

STAT GR5243 Project 3

Group 2

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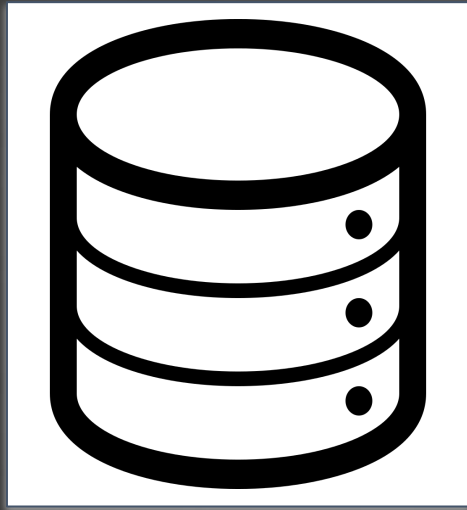


TRANSCENDING DISCIPLINES, TRANSFORMING LIVES



COLUMBIA | ENGINEERING
The Fu Foundation School of Engineering and Applied Science

Datasets



Training Set with
50k Images



clean_labels.csv

Human-verified, clean labels
for first 10k images



noisy_labels.csv

Noisy labels for
all images

Goal

Build a AI predictive model that is:



1) Accurate



2) Portable/Easy
to replicate

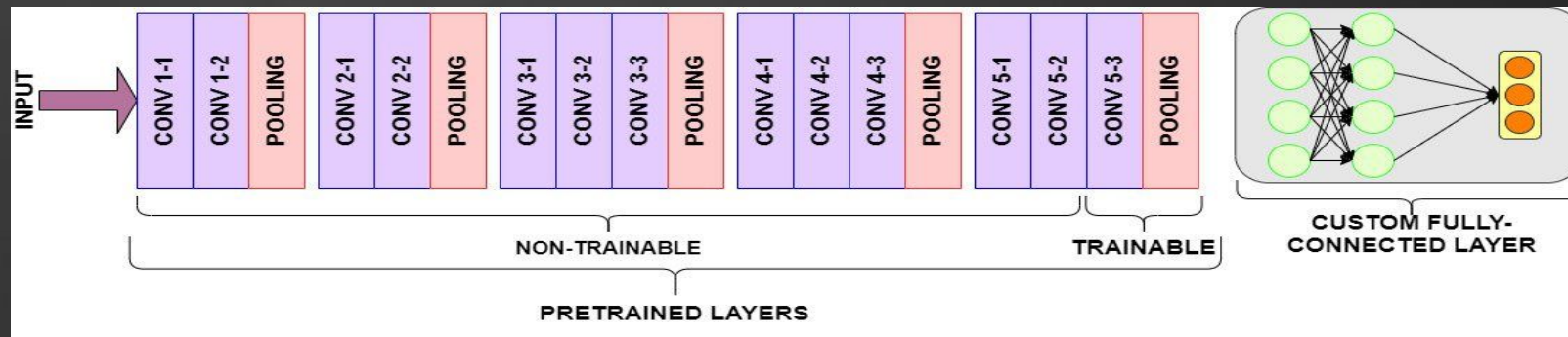
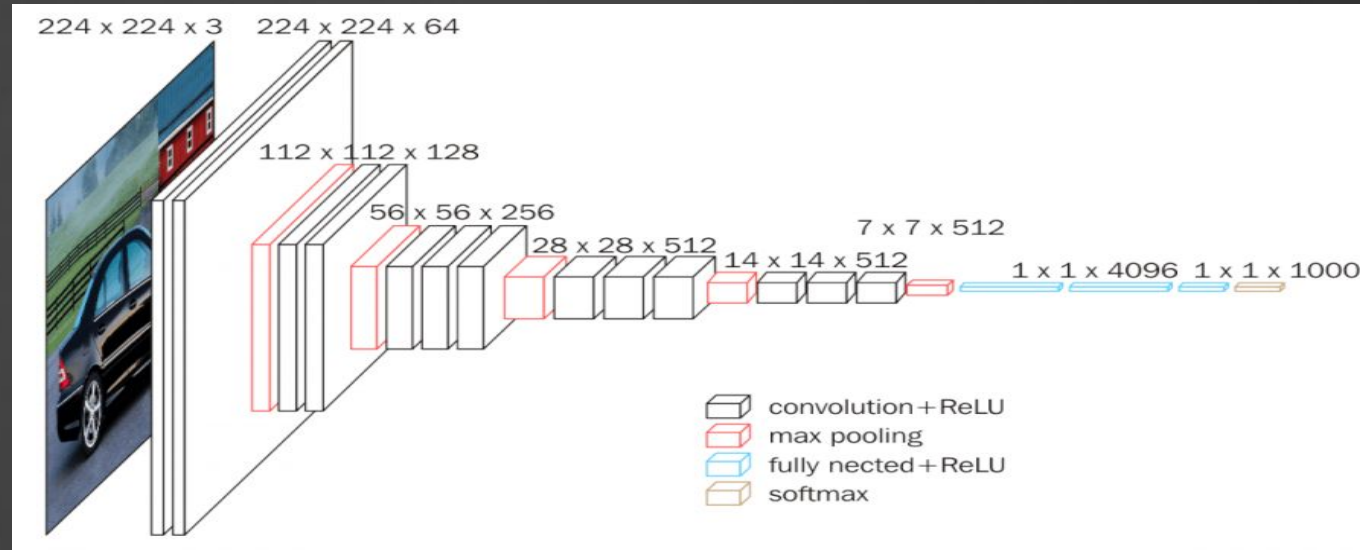


