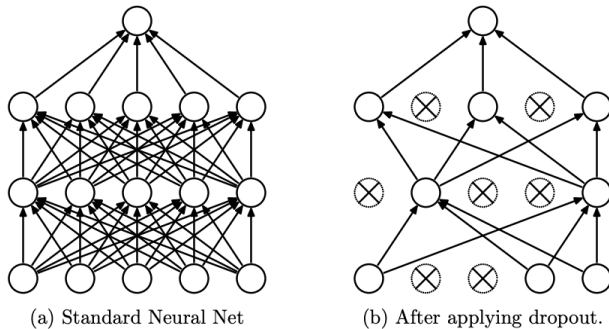
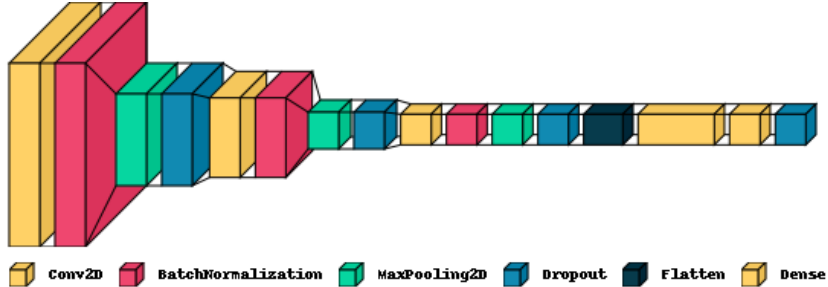**Figure 4:** Scheme explaining the principle of Dropout Layers

Figure 5: Visualization of the Convolutional Neural Network with Dropout Layers
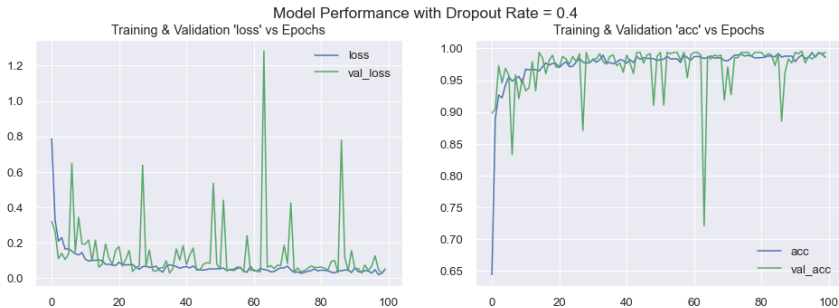
Figure 6: Model Performance with Dropout Rate = 0.4
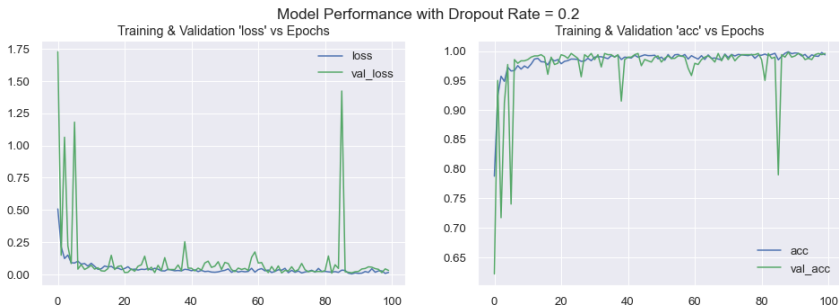
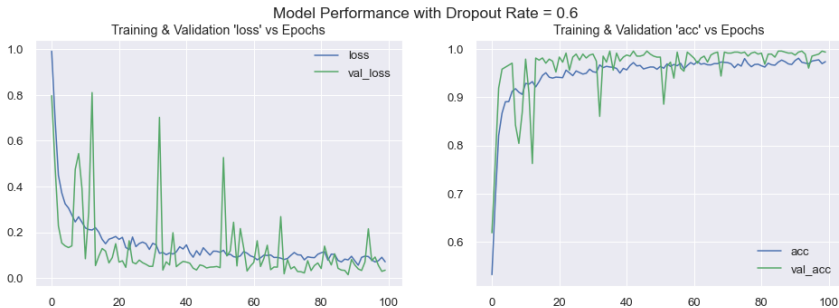**Figure 7:** Model Performance with Dropout Rate = 0.2

Figure 8: Model Performance with Dropout Rate = 0.6

Looking back at Data Engineering

A look back at the previous Research Question regarding Data Engineering

Does removing the background during the image preprocessing phase benefit the image classification task at hand?

