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sub-title

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Abstract

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Keywords: Lorem, Ipsum, Dolor, Sit, Amet

Sammanfattning

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List of Papers

A ***A Hierarchical Grocery Store Image Dataset with Visual and Semantic Labels***
Marcus Klasson, Cheng Zhang, Hedvig Kjellström
In *IEEE Winter Conference on Applications of Computer Vision (2019)*

B ***Using Variational Multi-view Learning for Classification of Grocery Items***
Marcus Klasson, Cheng Zhang, Hedvig Kjellström
In *Patterns, Volume 1(8) (2020)*

C ***Learn the Time to Learn: Replay Scheduling for Continual Learning***
Marcus Klasson, Hedvig Kjellström, Cheng Zhang
Under submission

D ***Meta Policy Learning for Replay Scheduling in Continual Learning***
Marcus Klasson, Hedvig Kjellström, Cheng Zhang
Under preparation

Acknowledgements

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Acronyms

List of commonly used acronyms:

AE	Acronym examples
CL	Continual Learning
CNN	Convolutional Neural Network
ML	Machine Learning
RL	Reinforcement Learning
VAE	Variational Autoencoder

Contents

Part I

Overview

Chapter 1

Introduction

Chapter 2

Background

2.1 Machine Learning

Deep Learning

Multi-view Learning

Continual Learning

2.2 Object Recognition Datasets

Chapter 3

Summary of Included Papers

In this chapter, we provide a summaries of the included paper for this thesis. Paper A and B are connected through the Grocery Store dataset where we present the work and then perform an ablation study over which modalities in the dataset that are useful for training classifiers. In Paper C and D, we focus on continual learning (CL) and present a new setting that aims to fill the gap between CL research and real-world problems as well as a method for doing so.

A A Hierarchical Grocery Store Image Dataset with Visual and Semantic Labels

Authors: Marcus Klasson, Cheng Zhang, Hedvig Kjellström.

Summary. We collect a dataset with natural images of raw and refrigerated grocery items taken in grocery stores in Stockholm, Sweden, for evaluating image classification models on a challenging real-world scenario. The data collection was performed by taking photos of groceries with a mobile phone to simulate a scenario of grocery shopping using an assistive vision app. Furthermore, we downloaded iconic images and text descriptions of each grocery item by web-scraping a grocery store website to enhance the dataset with information describing the semantics of each individual item. the items are grouped based on their type, e.g., apple, juice, etc., to provide the dataset with a hierarchical labeling structure.

We provide benchmark results evaluated using pre-trained and fine-tuned CNNs for image classification. Moreover, we take an initial step towards utilizing the rich product information in the dataset by training the classifiers with representations where both natural and iconic images have been combined through a multi-view VAE.

Author Contributions. CZ and HK presented the idea and the data collection procedure for the natural images and web-scraped information. MK performed

the data collection including visiting the grocery stores for taking the natural images and the web-scraping of the grocery store website for iconic images and text descriptions. MK performed all the experiments. All authors contributed to discussing the results and contributed to writing the manuscript.

B Using Variational Multi-view Learning for Classification of Grocery Items

Authors: Marcus Klasson, Cheng Zhang, Hedvig Kjellström.

C Learn the Time to Learn: Replay Scheduling for Continual Learning

Authors: Marcus Klasson, Hedvig Kjellström, Cheng Zhang.

D Meta Policy Learning for Replay Scheduling in Continual Learning

Authors: Marcus Klasson, Hedvig Kjellström, Cheng Zhang.

Summary.

Author Contributions. CZ presented the idea.

Chapter 4

Discussion and Conclusions

4.1 Conclusions

4.2 Future Work

- Video data for object recognition instead of images for making systems easier to use
- Federated Learning for decentralizing model updates
- Uncertainty Quantification - How to make the classifiers trustworthy?

References

[1] *BP Statistical Review of World Energy, ed. 68th, accessed 2019-09-26*. BP, 2019.

[2] F. Chen, *Introduction to Plasma Physics and Controlled Fusion*. Springer, Switzerland, third edition ed., 2016.

Part II

Included Papers

Chapter 5

Paper A

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