UNIVERSITAT POLITÈCNICA
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Barcelona, 3rd July 2019

Snake Species Identification Challenge

Deep Learning for Vision Seminar

Marina Alonso

Baseline

- **DenseNet-121** pertained on ImageNet fine-tuned for snake species identification.

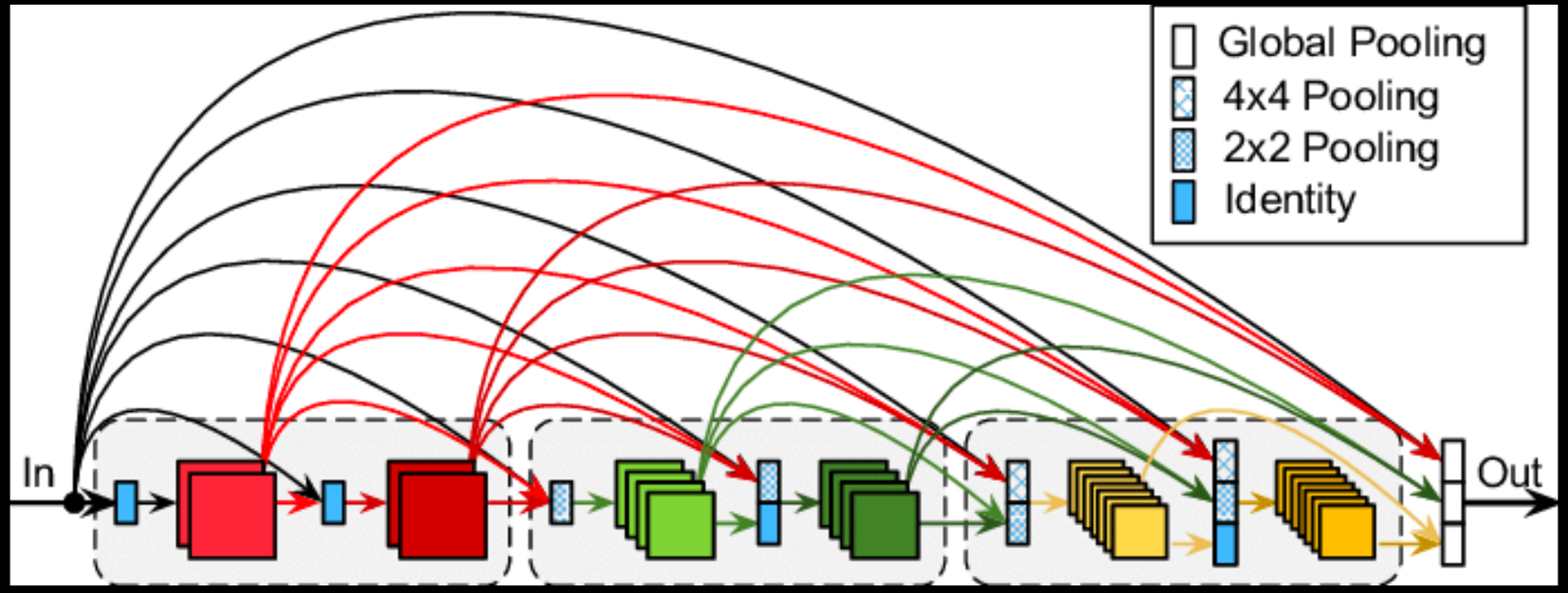
Model	Acc@1	Acc@5
DenseNet-121	**82.858**	92.290
DenseNet-161	**82.736**	93.798
DenseNet-169	**82.693**	93.150
DenseNet-201	**82.566**	93.660
Inception-v1	**81.320**	89.600
Inception-v2	81.304	91.800
Inception-v3	80.400	93.900
Inception-v4	80.200	95.200
Inception-v4	80.170	94.930
Inception-ResNet-v2	80.060	**95.300**
Inception-ResNet-v2	78.888	**95.234**

Top scoring networks on the ImageNet challenge
https://github.com/Lextal/SotA-CV/blob/master/content/image_classification.md

Baseline

- DenseNet jointly created by *Cornwell University*, *Tsinghua University* and *Facebook AI Research*. Received the **2017 CVPR Best Paper Award**.