3) Computationally
efficient

at multi-label classification of images.

Model 1 (VGG16):

Guidance: "Given a baseline model, create a more sophisticated model while still treating the noisy labels as clean ones"



Model 2 :

Guidance: “Use exactly the same predictive model as in Model 1, but add some extra models or procedures to address the label noise issue.”

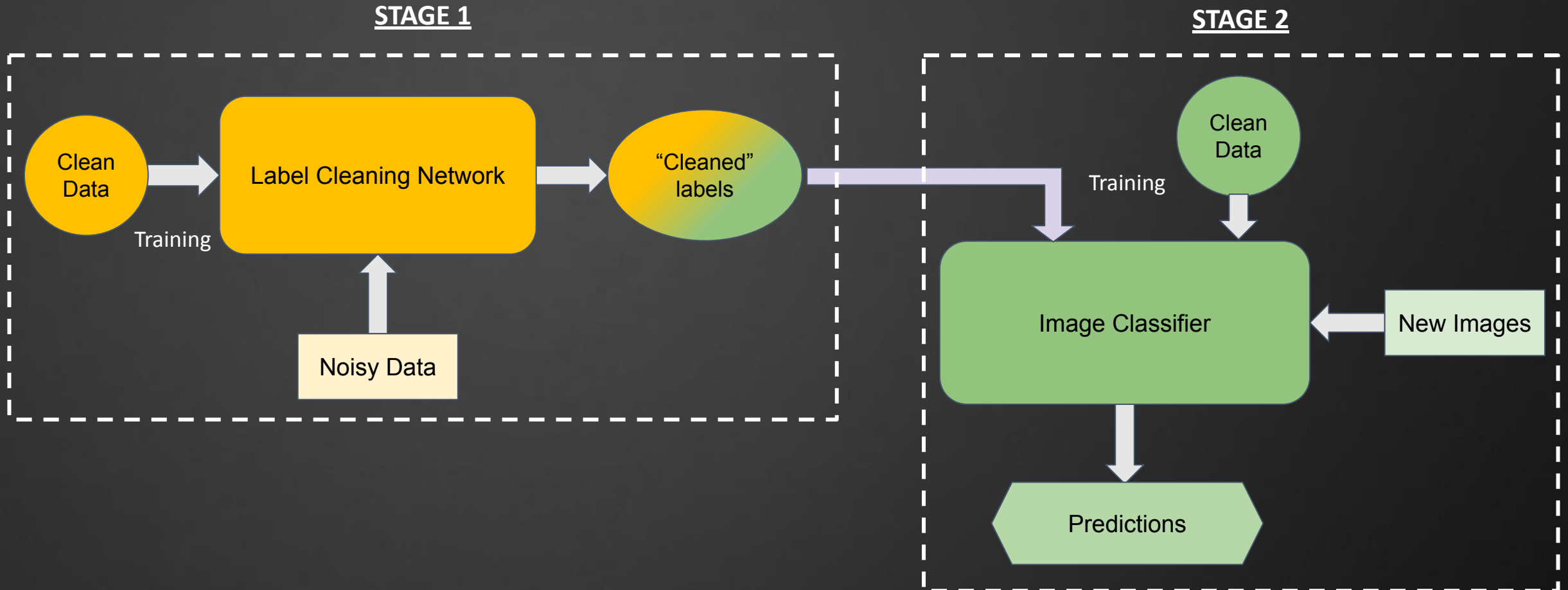
Still a VGG 16...

