

# Lab Meeting Presentation-5

June 27, 2017

Prerit Gupta  
Summer Intern

Ravi Kiran Sarvadevabhatla  
PhD Student

# Objective

- To plot the top 5 preferred and least 5 preferred classes for every layer of Alexnet & VGG-19 as a result from histogram plots of the maximum activated image data collected from Yosinski's toolbox.

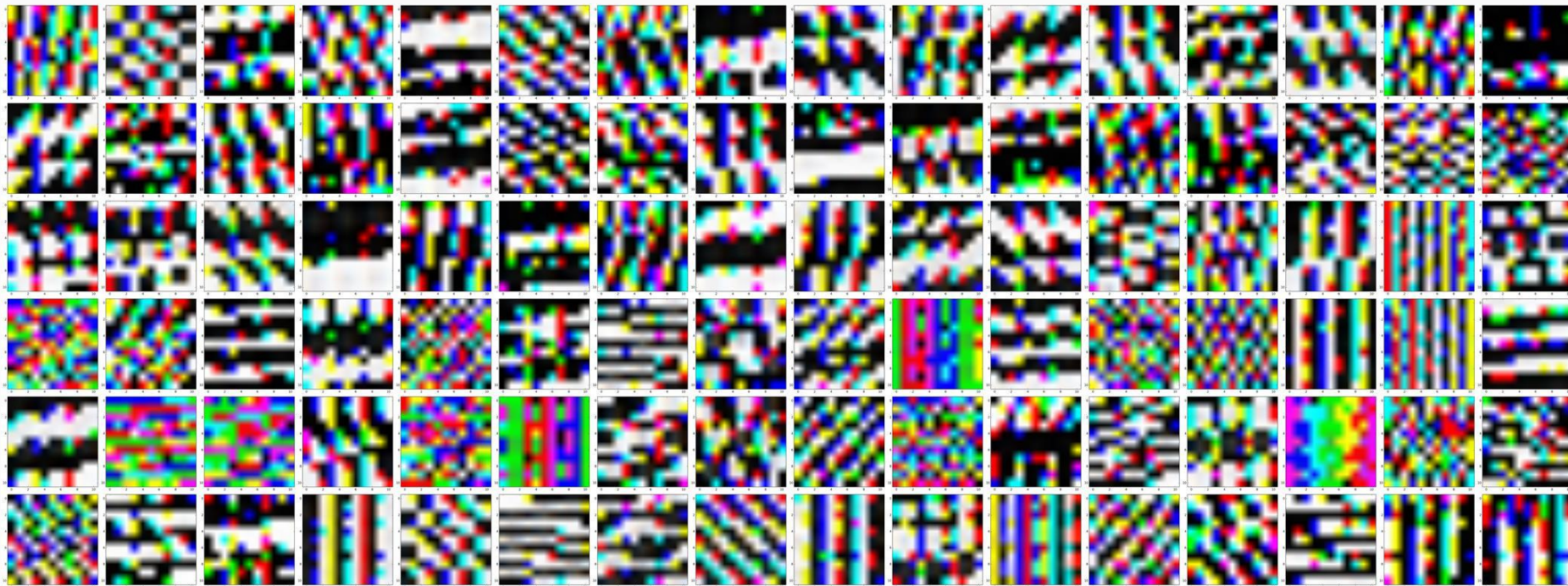
# Characterizing Visualizations in layers of Alexnet network

(Training of Alexnet uses mean file of sketch dataset)

