CIFAR-10 – Object Recognition in Images: Identify the subject of 300,000 labeled images

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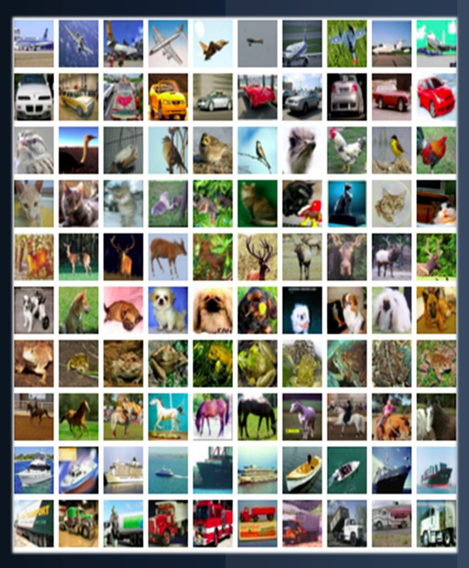
Abstract

This project aims to predict CIFAR-10 dataset which consists of 300,000 32*32 color images with one of 10 object classes.



Dataset[1]

10 label classes :
- Airplane
- Automobile
- Bird
- Cat
- Deer
- Dog
- Frog
- Horse
- Ship
- Truck

Training data: 50,000 labeled images
Testing data: 300,000 unlabeled images.

Preprocessing

Gary-Scaled

Training set= [2][Number][Pixel]

Object Serialization

Data_Gray.pkl

RGB

Training set= [2][Number][[R][G][B]]

Object Serialization

Data_RGB.pkl

Deep Learning Algorithms[2]

Tool: Theano[3]

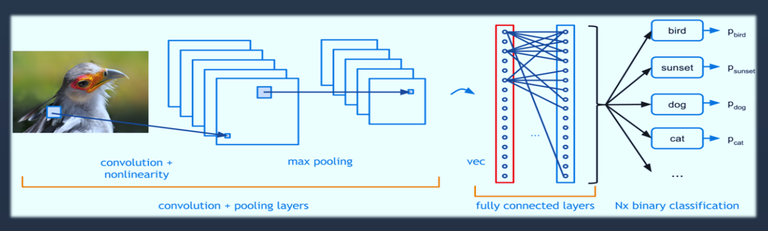
Logistic Regression[4]

$$J(\theta) = \frac{1}{m}\sum_{i=1}^{m} \mathrm{Cost}(h_\theta(x^{(i)}), y^{(i)})$$
$$= -\frac{1}{m}[\sum_{i=1}^{m} y^{(i)} \log h_\theta(x^{(i)}) + (1 - y^{(i)}) \log (1 - h_\theta(x^{(i)}))]$$

Output $h_\theta(x) = \frac{1}{1+e^{-\theta^T x}}$

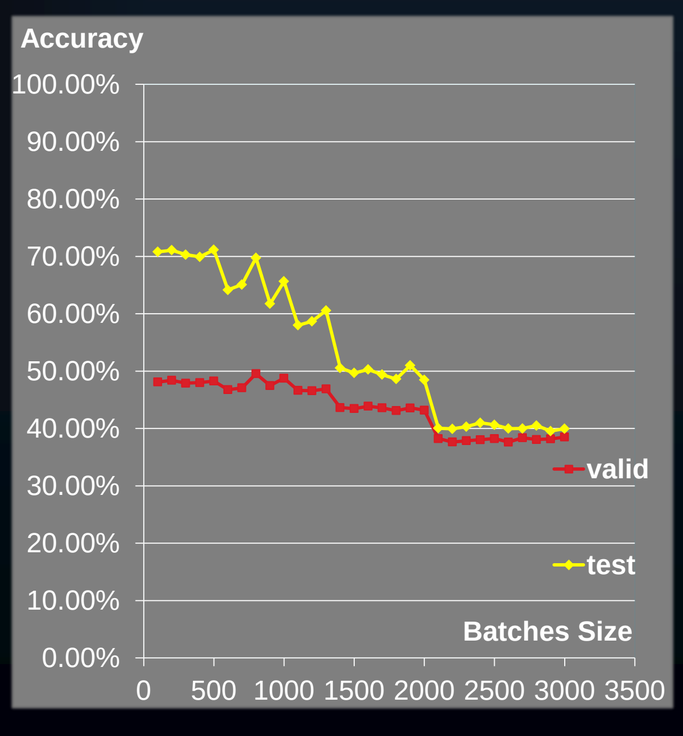
Data	Train	Valid	Test	Accuracy	Time
Gray	30,000	10,000	10,000	26%	32.2s
Gray	40,000	10,000	300,000	10.08%	23.55m

Convolutional Neural Networks[5]