BUT WITH:

A label correction network to clean the noisy label

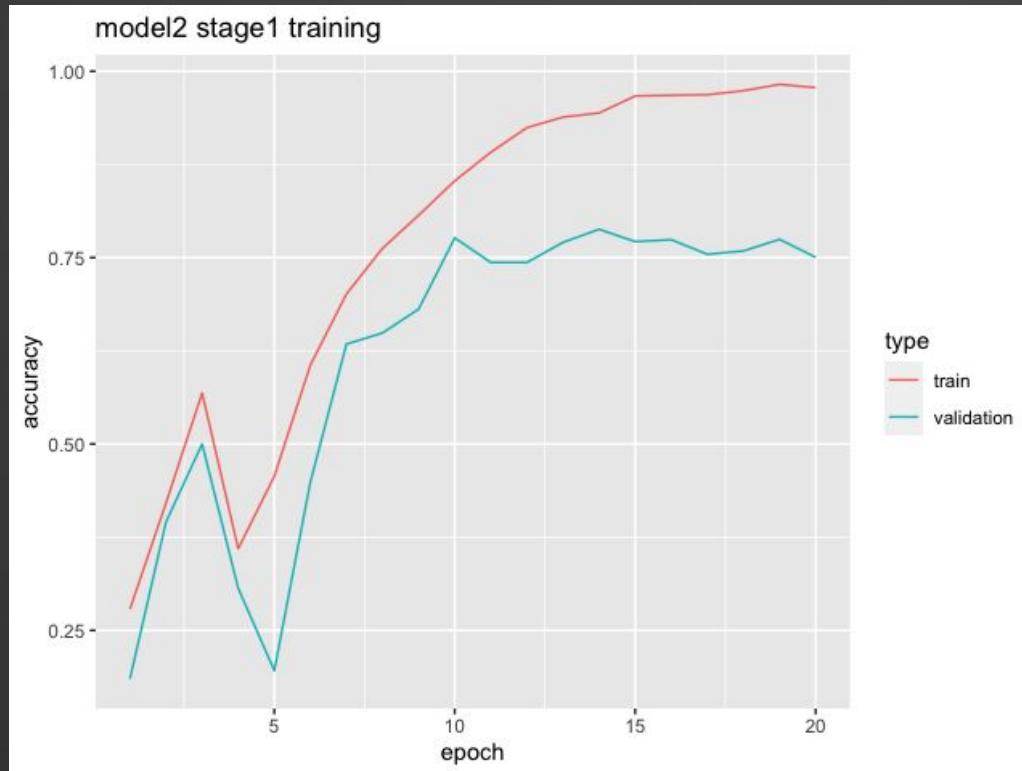
Our Proposal

Inspired by [Inoue et al. \(2017\)](#), we proposed a 2-stage model

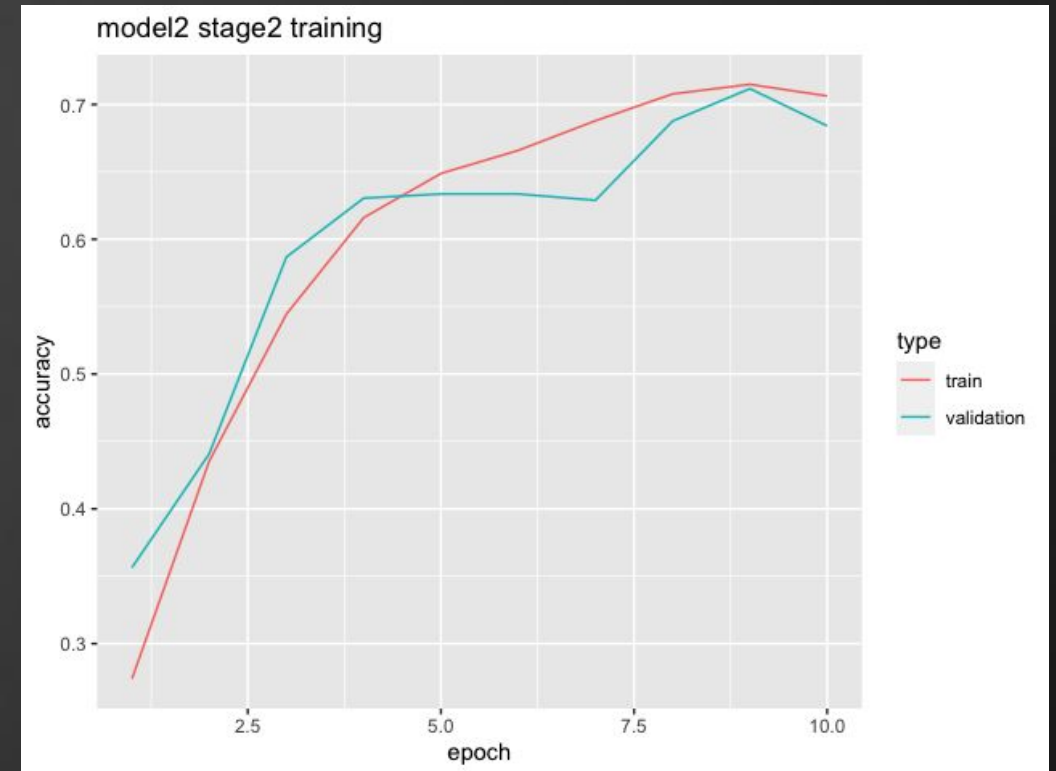


Training Process & Performance

Stage 1: Label Cleaning Network



Stage 2: Image Classifier



Performance Improvement

Model 1

```
: evaluation(baseline_model, clean_labels[:1000], imgs[:1000])
```