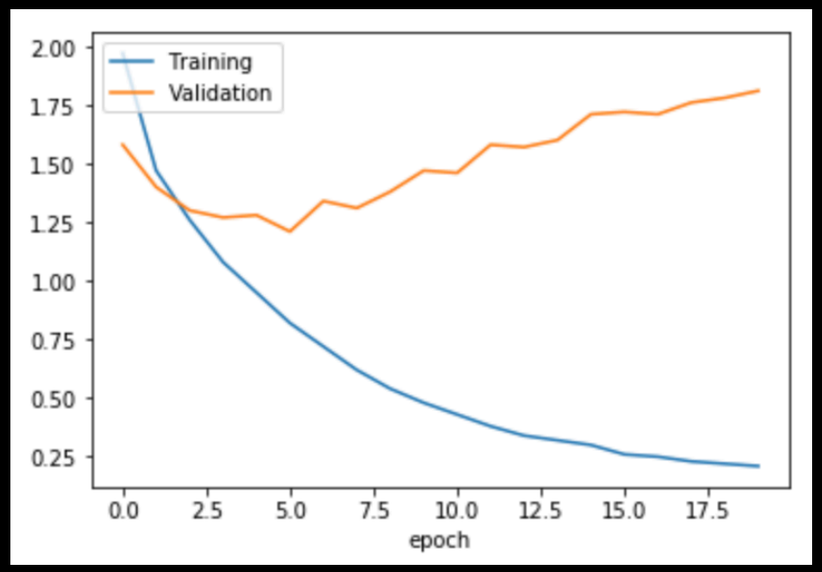
- **INTUITION:** Each layer obtains additional inputs from all preceding layers and passes its own feature maps to all subsequent layers using concatenation.



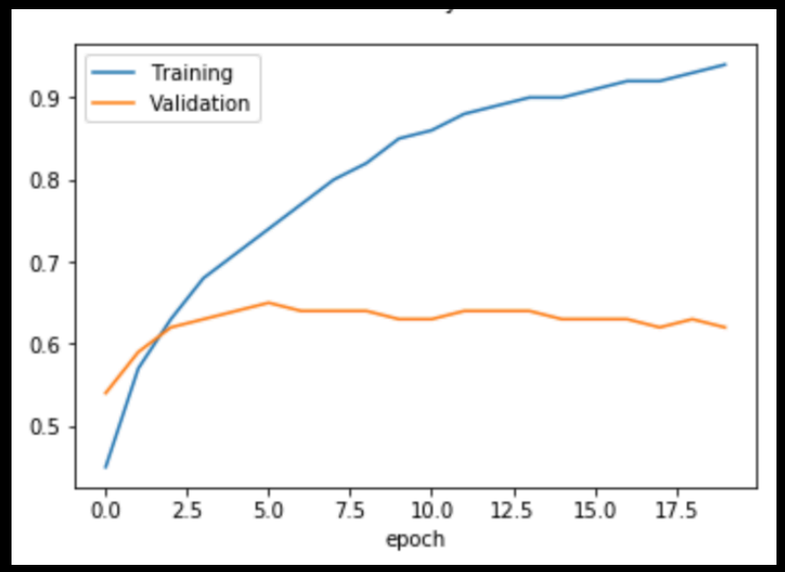
Huang, Liu, van der Maaten, Weinberger
Densely Connected Convolutional Networks CVPR 2017

