MobileNet v2 Collab

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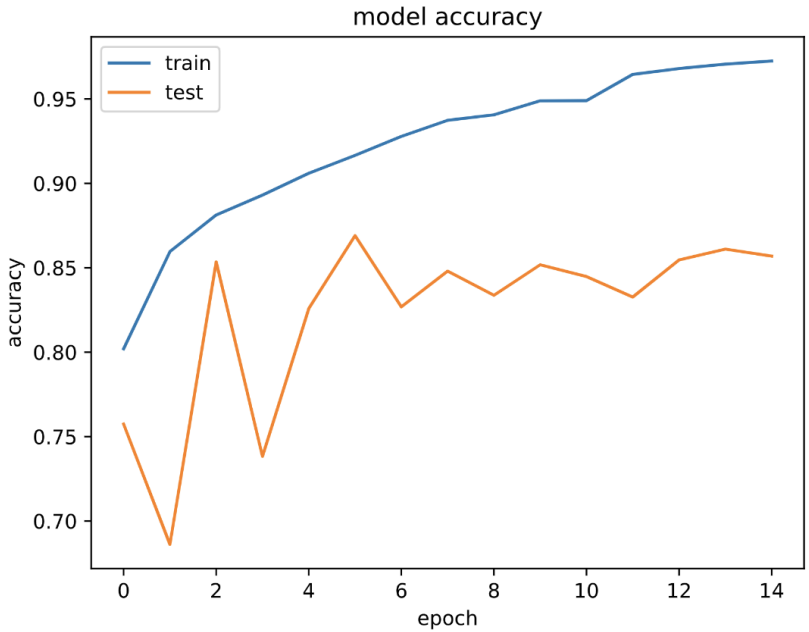
The Problem :(

- **Inaccuracy** in classifying lying images
- **Sitting and standing** classification confusion
- Image loading not optimized (30-45 min)

The Solution :)

- **Pre-processing**: Data set input images balancing
- **Data augmentation**
- **Border replication** with ratio exclusion
- **Alternative image loading process**
  - tf.data.Dataset object

Model - Full Dataset



Posture	Correct	Total	Accuracy
Sitting	1679	1906	88.1%
Standing	3895	4392	88.7%
Lying	670	988	72%

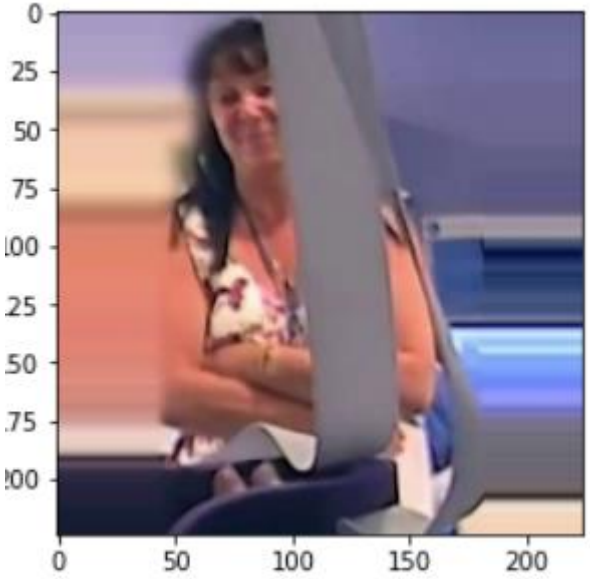
```
[[1679  168   59]
 [ 487 3895   10]
 [ 262   56  670]]
```

Test Accuracy:
87.2%

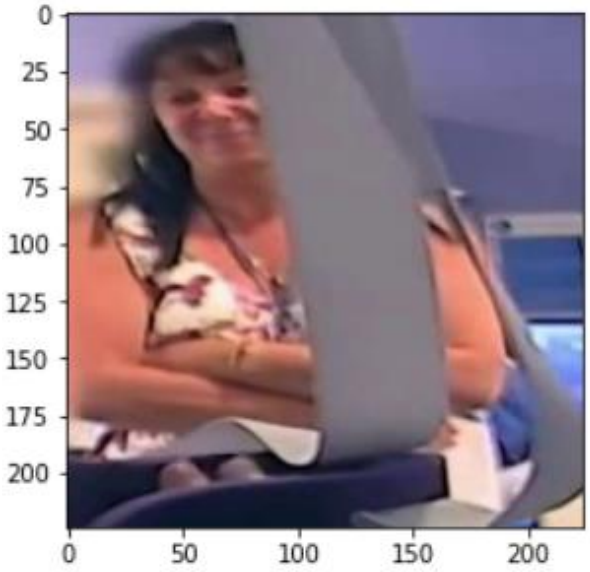
Split: 50, 30, 20

Border replication - Ratio

With Border Replication



Without Border Replication



Border replication - Ratio

Test Accuracy: 86.12%

	Correct	Incorrect Classification - Sitting	Incorrect Classification - Standing	Incorrect Classification - Lying	Total Observations in Class	Categorical Classification Accuracy
Sitting	1316	--	120	229	1665	79.03%
Standing	4335	477	--	87	4899	88.5%
Lying	624	91	7	--	722	86.4%