# Characterizing Visualizations of Layer 1 filter weights

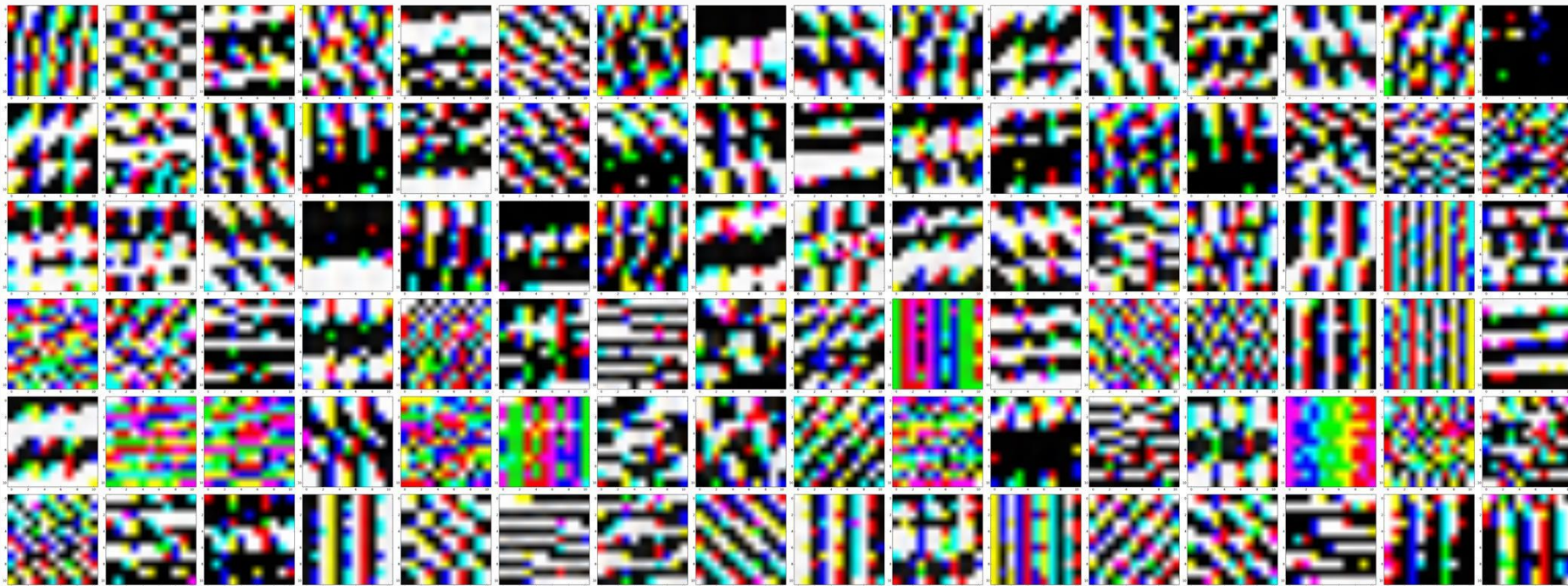
(Comparing it before and after fine tuning )

11 x 11 Convolutional Layer 1 filter weights before fine tuning (bvlc\_alexnet)