Baseline

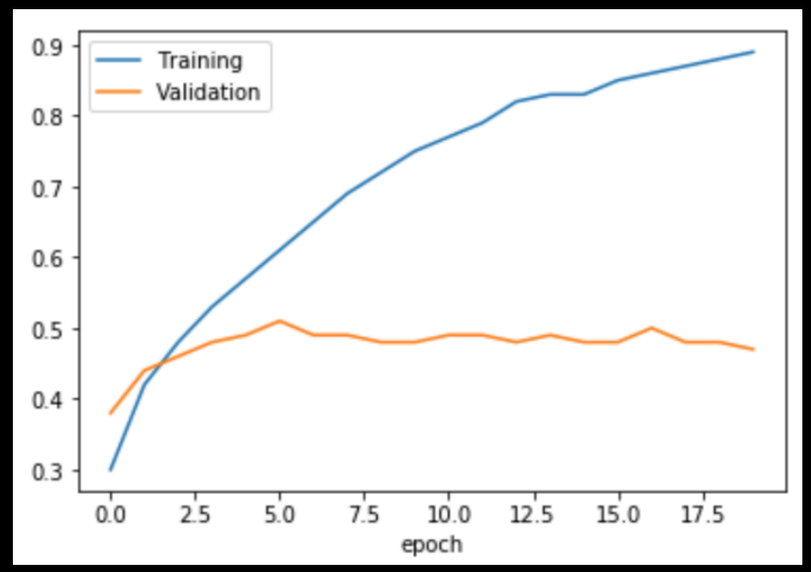
Loss



Accuracy



F1-Score

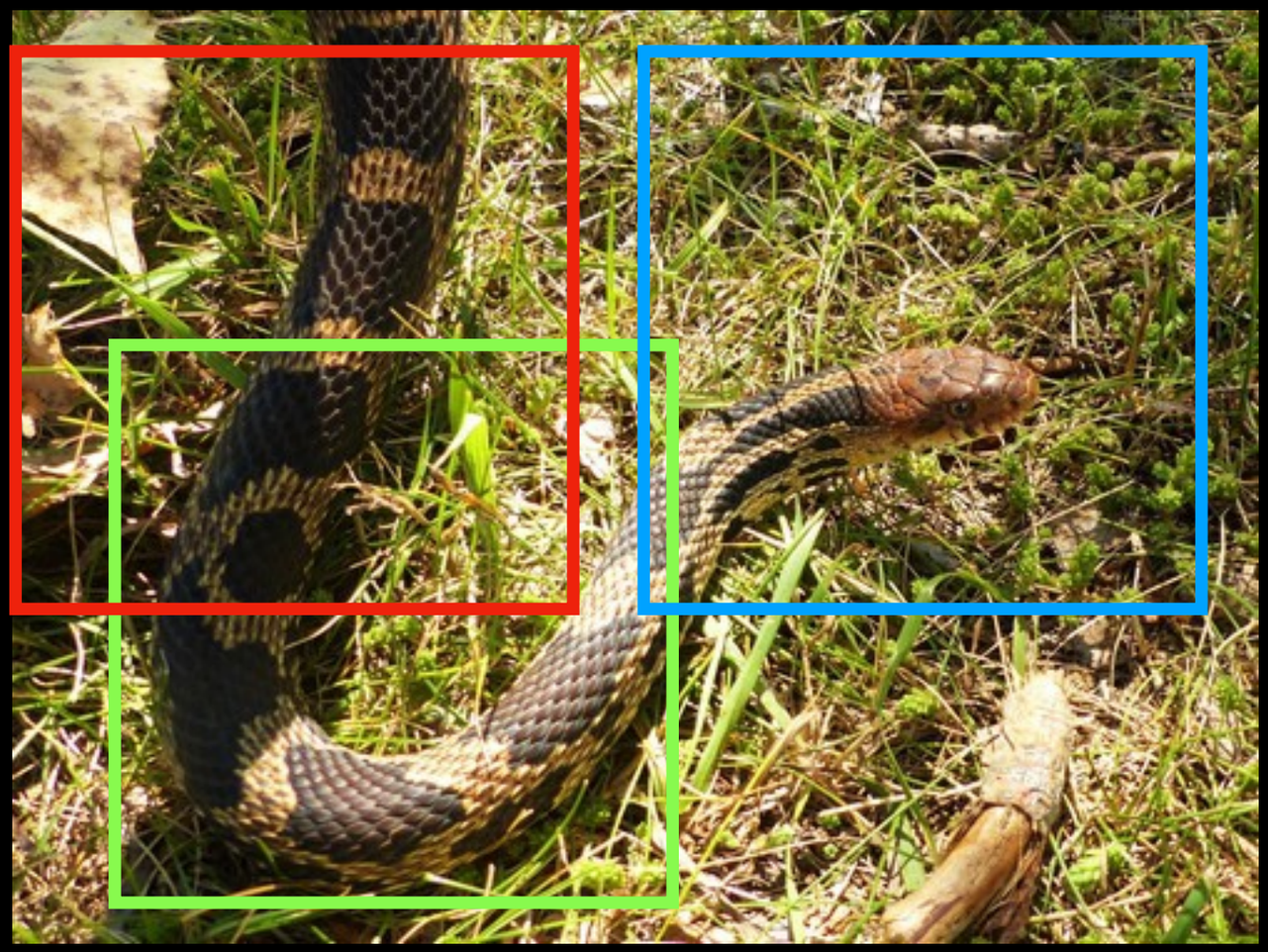


- Best Validation **Accuracy**: **65.18%**
- Best Validation **F-Score**: **50.58%**

