

Plant Recognition using Convolutional Neural Networks

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Overview

- Problem Statement
- Related Works
- Analysis of Dataset
- Implementation
- Future works

Problem Statement



From an organ to the entire

Problem Statement



Analysis of Dataset

Year: 2013



2014



2015

Species: 250



500



1000

Pictures: 26077



60000



113205

Analysis of Dataset



5476



25972



28225



7720

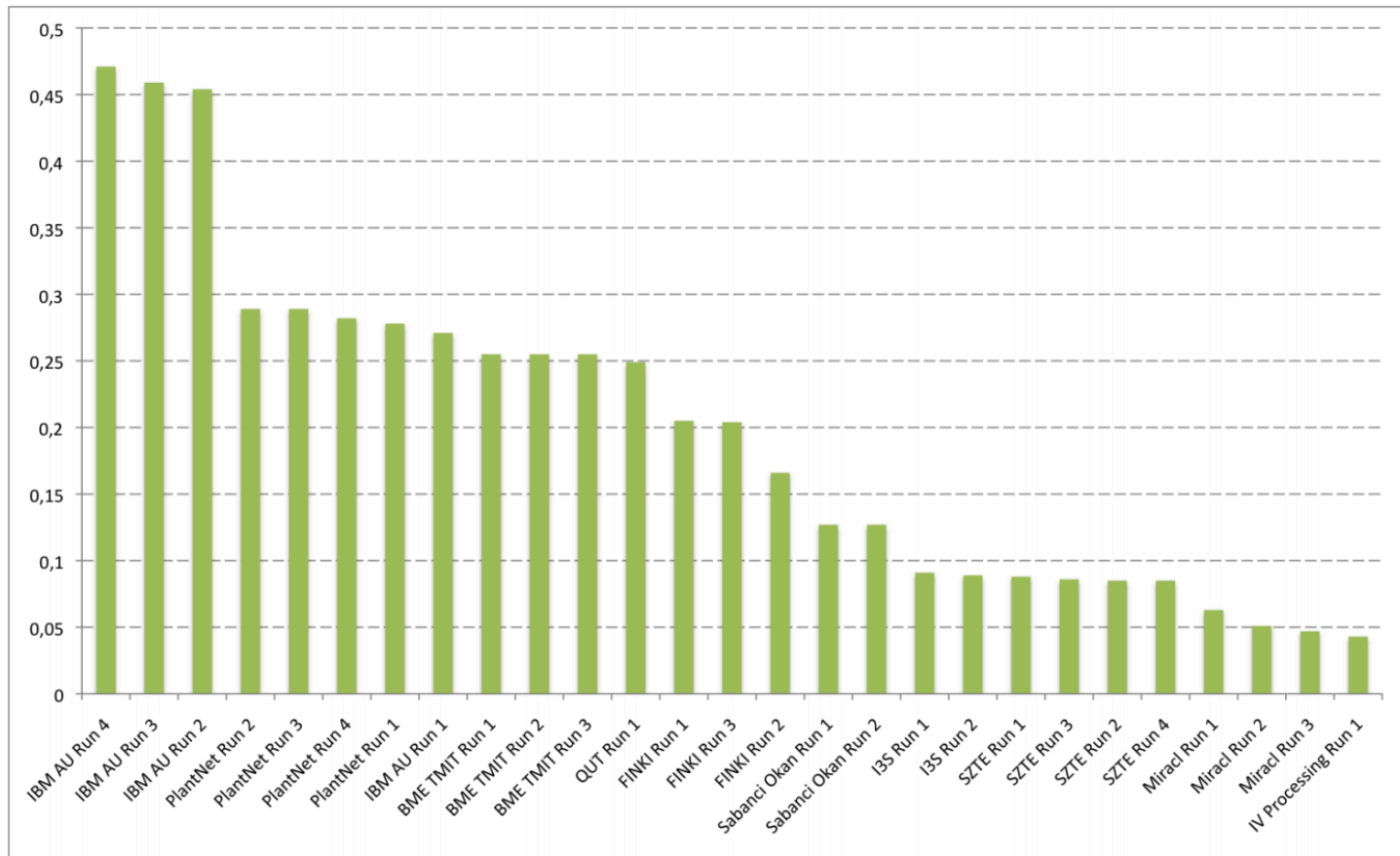


16235



8130

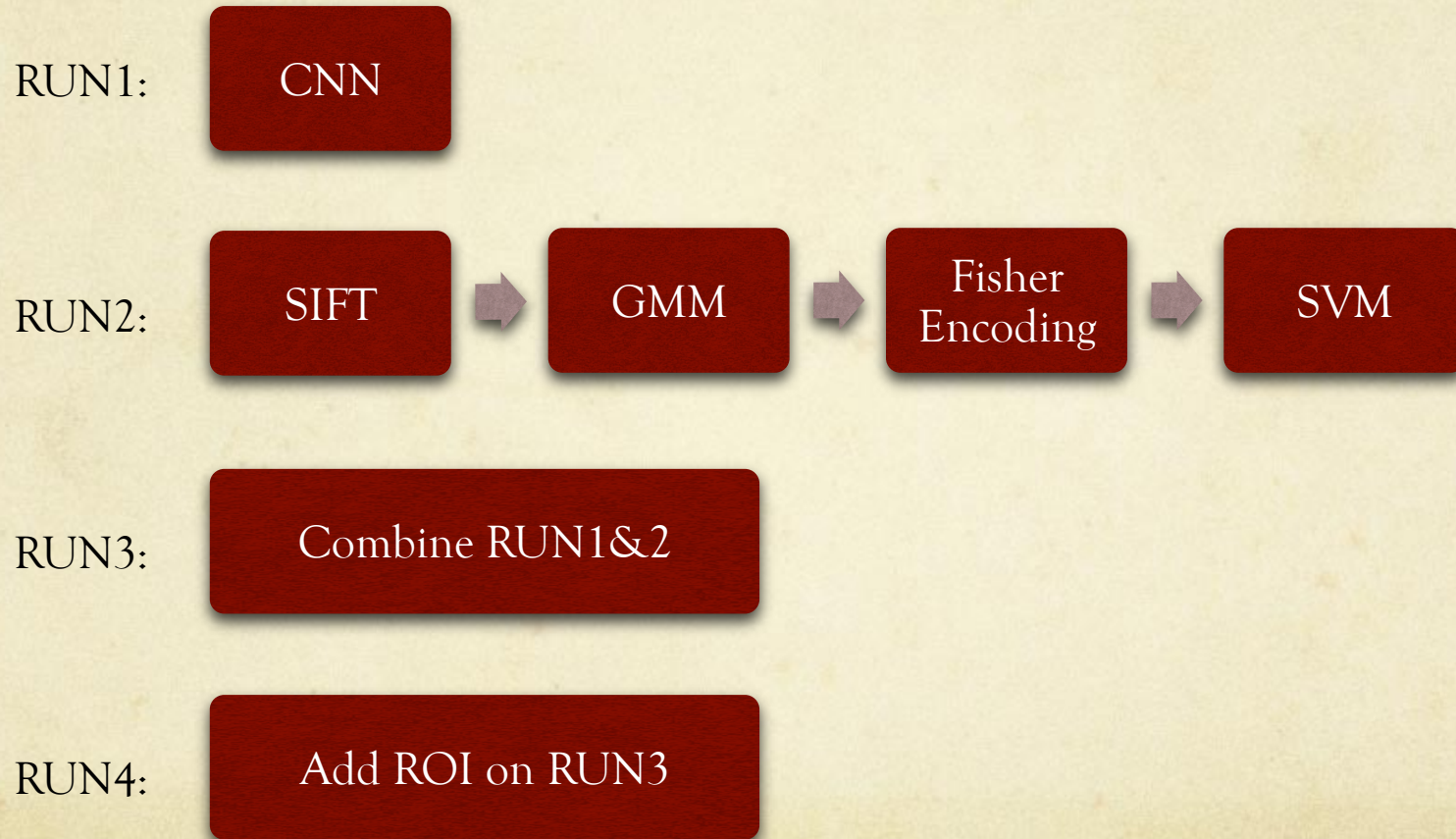
Related Works



Related Works

- IBM Team