	precision	recall	f1-score	support
0	0.32	0.45	0.37	102
1	0.18	0.25	0.21	112
2	0.24	0.05	0.08	99
3	0.23	0.15	0.18	92
4	0.26	0.52	0.34	99
5	0.18	0.12	0.14	85
6	0.28	0.36	0.31	107
7	0.55	0.06	0.11	102
8	0.27	0.44	0.34	99
9	0.23	0.12	0.15	103
accuracy			0.25	1000
macro avg	0.27	0.25	0.22	1000
weighted avg	0.27	0.25	0.23	1000

Model 2

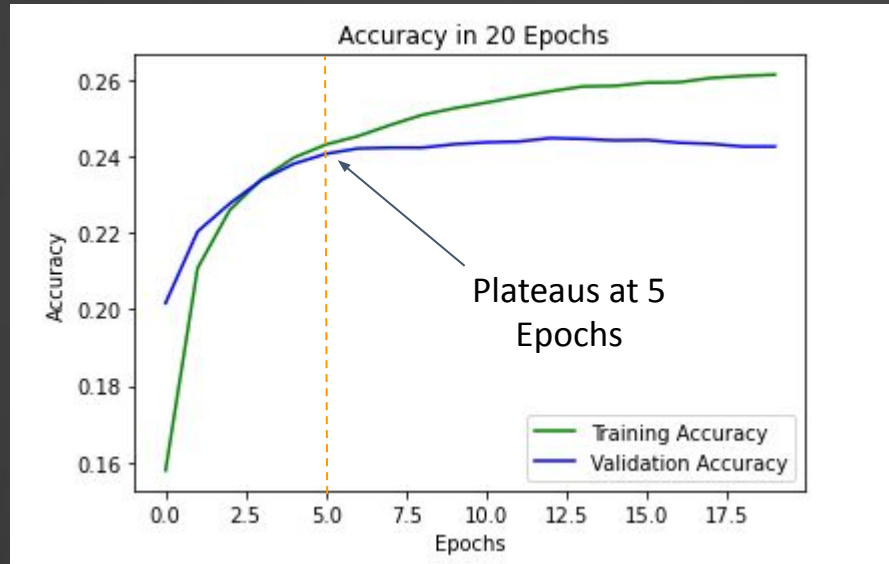
```
evaluation(model_II, clean_labels[:1000], imgs[:1000])
```

