EEE6503 Computer Vision
Spring 2025
Final Project

For this project, you will work in teams of 2-3 students. Please refer to the accompanying notice on LearnUS for more details on forming your teams.

Goal(s)
Propose a domain generalization method for an image classification task.

Brief Summary

Domain generalization aims at learning a model from multiple source domains that can generalize to unseen target domains. Many approaches to domain generalization focus on learning discriminative, domain-invariant features. This project's objective is to train a classification model using images from art paintings, cartoons, and sketches that performs well on unseen, realistic images. Importantly, we have curated a set of realistic images collected from the web, which will not be accessible to students. We will evaluate your submitted model on this curated set and measure its performance. This performance will be factored into your final grade.

To facilitate this domain generalization project, we will use the PACS [1] dataset, which contains images from multiple domains depicting objects of seven categories. We also provide a baseline code that implements a ResNet50 model [2] trained on the PACS dataset using standard cross-entropy loss and data augmentations. See the accompanying Jupyter Notebook for more details.

[1] Deeper, Broader and Artier Domain Generalization, ICCV 2017
[2] Deep Residual Learning for Image Recognition, CVPR 2016

Instructions

- We provide code for training a baseline model using cross-entropy loss with standard data augmentation techniques, including random horizontal flipping and color jittering.
- You may only use the provided training datasets to train your model.
- The initial model must not be pre-trained on any datasets other than ImageNet-1k.
- The input image size, training batch size, and number of epochs must remain unchanged.
- Your trained model will be evaluated on our curated test dataset. Your submission thus should include your final model weights in a '.pth' format.
- Only one member of a group needs to upload the submission via Learnus.

Grading Policy

- Report (15 points)
    - Format (3 points): Is your report well-formatted?
        - The report should include the following sections: abstract, introduction, related work, proposed method, experimental results, and concluding remarks.
        - The maximum length of the report is 6 pages, excluding references. References are mandatory.
        - Use the CVPR author kit for LaTeX: https://github.com/cvpr-org/author-kit/releases/tag/CVPR2024-v2
    - Technical Novelty (5 points): Is your proposed approach technically novel?
    - Analysis (2 points): Is your analysis valid?
        - Your experimental results should clearly demonstrate the effectiveness of your approach.

        - Include both qualitative and quantitative results.
    - Results (5 points): Is your proposed approach effective?
        - Evaluate performance on a realistic image domain using the PACS dataset.
        - We will measure performance on our curated test set.

Due date

- June 17, PM 11:00
- Submit via LearnUS.
- Include your final report (*.pdf), code (*.ipynb), and model weights (*.pth)
  (Note: Only one submission per group is required.)

Recommended references

We offer some domain generalization papers below.
Note that directly applying techniques provided in these references will be penalized due to lack of novelty.

• “Domain Generalization via Invariant Feature Representation”,
  Muandet et al., ICML 2013 (paper link)

• “Domain Generalization via Entropy Regularization”,
  Zhao et al., NeurIPS 2020 (paper link)

• “A Fourier-based Framework for Domain Generalization”,
  Xu et al., CVPR 2021 (paper link)

If you have any questions or concerns, feel free to contact TAs via email:
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