- Pl@ntNet Team
- FINKI Team

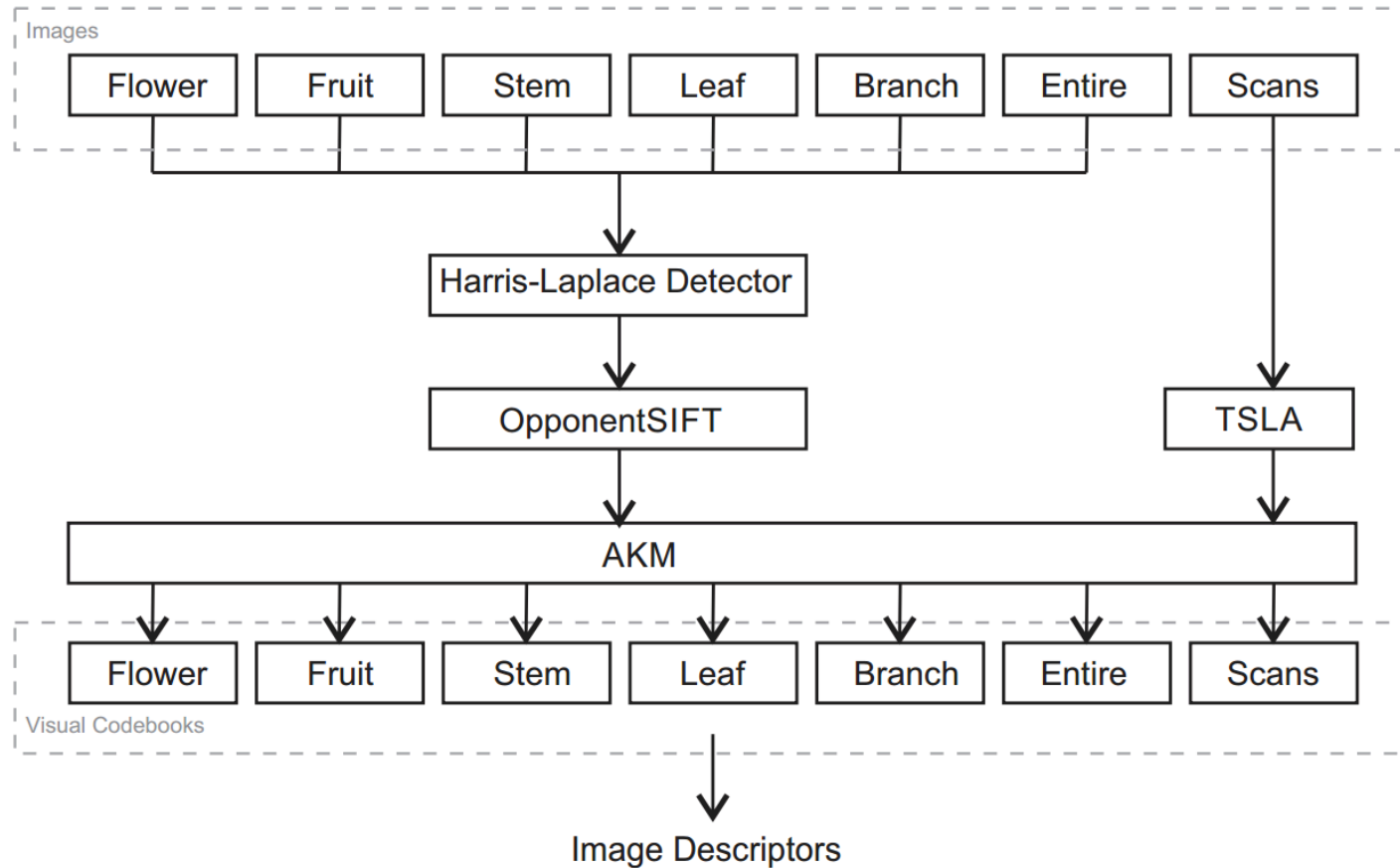
IBM Team



Pl@nt Team

	SURF	Fourier	EOH	riLbp	wRGB	wLUV	HSV	SEFH	DFH	Shapes6
Branch			✓	✓	✓	✓				
Entire	✓		✓	✓	✓	✓				
Flower	✓	✓	✓	✓	✓	✓	✓			
Fruit	✓			✓	✓	✓				
Leaf	✓		✓	✓		✓	✓			
Scan								✓	✓	✓
Stem	✓	✓		✓	✓	✓				