Data Augmentation

Original Image

Data Augmentation

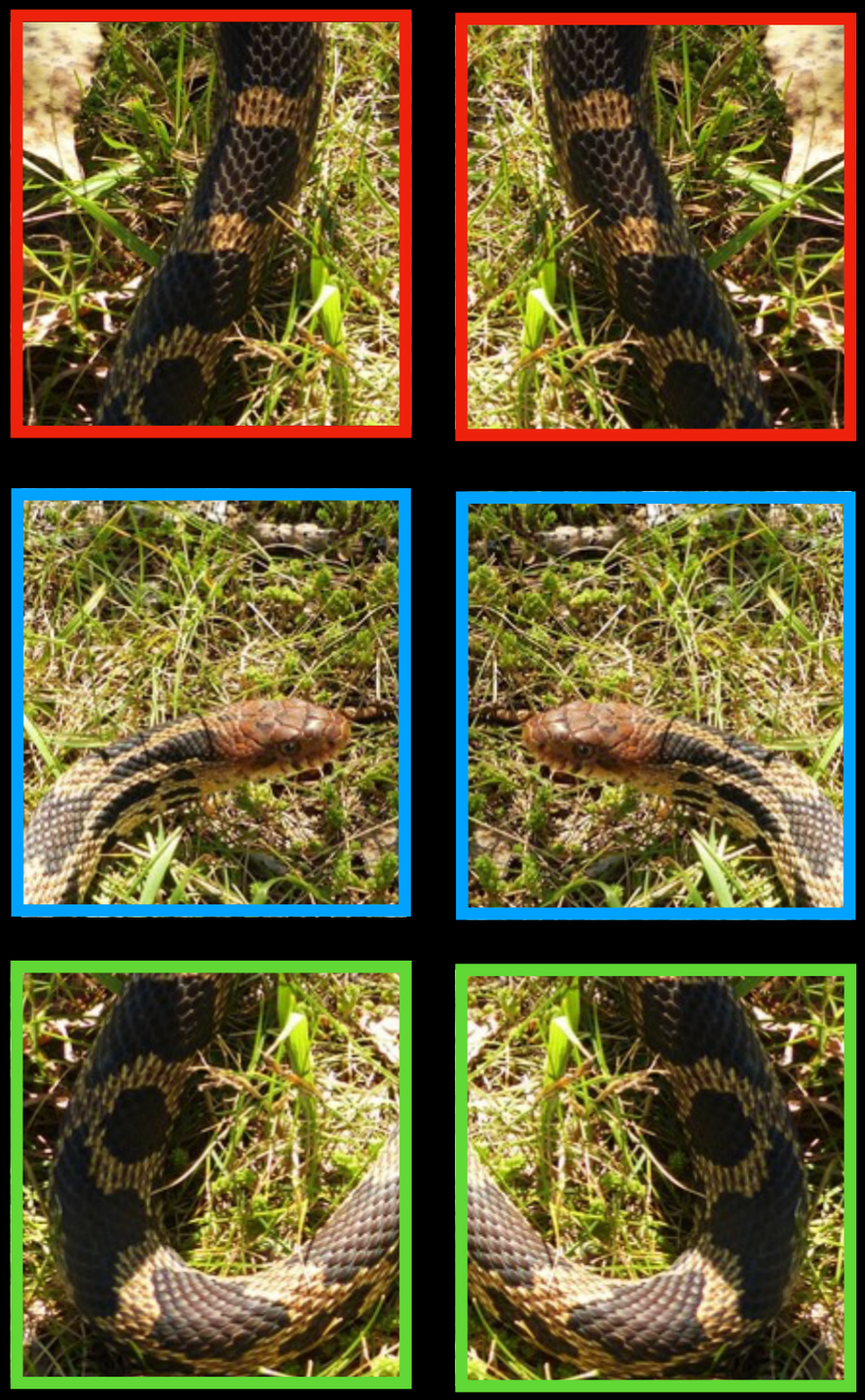


Random 224x224 crops

Data Augmentation

Random 224x224 crops

Data Augmentation



