ISIB dataset (2017 has 2000 images, 2016 has 900 images)

**specifics about the dataset:**

1. high intra-class variance: the images belonging to either of the class(cancer/non-cancer) has many types of images. So if given a image, it cannot be generalised that all images of that class will look like that.

2. low inter-class variance: the images belonging to the two classes look very similar. (example cats and dogs are easily distinguishable but whether the lesion is malignant or benign is very difficult to tell.

3. skewed proportion of images in classes: 80% of the images are benign and 20% are malignant.

**how is this dataset similar to Imagenet dataset:**

1. both are clicked in natural light, therefore the concept of edges and corners are still intact.

2. both are labeled.

3. Intra-class variance is high in both.

**how is this dataset different from Imagenet dataset:**

1. Number of images: imagenet has 1.5million images while our dataset has 900/2000 images.

2. Imagenet has high  inter class variance.

**how doctors classify cancer**

1. ABCDE rule: Asymmetry, Border irregularity, colour non uniform, diameter greater than 6mm, evolution in color, size

2. i don't remember.

**Most methods used earlier in image processing:**

1. Either collected features wrt ABCD rule or usual feature detection methods like Bag-of-visual-words, sparse coding, (read goodReview paper for more.

**Problem with these methods?**

1. Could not model ABCD rule well.

2. High Intra class variance, difficult to find problem specific features because different types of images in the same class have different results on applying filters or methods.

**Good things about these methods?**

1. even though inter-class variance is low, it was not an issue because classifiers like SVM(support vector machines) are designed specifically to handle this type of problem.

2. low compute time and minimum hyper parameters therefore, the researcher had the idea about what is learnt by the model and on what basis does it classify image as cancer or not.

**Why deep learning based classifier?**

1. our dataset similar to imagenet. Therefore features learn't on it can be used on the cancer dataset (transfer learning and fine tuning of pre-trained model.)

2. our dataset is similar to imagenet so the algorithm that works well for imagenet, a mini version of those can be useful on our dataset.

**metrics for evaluation?**

1. Accuracy: depends on the proportion of images, therefore never directly accepted as the only metric.

2. Sensitivity

3. Specificity

4. RUC AUC : Area under the curve

5. Jaccard Coefficient

**What papers did we implement?**

1.Transfer learning using caffenet: 76% accuracy best so far

2.Transfer learning using resnet: don't remember

3.Sparse Coding: didn't give output for all images because the method involves finding the minima of an objective function. For some images minima could not be found so it gave NaN as output..so not a reliable method. Results are in ppt.

4. Trained a resnet-50

**After this, we did**

1. Visualization: We ran the [<http://yosinski.com/deepvis>] model which uses deconvolution and unpooling layers to extra info from a trained model by undoing what the convolution layers have done and then see the effect of each layer of the model on the input image. We found that

a. initial layers of the trained model learn't to extract either background or foreground,

Some experiments we didn't do that should have been done?

1. Fine tuning a pre-trained resnet model on Imagenet dataset. (higher chances of getting results)