Figure 9: Labeled Training Raw Data from the Webcam Dataset
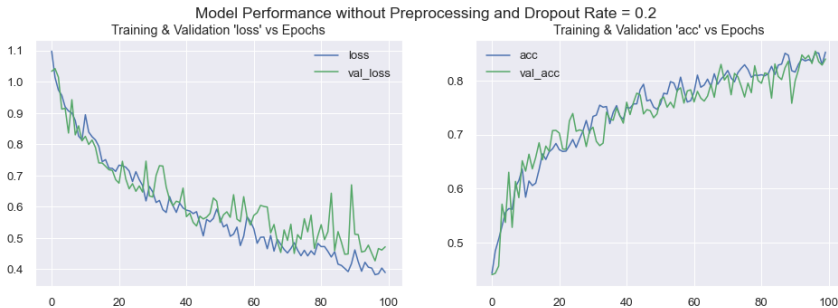
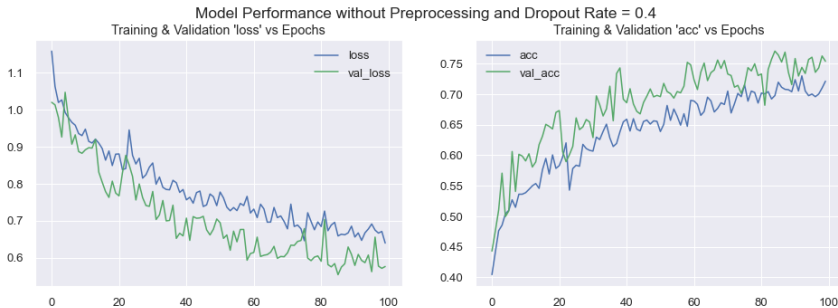**Figure 10:** Model Performance without Preprocessing & Dropout Rate = 0.2

Figure 11: Model Performance without Preprocessing & Dropout Rate = 0.4

Figure 12: Labeled Training Preprocessed Data from the Webcam Dataset
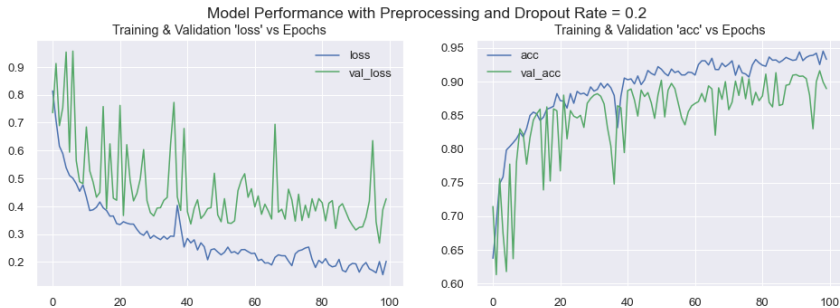
Figure 13: Model Performance with Preprocessing & Dropout Rate = 0.2
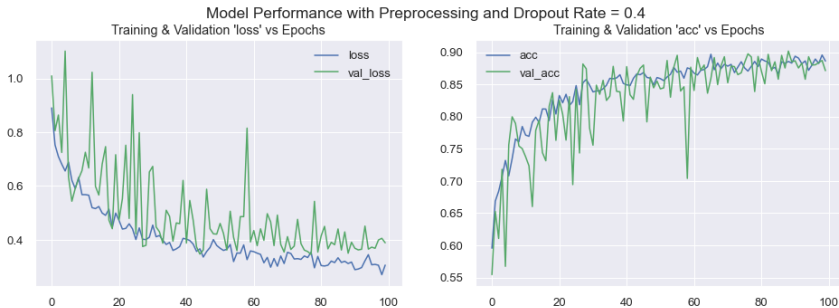
Figure 14: Model Performance with Preprocessing & Dropout Rate = 0.4

Further Considerations

Issues we have not address yet :

- What influence does the optimizer have on the efficiency of the dropout?
- Is it necessary to use batch normalization in addition to dropout?
- How about considering the number of epochs as a parameter and explore early stopping?

Thank you for your attention!
Do you have any questions?