



Hochschule der Medien  
Fakultät für Druck und Medien  
Computer Science and Media

# Generative Data Augmentation

Multi-Agent Diverse Generative Adversarial Networks  
for Generative Data Augmentation

Dissertation submitted for the degree of  
Master of Science

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# Abstract

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## List of Abbreviations

CNN	.....	Convolutional Neural Network
CNNs	.....	Convolutional Neural Networks
DNN	.....	Deep Neural Network
FFN	.....	Feed Forward Netzwerk
GAN	.....	Generative Adversarial Network
GANs	.....	Generative Adversarial Networks
GANsa	.....	Generative Adversarial Networksaaaaaaaaaaaaaaaa
GDA	.....	Generative Data Augmentation
MLP	.....	Multi Layer Perceptron
NN	.....	Neural Netzwerk
SLP	.....	Single Layer Perceptron

# 1 Introduction and Motivation

Generative Adversarial Networks (GANs) [GPAM<sup>+</sup>14] and their variants revolutionized the field of computer vision in the year of 2014, enabling advancements in multiple areas of generating data. From *Text to Image Synthesis* [RAY<sup>+</sup>16], *Image Translation* [IZZE18], *Super Resolution* [LTH<sup>+</sup>17], *Image Inpainting* [PKD<sup>+</sup>16], *Style Transfer* [WWR<sup>+</sup>23] to *Data Augmentation* [SK19], GANs have been used in a variety of applications. The idea of using GANs for Generative Data Augmentation (GDA) is to generate additional training data for machine learning models. This can be especially useful when the amount of available training data is limited. Data augmentation is a common technique in machine learning to artificially increase the size of the training dataset. It is used to improve the generalization of machine learning models and to prevent overfitting. The idea is to create new training examples by applying transformations to the existing training data. These transformations can include rotations, translations, scaling, flipping, cropping, and color changes. The goal is to create new training examples that are similar to the original examples but different enough to improve the generalization of the model. In this thesis, we will investigate the potential of generative data augmentation for the task of image classification. The goal is to improve the performance of a convolutional neural network (CNN) by generating additional training data. The thesis will focus on the following research questions:

**Ziel der Arbeit** The aim of this thesis is to investigate the potential of generative data augmentation for the task of image classification. The goal is to improve the performance of a convolutional neural network (CNN) by generating additional training data. The thesis will focus on the following research questions:

## 2 Related Work

## 3 Preliminary Remarks

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## 4 Theoretical Background



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## 5 Theoretical Background

## 6 Experiments Results

### Motivation

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## 7 Outlook

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## 8 Conclusion

## List of References

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## **Appendix**



# Declaration of Academic Integrity

## Generative Data Augmentation

Multi-Agent Diverse Generative Adversarial Networks for Generative Data Augmentation.

I hereby declare that I have written this thesis independently. I have properly cited all passages that are taken verbatim or in essence from published or unpublished works of others. All sources and aids used in the preparation of this thesis have been fully acknowledged. Furthermore, this thesis has not been submitted, in whole or in substantial part, to any other examination authority for academic credit.

*Signature :*

*Place, Date :*