FINKI Team



Implementation

- Crop the image:
- 300×400 on average $\rightarrow 128 \times 128$
- 60 GB \rightarrow 18 GB



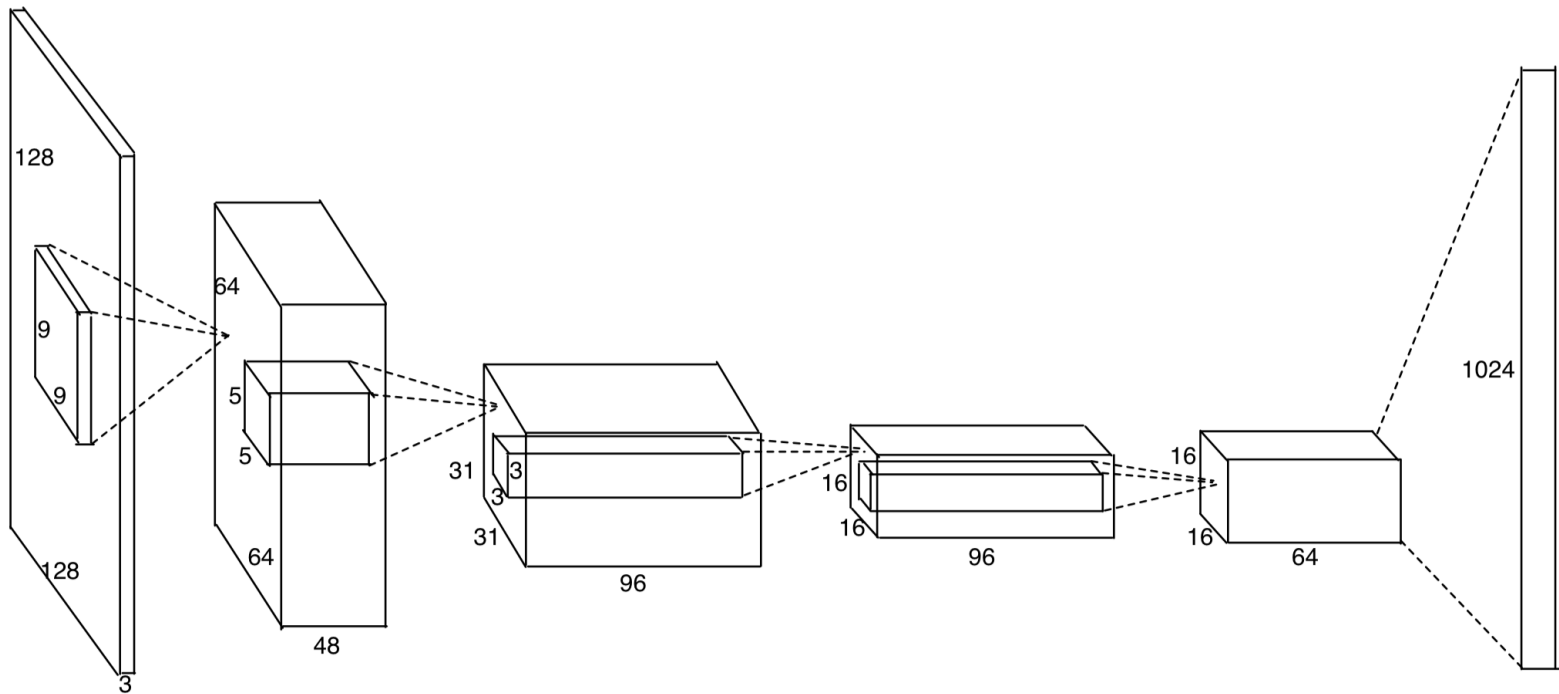
Hyper parameters

- Network Shape:
- Input: $(128, 128) * 3$
- Conv: $(64, 64) * 48$
- Conv: $(31, 31) * 64$
- Conv: $(16, 16) * 96$
- Conv: $(16, 16) * 64$
- Full-con: 1024 (num_pieces: 5)
- Softmax Output: 1000

