

Statistical Methods for Machine Learning Report

Image Classification with Artificial Neural Networks

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Abstract

This document contains a report on the project created by Gabriele Maurina for the exam Statistical Methods for Machine Learning. The report is divided in two parts.

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1 Introduction

2 Experiment 1

2.1 Goal

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3 Experiment 2

3.1 Goal

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3.3 Results

3.4 Reproducing experiment

Table 1: Experiment 1

IS	T	D	W	ZOL	#E	IS	T	D	W	ZOL	#E	IS	T	D	W	ZOL	#E
10	dense	1	32	0.07	25	20	conv	2	8	0.07	15	40	dense	3	32	0.24	13
10	dense	1	64	0.03	20	20	conv	2	16	0.03	15	40	dense	3	64	0.10	7
10	dense	1	96	0.03	23	20	conv	2	24	0.02	15	40	dense	3	96	0.09	6
10	dense	1	128	0.05	13	20	conv	2	32	0.01	10	40	dense	3	128	0.10	6
10	dense	1	160	0.08	12	20	conv	2	40	0.02	11	40	dense	3	160	0.03	8
10	dense	2	32	0.04	20	20	conv	3	8	0.11	12	40	conv	1	8	0.08	8
10	dense	2	64	0.07	8	20	conv	3	16	0.02	12	40	conv	1	16	0.11	13
10	dense	2	96	0.09	9	20	conv	3	24	0.01	9	40	conv	1	24	0.07	5
10	dense	2	128	0.06	10	20	conv	3	32	0.04	5	40	conv	1	32	0.07	12
10	dense	2	160	0.04	10	20	conv	3	40	0.02	8	40	conv	1	40	0.04	14
10	dense	3	32	0.08	11	30	dense	1	32	0.20	15	40	conv	2	8	0.16	15
10	dense	3	64	0.05	17	30	dense	1	64	0.11	19	40	conv	2	16	0.03	9
10	dense	3	96	0.03	11	30	dense	1	96	0.07	14	40	conv	2	24	0.03	9
10	dense	3	128	0.02	12	30	dense	1	128	0.08	14	40	conv	2	32	0.03	7
10	dense	3	160	0.07	9	30	dense	1	160	0.06	10	40	conv	2	40	0.02	7
10	conv	1	8	0.10	16	30	dense	2	32	0.14	12	40	conv	3	8	0.10	11
10	conv	1	16	0.04	20	30	dense	2	64	0.11	8	40	conv	3	16	0.04	9
10	conv	1	24	0.14	9	30	dense	2	96	0.05	8	40	conv	3	24	0.01	14
10	conv	1	32	0.02	16	30	dense	2	128	0.06	12	40	conv	3	32	0.02	21
10	conv	1	40	0.02	14	30	dense	2	160	0.08	4	40	conv	3	40	0.01	18