HORIZONTALLY FLIPPED
Random 224x224 crops

Data Augmentation

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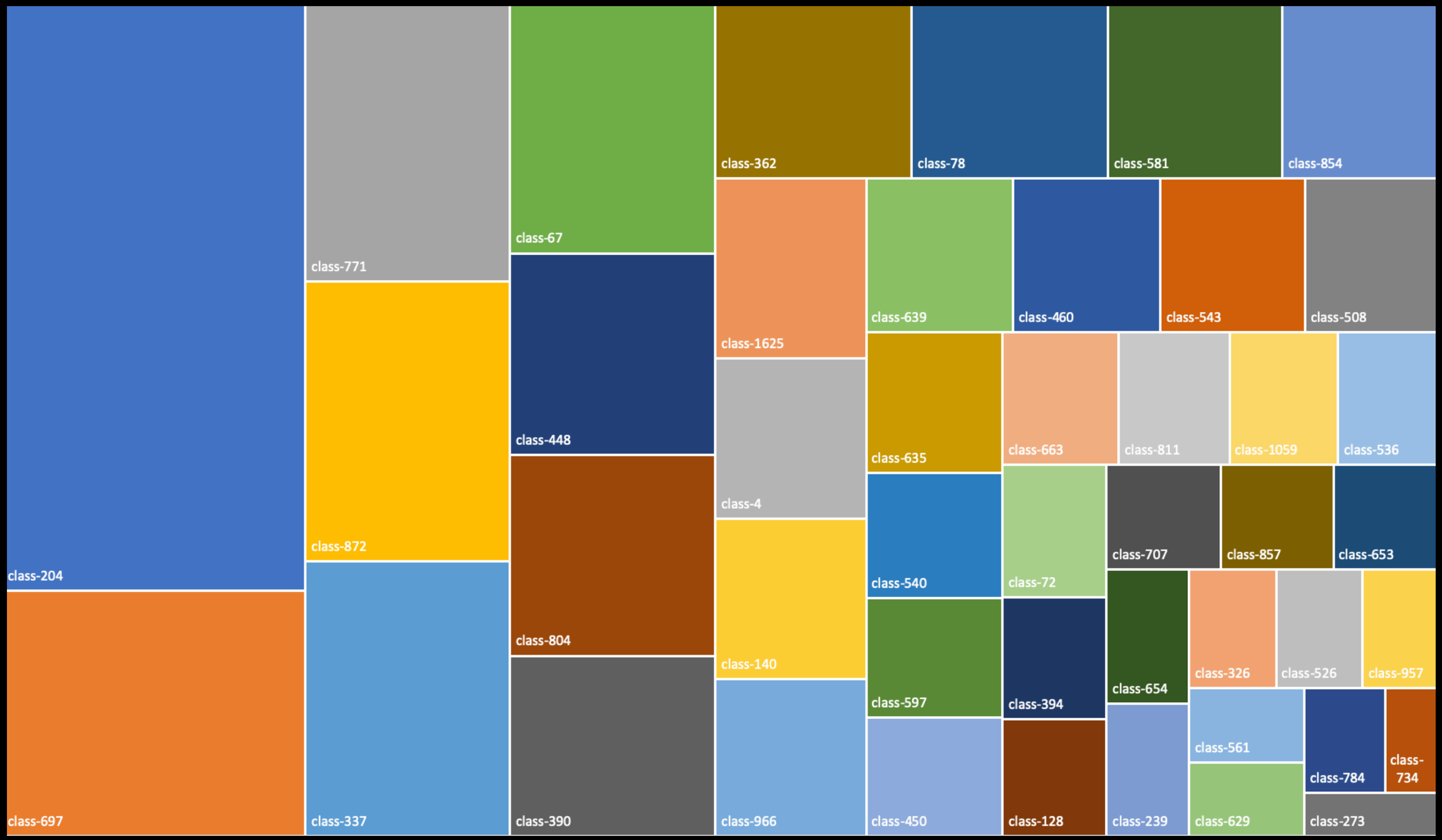
RANDOMLY ROTATED crops