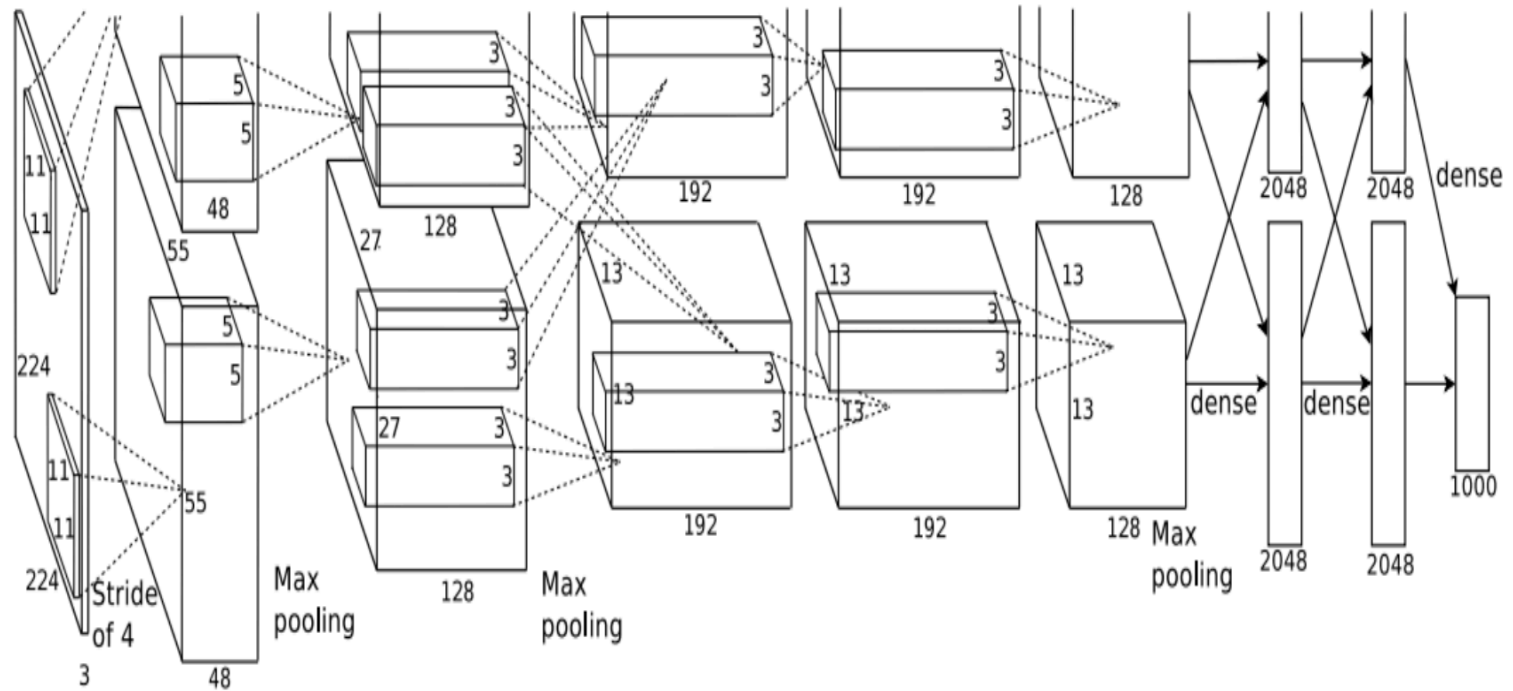
Hyper parameters

- Kernel Shape: 9×9 , 5×5 , 3×3 , 3×3
- Max Pooling: 2×2 , 4×4 , 2×2 , no pooling
- Learning Rate: 0.005
- Linear Decay: 0.01 over 250 Epoch
- Learning rate for conv layers: scale 0.05
- Momentum: 0.5
- L2 norm: Weight 0.00005 on each layer