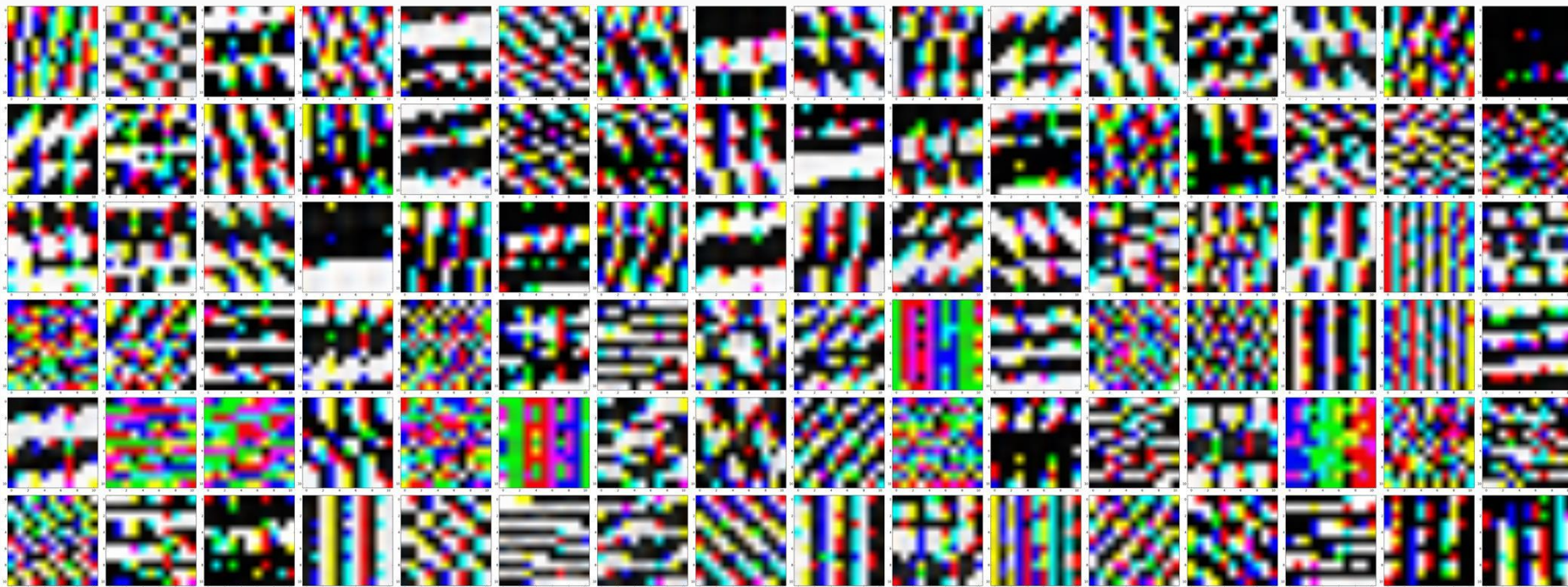




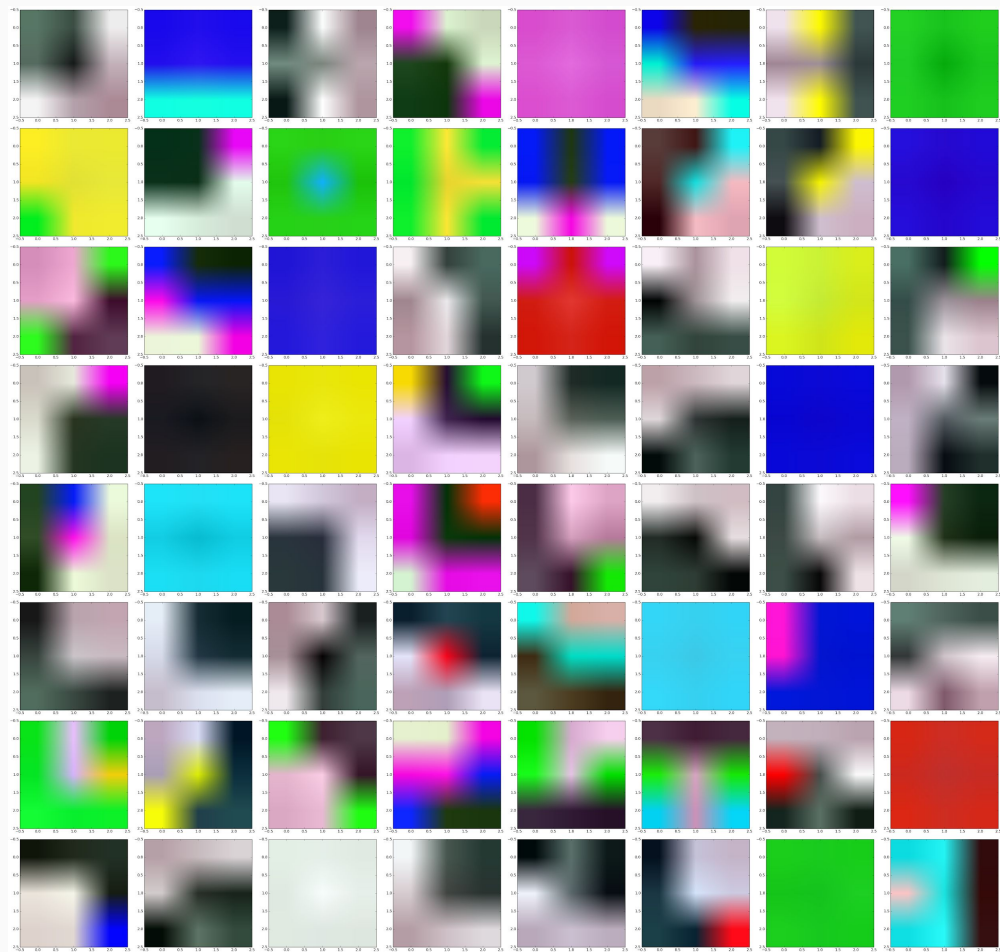
11 x 11 Convolutional Layer 1 filter weights after fine tuning (bvlc-alexnet)