Class Imbalance



Weighted Cross-Entropy Loss with Regularisation

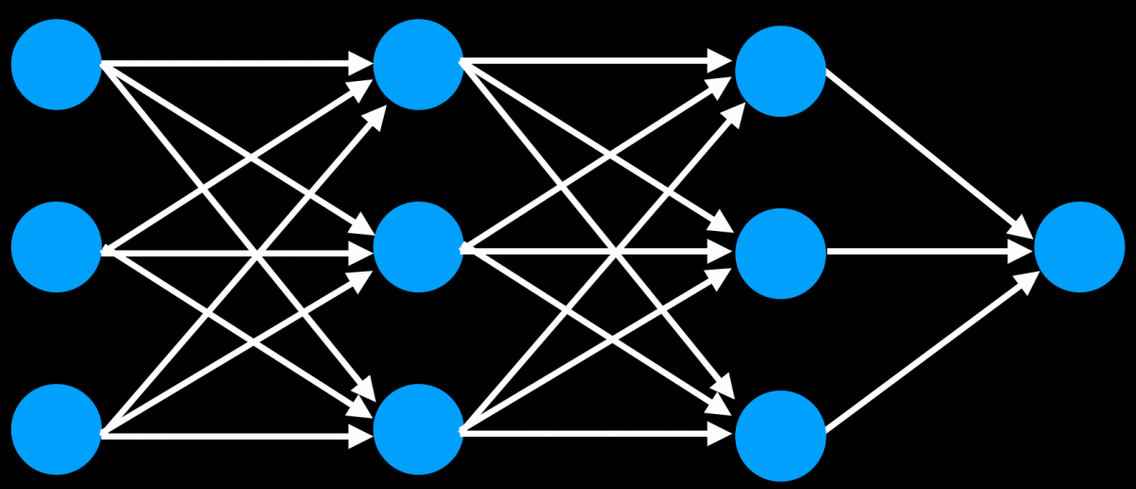
L2 Regularisation (Weight Decay)
Controls the capacity of the network

$$L = -\sum_{i=1}^{n} \alpha_i y_i log(S(f_\theta(\mathbf{x}_i))) + \frac{\lambda}{2} W^2$$