Data Augmentation - Class Specific

Sitting Augmentation

- Sitting confusion generally
  - Worse confusion with lying
  - sitting/standing confusion better but still not great
- 84.4% Sitting correctly categorized: decrease 3.7%
- 93.3% Standing correctly categorized: increase 4.6%
- 84.4% Lying correctly categorized: increase 12.4%

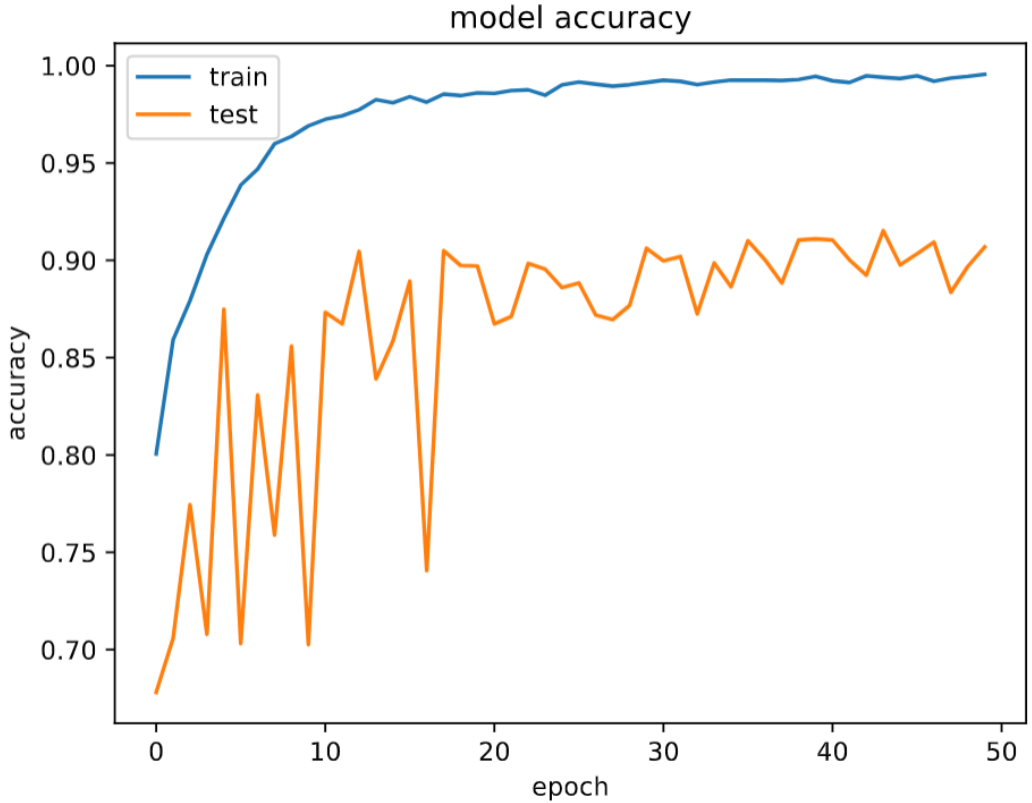
Lying Augmentation

- Sitting/standing confusion
  - ¾ of the error in these classes comes from this confusion
- 78.6% Sitting correctly categorized:
- decrease 9.5%
- 94.4% Standing correctly categorized: increase 5.7%
- 87.5% Lying correctly categorized:
- increase 15.5%

Data Augmentation

Test Accuracy: 90.69%

	Correct	Incorrect Classification - Sitting	Incorrect Classification - Standing	Incorrect Classification - Lying	Total Observations in Class	Categorical Classification Accuracy
Sitting	2357	--	134	104	2595	90.83%
Standing	3811	351	--	59	4221	90.29%
Lying	1392	116	24	--	1532	90.86%