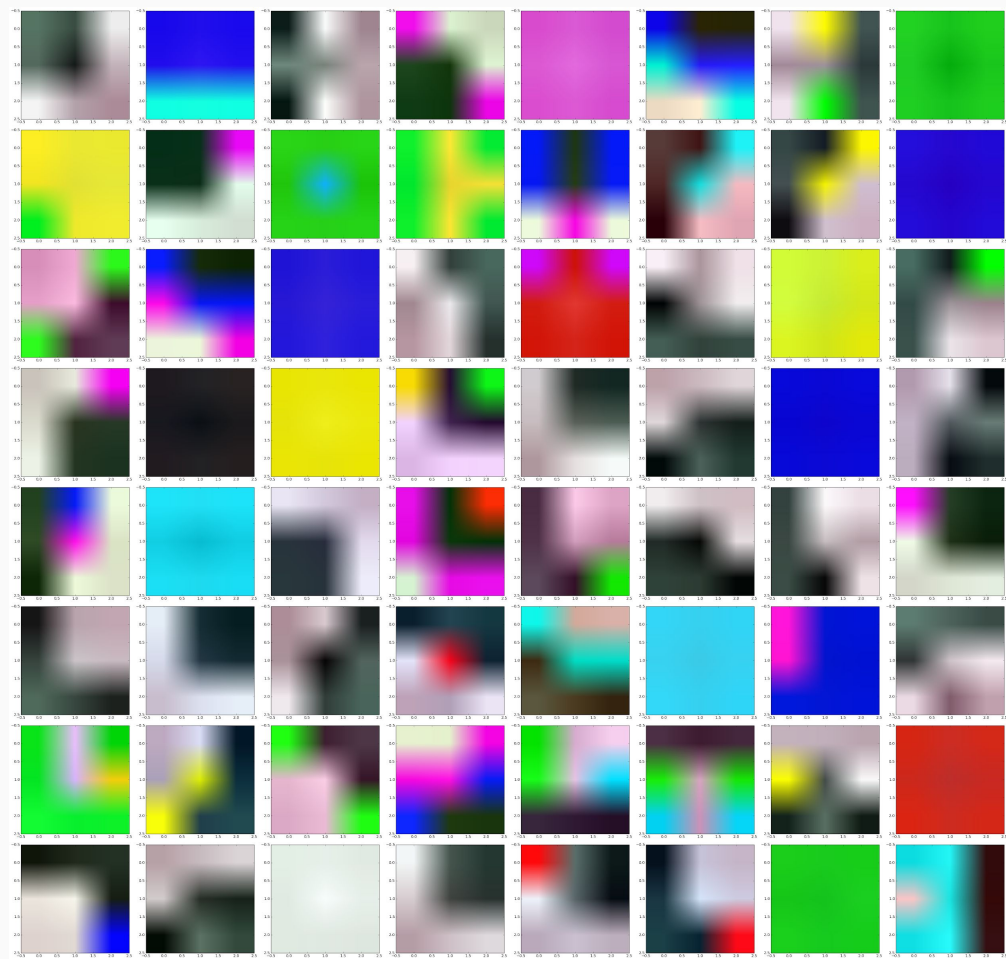
## 11 x 11 Convolutional Layer 1 filter weights











	Alexnet + GRU		Alexnet + LSTM	
	Categories	Accuracy(%)	Categories	Accuracy(%)
Top 3	envelope	100	apple	100
	apple	100	ear	100
	wineglass	98.61	wineglass	98.61
Mid 3	face	76.27	butterfly	76.62
	suitcase	76.12	toothbrush	75.76
	car (sedan)	76.06	axe	75.71
Bottom 3	santa claus	20.59	lion	22.39
	pig	24.19	scorpion	22.41
	cow	25.35	cow	26.76

First stroke sketches : 10813    Accuracy : 3.89%  
Second stroke sketches: 10652    Accuracy: 12.89%

LSTM test accuracy: 65.4%  
GRU test accuracy: 66.34%

# Conclusion

- Filters in lower level layers are sensitive to edges, patterns, corners, lines and certain localized geometries present in sketches & in higher level layers are sensitive to certain classes & some specific objects in sketches.
- Deconvolution of the filters in VGG-19 shows more sharp input space activations than filters in the Alexnet.
- This comes in coherence with difference in performance where Alexnet gives 73% accuracy & VGG-19 gives 87% on test dataset.
- Convolutional layers are selective to classes with high stroke density.



# For next week ...

- Extending the usage of Yosinski's Deep Visualization Toolbox to analyze sketch CNNs fine-tuned for sketches ( GoogLeNet, ResNet)
- Visualizing & Understanding the hidden states & cell states in Alexnet + GRU Architecture to know which neurons learn the most to give the correct category label.

# Thank You

