# Active Learning for Object Detection by using Probabilistic Modeling

Team : "Brute Force"
Team members :   Abhinav Kumar (16907018)
                 Nishant Kiran Valvi (21111407)

Problem Statement and Action Plan

- The performance of deep neural networks for object detection depends on the size of the labeled data. Creating large amount of labeled data is a very costly task.
- The goal of active learning is to reduce labeling costs by selecting only the most informative samples on a dataset.
- The approaches in [1,2] use Gaussian mixture models to estimate probabilistic distribution for localization head and classification head for unlabeled images by using a single model.
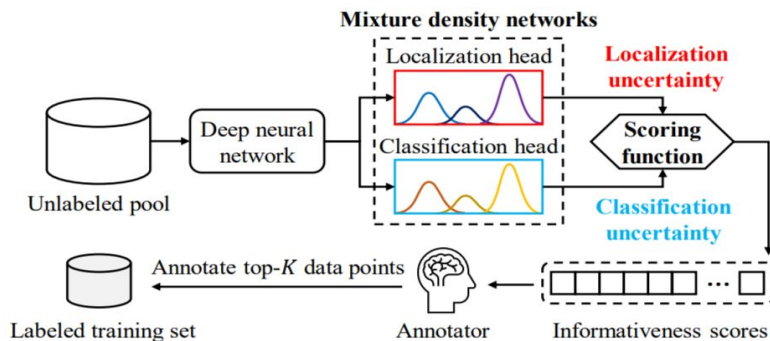
Problem Statement and Action Plan

- The localization and classification losses utilize negative log-likelihood for training which works as a regularizer. A scoring function is used which provides a single value for informativeness of an image. Based on which top K images are selected for labeling.
- We plan on experimenting with different mixture density models (Laplace Mixture Models etc). We also plan on using other probabilistic modeling methods if time permits such as Gaussian Processes etc.
- We also plan on training the said model with different backbones such as Resnet-34, Faster-RCNN, etc. by using the proposed active learning approach.
- Timeline :
  - Week 1 - More literature survey and understanding the base paper code
  - Week 2 - Replicate results of [1,2]
  - Week 3, 4 - Try various mixture density models and probabilistic modeling methods
  - Week 5, 6 - Try different backbones for the said single model
  - Week 7 - Project report and buffer time.

References

1. Choi, Jiwoong et al. (2021). ``Active Learning for Deep Object Detection via Probabilistic Modeling.'' arXiv:2103.16130 [cs.CV]
2. Li, Ying et al. (Aug. 2021). "Deep Active Learning for Object Detection". In:InformationSciences579.doi:10.1016/j.ins.2021.08.019.

Thank You !