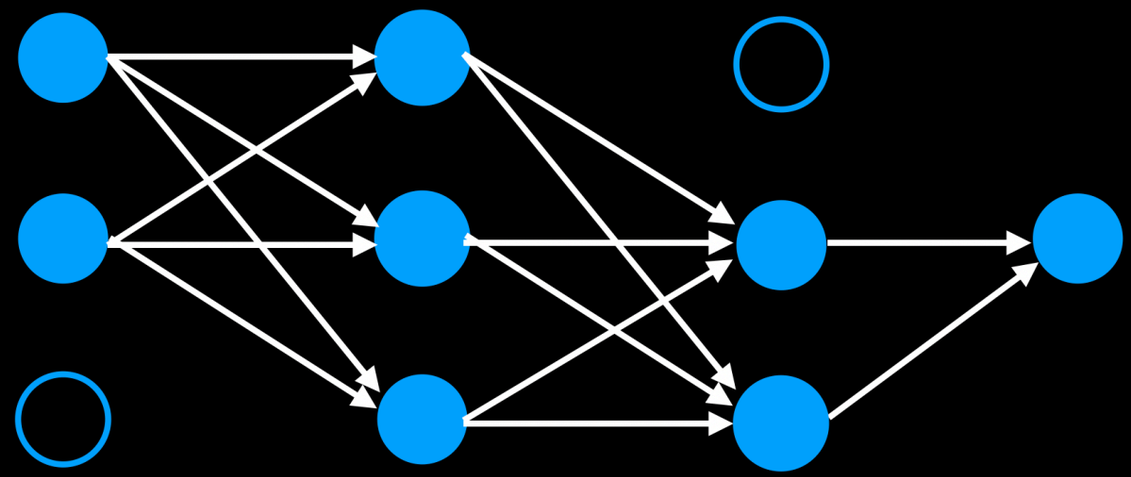
Class Weight
Inverse to class frequency

Dropout

- Randomly pick some nodes in a layer to be dropped/ignored during training.
- It forces the learning algorithm to spread the out the weights and not focus on some specific features.