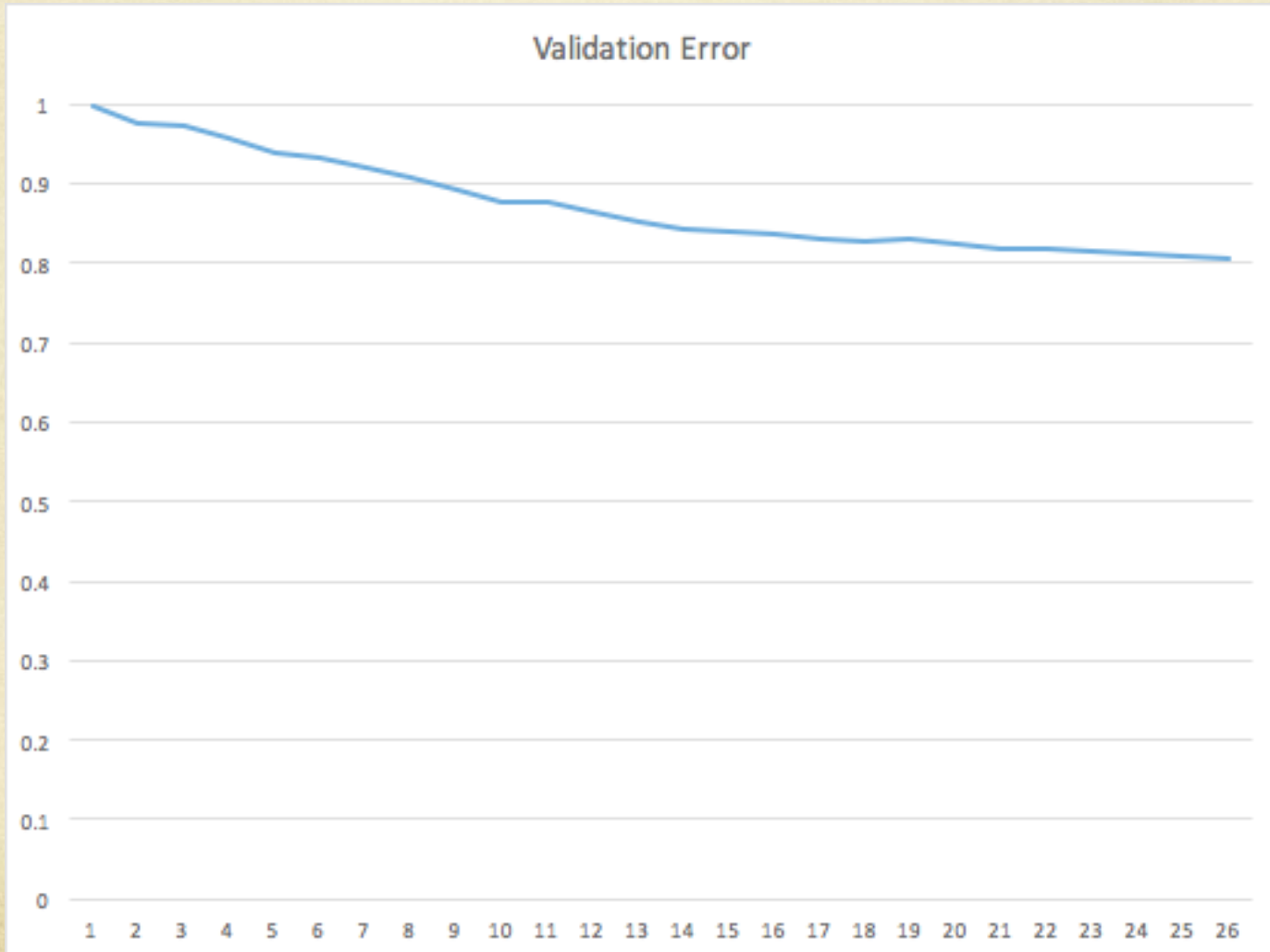
Our CNN



IBM CNN



- Best validation precision: 19.31%



How is 19% ?



How is 19% ?

- The metrics of the competition:
- r = rank of the ground truth in the top n predictions
- Score = Average ($1/r$)

Some problems

- “Deep Learning is easy! Just buy chips and tune parameters!”
- It’s hard to make it work.
- I ain’t got no chips !!!
- Memory certainly not big enough for the data.
- If we don’t crop the images, the hard drive won’t fit.
- 1h/epoch with 4 conv layers.
- GPU memory not enough.

Some problems

- Is the data enough?
- 60 pics / class
- 10 pics / (class, view)

Future work

- Drop out
- Complete the testing run and compete in the contest

Thanks