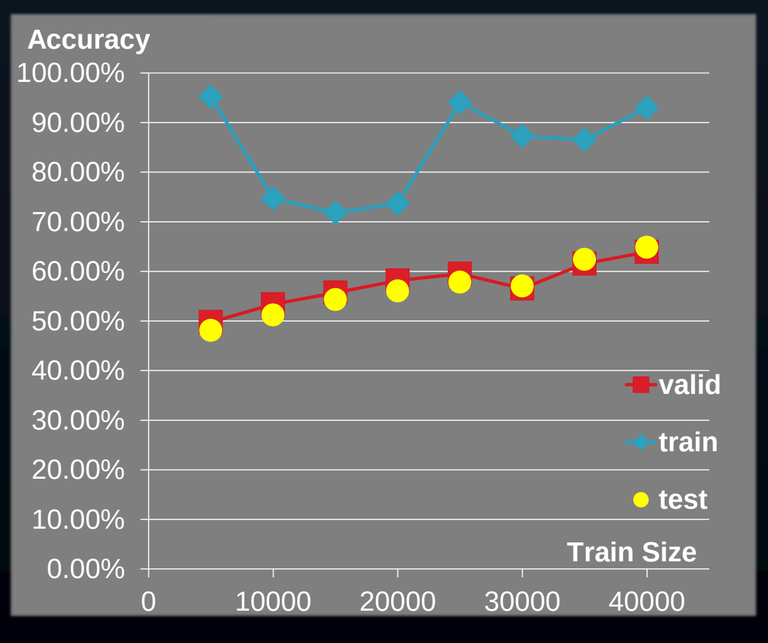


Data	Train	Valid	Test	Accuracy	Time
Gray	30,000	10,000	10,000	58.2%	814.42m
Gray	40,000	10,000	300,000	59%	1107.51m
RGB	30,000	10,000	10,000	65.3%	907.1m
RGB	40,000	10,000	300,000	64.87%	1891m

Different Batch Sizes
- Training data: 3000
- Validation data: 3000
- Testing data: 9000



Different Training Sizes
- Training : Validation: Testing = 4 : 1 : 4

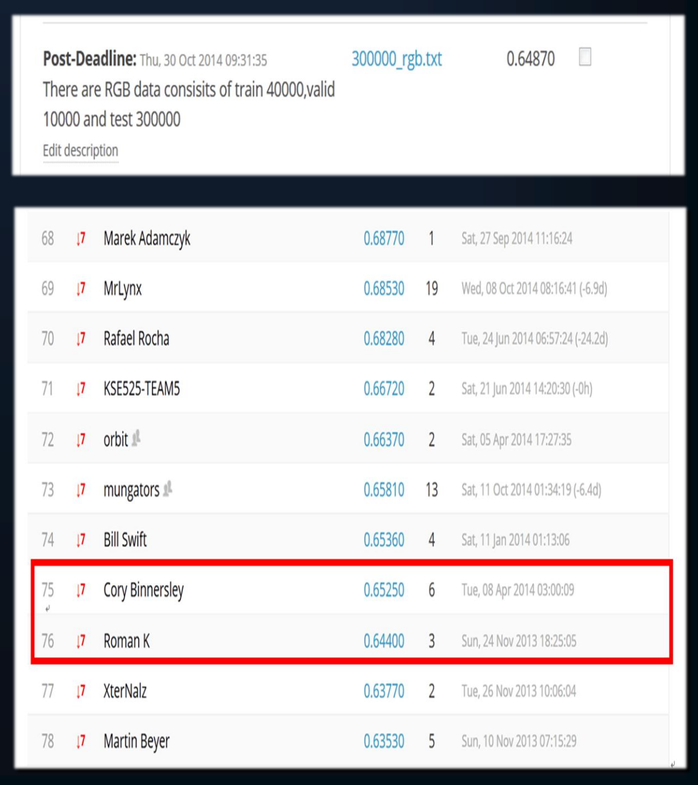


Evaluation

1. *TP* =number of true positives
2. *TN* =number of true negatives
3. *P* =total positive
4. *N* =total negative

Accuracy=$\frac{(TP+TN)}{(P+N)}$

Leaderboard



Post-Deadline: Thu, 30 Oct 2014 09:31:35 — 300000_rgb.txt — 0.64870
There are RGB data consisits of train 40000,valid 10000 and test 300000
Edit description

68	↓7	Marek Adamczyk	0.68770	1	Sat, 27 Sep 2014 11:16:24
69	↓7	MrLynx	0.68530	19	Wed, 08 Oct 2014 08:16:41 (-6.9d)
70	↓7	Rafael Rocha	0.68280	4	Tue, 24 Jun 2014 06:57:24 (-24.2d)
71	↓7	KSE525-TEAM5	0.66720	2	Sat, 21 Jun 2014 14:20:30 (-0h)
72	↓7	orbit	0.66370	2	Sat, 05 Apr 2014 17:27:35
73	↓7	mungators	0.65810	13	Sat, 11 Oct 2014 01:34:19 (-6.4d)
74	↓7	Bill Swift	0.65360	4	Sat, 11 Jan 2014 01:13:06
75	↓7	Cory Binnersley	0.65250	6	Tue, 08 Apr 2014 03:00:09
76	↓7	Roman K	0.64400	3	Sun, 24 Nov 2013 18:25:05
77	↓7	XterNalz	0.63770	2	Tue, 26 Nov 2013 10:06:04
78	↓7	Martin Beyer	0.63530	5	Sun, 10 Nov 2013 07:15:29

[1] http://www.kaggle.com/c/cifar-10/data
[2] http://www.deeplearning.net/tutorial/contents.html
[3] http://deeplearning.net/software/theano/
[4] https://www.coursera.org/course/ml
[5] https://flickrcode.files.wordpress.com/2014/10/conv-net2.png