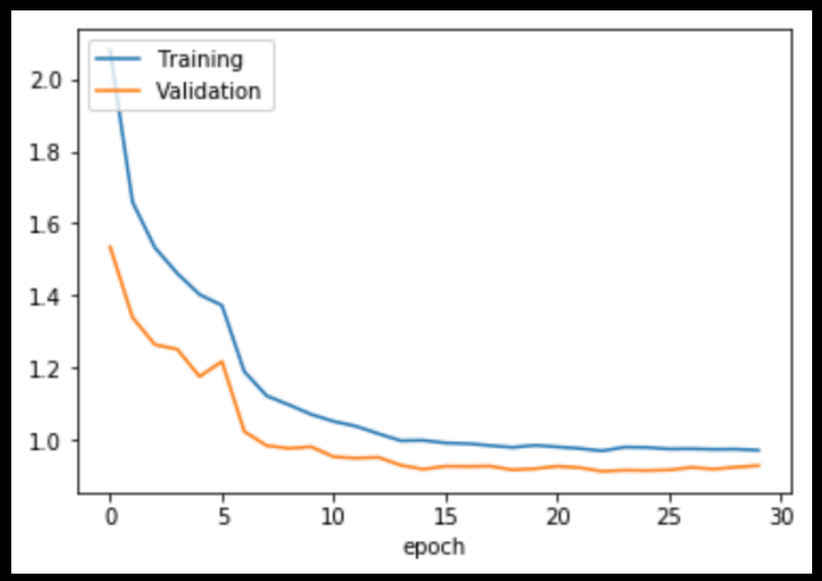
Regular NN



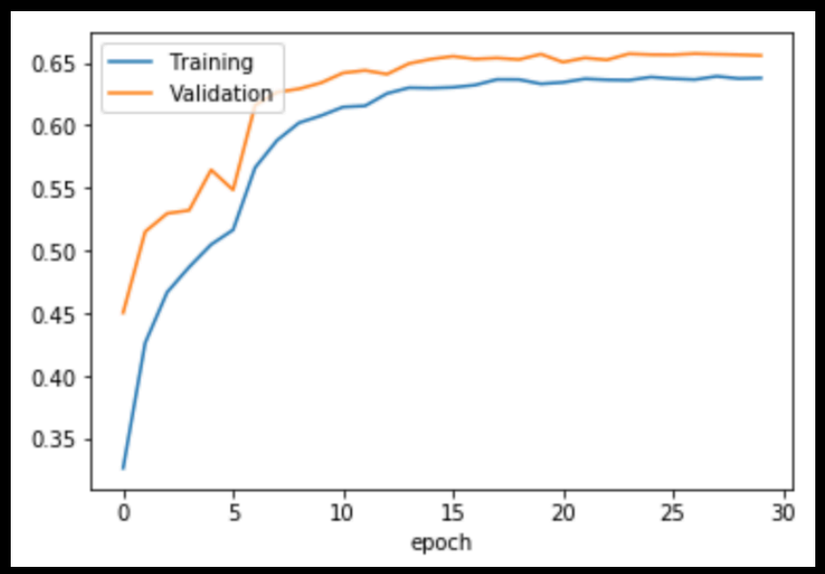
NN with Dropout

Enhanced

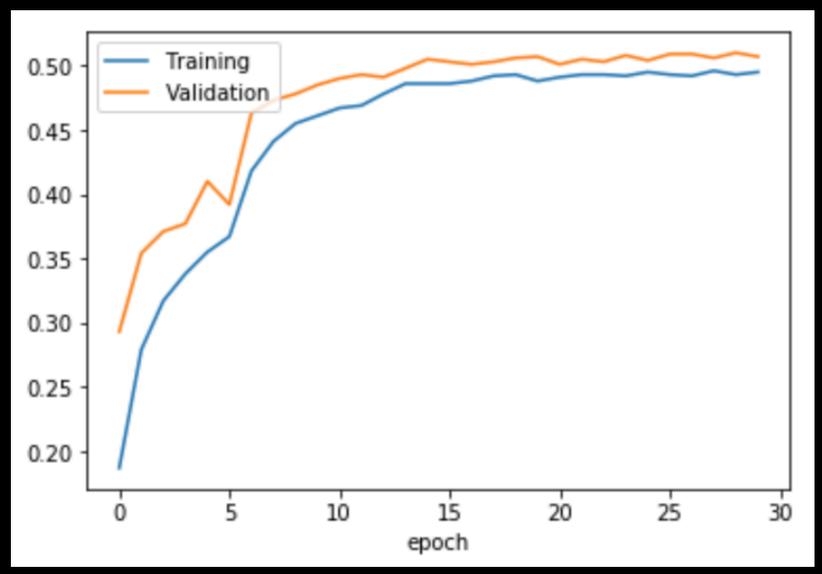
Loss



Accuracy



F1-Score



- Best Validation **Accuracy**: **65.72 %**
- Best Validation **F-Score**: **51 %**

Comparison

	Baseline	Enhanced
Data Augmentation	✗	✓
Loss	Cross-Entropy Loss	**Weighted** Cross-Entropy Loss
Regularization	✗	✓
Dropout	✗	✓

Summary

	Chance	AICrowd Baseline	Baseline	Enhanced
Accuracy	2.22 %	64 %	65.18 %	65.72 %
F-Score	2.22 %	-	50.58 %	51 %

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Thanks for your attention!

Questions?

https://github.com/marinaIpo/SnakeSpeciesIdentification

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