	precision	recall	f1-score	support
0	0.76	0.74	0.75	102
1	0.88	0.92	0.90	112
2	0.57	0.61	0.59	99
3	0.52	0.15	0.24	92
4	0.79	0.71	0.74	99
5	0.47	0.87	0.61	85
6	0.72	0.79	0.75	107
7	0.83	0.84	0.84	102
8	0.94	0.68	0.79	99
9	0.84	0.92	0.88	103
accuracy			0.73	1000
macro avg	0.73	0.72	0.71	1000
weighted avg	0.74	0.73	0.72	1000

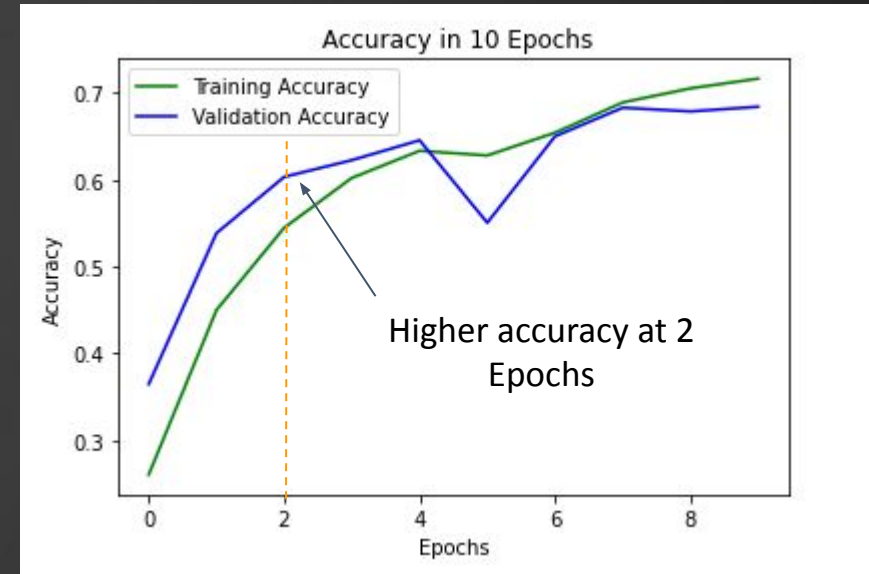
- Model II outperform Model I
- Accuracy have a boost from 20% to 70%

Computational Cost Improvement

Model 1

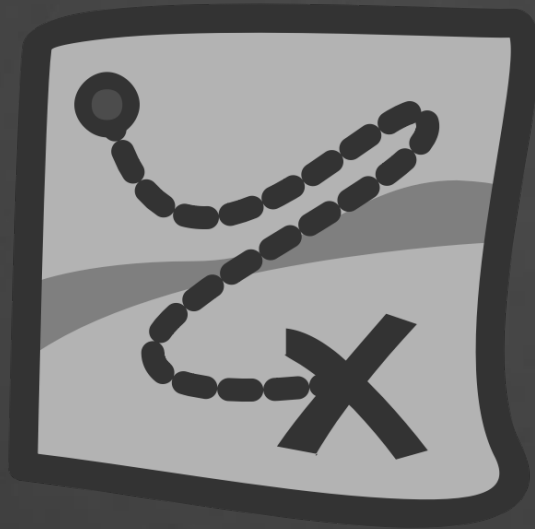


Model 2



- Model II requires less training time:
 - Outperforms with 2 iteration of data, while Model I plateau at 5 iterations
- Faster computational speed for prediction

Intuition of Strategy



Find a mapping between
noisy and clean labels



Exploit mapping to
clean the labels

Thank You !