10	conv	2	8	0.06	23	30	dense	3	32	0.07	14	50	dense	1	32	0.25	7
10	conv	2	16	0.07	8	30	dense	3	64	0.10	6	50	dense	1	64	0.14	11
10	conv	2	24	0.03	7	30	dense	3	96	0.07	7	50	dense	1	96	0.14	11
10	conv	2	32	0.02	9	30	dense	3	128	0.05	9	50	dense	1	128	0.15	8
10	conv	2	40	0.02	11	30	dense	3	160	0.09	4	50	dense	1	160	0.08	13
10	conv	3	8	0.11	21	30	conv	1	8	0.29	21	50	dense	2	32	0.19	8
10	conv	3	16	0.06	9	30	conv	1	16	0.04	9	50	dense	2	64	0.12	6
10	conv	3	24	0.10	6	30	conv	1	24	0.08	4	50	dense	2	96	0.04	9
10	conv	3	32	0.02	13	30	conv	1	32	0.03	10	50	dense	2	128	0.05	8
10	conv	3	40	0.01	11	30	conv	1	40	0.06	4	50	dense	2	160	0.14	3
20	dense	1	32	0.20	17	30	conv	2	8	0.14	10	50	dense	3	32	0.08	7
20	dense	1	64	0.07	11	30	conv	2	16	0.04	9	50	dense	3	64	0.07	12
20	dense	1	96	0.03	16	30	conv	2	24	0.02	7	50	dense	3	96	0.09	9
20	dense	1	128	0.04	12	30	conv	2	32	0.03	14	50	dense	3	128	0.05	5
20	dense	1	160	0.04	15	30	conv	2	40	0.02	7	50	dense	3	160	0.03	7
20	dense	2	32	0.08	9	30	conv	3	8	0.20	15	50	conv	1	8	0.80	8
20	dense	2	64	0.08	7	30	conv	3	16	0.04	8	50	conv	1	16	0.09	14
20	dense	2	96	0.06	12	30	conv	3	24	0.03	7	50	conv	1	24	0.08	5
20	dense	2	128	0.05	10	30	conv	3	32	0.02	9	50	conv	1	32	0.04	10
20	dense	2	160	0.03	11	30	conv	3	40	0.01	12	50	conv	1	40	0.04	19
20	dense	3	32	0.06	16	40	dense	1	32	0.14	11	50	conv	2	8	0.07	15
20	dense	3	64	0.04	10	40	dense	1	64	0.13	8	50	conv	2	16	0.05	12
20	dense	3	96	0.08	10	40	dense	1	96	0.14	14	50	conv	2	24	0.03	7
20	dense	3	128	0.04	8	40	dense	1	128	0.15	14	50	conv	2	32	0.02	15
20	dense	3	160	0.05	7	40	dense	1	160	0.16	9	50	conv	2	40	0.04	5
20	conv	1	8	0.13	24	40	dense	2	32	0.24	12	50	conv	3	8	0.08	10
20	conv	1	16	0.09	17	40	dense	2	64	0.14	10	50	conv	3	16	0.03	13
20	conv	1	24	0.05	8	40	dense	2	96	0.08	6	50	conv	3	24	0.03	16
20	conv	1	32	0.03	14	40	dense	2	128	0.14	4	50	conv	3	32	0.01	32
20	conv	1	40	0.02	11	40	dense	2	160	0.04	9	50	conv	3	40	0.02	15