Best Replication Strategy - Model Accuracy

Optimizing Image Loading

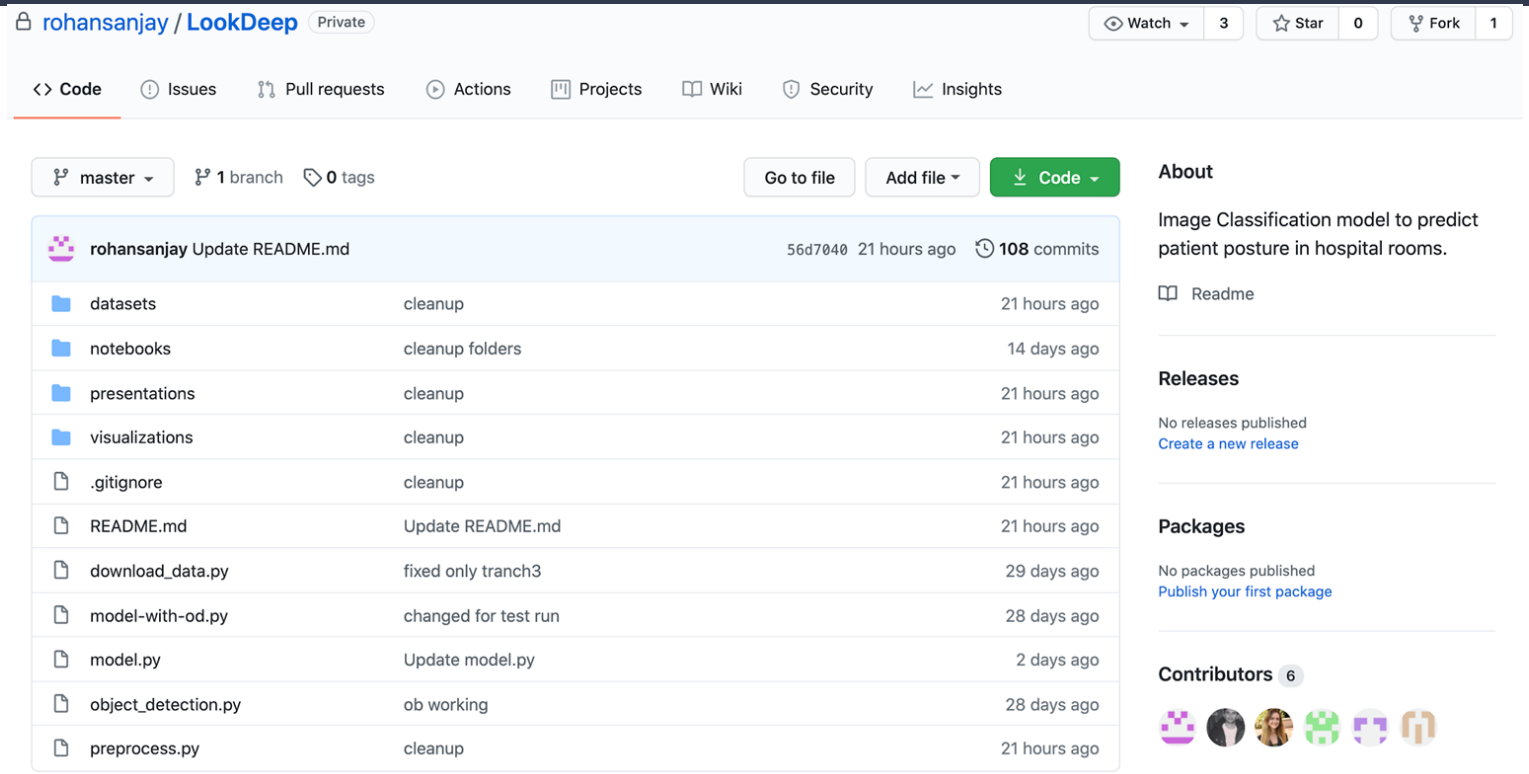
- Load images to directory with subfolder structure
- Use tf.data.Dataset object
- Prefetch to load and train in parallel
- Drastically lowers runtime
- Output doesn't function with MobileNet V2 but compatible with other models

```
# ds means dataset
train_ds = tf.keras.preprocessing.image_dataset_from_directory(config.PROCESSED, image_size=(224, 224),
    seed=100, labels='inferred', subset='training', color_mode='rgb',validation_split=0.8)

test_ds = tf.keras.preprocessing.image_dataset_from_directory(config.PROCESSED,  image_size=(224, 224),
    seed=100, labels='inferred',subset='validation', color_mode='rgb',validation_split=0.2)

# Enables parallel loading of images and model training
AUTOTUNE = tf.data.experimental.AUTOTUNE
train_ds = train_ds.shuffle(700).cache().prefetch(buffer_size=AUTOTUNE)
test_ds = test_ds.cache().prefetch(buffer_size=AUTOTUNE)
```

Our Deliverable



Questions?