IS is image size in pixel;

T is the type of model, can be "dense" or "conv";

D is the depth of the model;

W is the width of the model;

ZOL is the Zero-One loss achieved on the test set;

#E is the number of epochs the model was trained for.

Table 2: Experiment 2

IS	T	D	W	ZOL	#E	IS	T	D	W	ZOL	#E	IS	T	D	W	ZOL	#E
10	dense	1	32	0.07	28	20	conv	2	8	0.12	17	40	dense	3	32	0.38	10
10	dense	1	64	0.08	22	20	conv	2	16	0.09	11	40	dense	3	64	0.18	6
10	dense	1	96	0.08	17	20	conv	2	24	0.14	7	40	dense	3	96	0.10	8
10	dense	1	128	0.08	14	20	conv	2	32	0.05	12	40	dense	3	128	0.12	5
10	dense	1	160	0.07	11	20	conv	2	40	0.09	5	40	dense	3	160	0.16	7
10	dense	2	32	0.09	16	20	conv	3	8	0.24	12	40	conv	1	8	0.44	12
10	dense	2	64	0.09	12	20	conv	3	16	0.08	11	40	conv	1	16	0.07	10
10	dense	2	96	0.07	9	20	conv	3	24	0.10	7	40	conv	1	24	0.99	7
10	dense	2	128	0.09	10	20	conv	3	32	0.12	5	40	conv	1	32	0.08	10
10	dense	2	160	0.07	9	20	conv	3	40	0.06	7	40	conv	1	40	0.14	12
10	dense	3	32	0.10	16	30	dense	1	32	0.95	22	40	conv	2	8	0.13	13
10	dense	3	64	0.11	8	30	dense	1	64	0.37	26	40	conv	2	16	0.19	14
10	dense	3	96	0.08	11	30	dense	1	96	0.30	25	40	conv	2	24	0.12	8
10	dense	3	128	0.12	7	30	dense	1	128	0.13	17	40	conv	2	32	0.08	5
10	dense	3	160	0.13	7	30	dense	1	160	0.13	12	40	conv	2	40	0.04	8
10	conv	1	8	0.30	19	30	dense	2	32	0.34	14	40	conv	3	8	0.13	13
10	conv	1	16	0.11	20	30	dense	2	64	0.16	10	40	conv	3	16	0.22	13
10	conv	1	24	0.11	10	30	dense	2	96	0.08	8	40	conv	3	24	0.07	11
10	conv	1	32	0.06	17	30	dense	2	128	0.11	6	40	conv	3	32	0.07	8
10	conv	1	40	0.07	10	30	dense	2	160	0.11	5	40	conv	3	40	0.05	5
10	conv	2	8	0.19	16	30	dense	3	32	0.55	17	50	dense	1	32	0.99	6
10	conv	2	16	0.12	16	30	dense	3	64	0.14	11	50	dense	1	64	0.99	4
10	conv	2	24	0.09	8	30	dense	3	96	0.12	7	50	dense	1	96	0.53	18
10	conv	2	32	0.10	8	30	dense	3	128	0.08	13	50	dense	1	128	0.99	4
10	conv	2	40	0.10	6	30	dense	3	160	0.13	5	50	dense	1	160	0.53	16
10	conv	3	8	0.21	21	30	conv	1	8	0.17	15	50	dense	2	32	0.99	4
10	conv	3	16	0.11	12	30	conv	1	16	0.68	18	50	dense	2	64	0.91	14
10	conv	3	24	0.09	15	30	conv	1	24	0.67	18	50	dense	2	96	0.89	13
10	conv	3	32	0.14	7	30	conv	1	32	0.27	21	50	dense	2	128	0.31	15
10	conv	3	40	0.05	12	30	conv	1	40	0.14	14	50	dense	2	160	0.16	5
20	dense	1	32	0.52	23	30	conv	2	8	0.21	14	50	dense	3	32	0.90	14
20	dense	1	64	0.31	28	30	conv	2	16	0.10	9	50	dense	3	64	0.56	12
20	dense	1	96	0.12	22	30	conv	2	24	0.04	9	50	dense	3	96	0.16	7
20	dense	1	128	0.09	14	30	conv	2	32	0.07	6	50	dense	3	128	0.14	5
20	dense	1	160	0.09	12	30	conv	2	40	0.07	8	50	dense	3	160	0.15	4
20	dense	2	32	0.31	13	30	conv	3	8	0.40	30	50	conv	1	8	0.99	6
20	dense	2	64	0.08	8	30	conv	3	16	0.13	8	50	conv	1	16	0.39	13
20	dense	2	96	0.09	11	30	conv	3	24	0.08	7	50	conv	1	24	0.41	12
20	dense	2	128	0.10	10	30	conv	3	32	0.09	5	50	conv	1	32	0.21	17
20	dense	2	160	0.14	6	30	conv	3	40	0.06	9	50	conv	1	40	0.15	8
20	dense	3	32	0.13	16	40	dense	1	32	0.94	31	50	conv	2	8	0.39	23
20	dense	3	64	0.11	9	40	dense	1	64	0.81	20	50	conv	2	16	0.27	15
20	dense	3	96	0.12	4	40	dense	1	96	0.30	27	50	conv	2	24	0.22	17
20	dense	3	128	0.09	8	40	dense	1	128	0.41	13	50	conv	2	32	0.11	6
20	dense	3	160	0.11	4	40	dense	1	160	0.24	13	50	conv	2	40	0.06	9
20	conv	1	8	0.80	28	40	dense	2	32	0.99	10	50	conv	3	8	0.49	14
20	conv	1	16	0.37	28	40	dense	2	64	0.27	14	50	conv	3	16	0.10	6
20	conv	1	24	0.10	10	40	dense	2	96	0.11	9	50	conv	3	24	0.07	5
20	conv	1	32	0.11	7	40	dense	2	128	0.11	12	50	conv	3	32	0.07	5
20	conv	1	40	0.07	6	40	dense	2	160	0.18	4	50	conv	3	40	0.05	6

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T is the type of model, can be "dense" or "conv";

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