

Scene classification challenge

I. Challenge description

Scene classification is used in remote sensing to categorize the data for differentiating various earth features such as barren land, forests, roads, settlements, water bodies, etc based on image-level labels.

In this challenge, you will be attempting an image-based classification. Given a set of images and labels, you have to design a deep learning-based classifier. Even before jumping into the design, examine the peculiar qualities of this dataset - is it balanced? Are there enough training samples? etc. Depending upon your observation, suggest techniques to come up with a good classifier. Justify your selected techniques. Also, propose what evaluation metric you will use and why.

Note: the goal of the challenge is not to achieve the best performing classifier; we are rather interested to see your coding skills, knowledge of principles of machine learning and deep learning, creativity, the way that you approach addressing the task, and the way you present your findings.

II. Task Description

1. Dataset:

- a. Download the dataset shared in the google drive

https://drive.google.com/file/d/1zVkU9eMuerAJ_lbC2Uj8mAcn6rueuAK7/view?usp=sharing

It contains train and test folders with images corresponding to each class given in separate subfolders.

- b. Split the train folder (80/20%) for training and validation. Use the test folder for testing.

2. Experimental setup and baseline

- a. Analyze the dataset in the train folder and plot the data distribution in each class (is the data balanced?)
- b. Train a classifier and observe the performance on the test set. This will be your baseline.
- c. Now based on your analysis in (a) suggest how to improve the classifier in (b) and explain why you think your solution can improve the classification performance. (at least two suggestions are welcome)
- d. Propose evaluation metrics in this given scenario. Choose metrics that can give insight into the scenario at hand.

3. Implementation of the classifier:
 - a. You can select any deep learning-based models you prefer
 - b. You can start with pre-trained models as wellWhichever model you select, modify it according to the available dataset
4. Evaluate and compare the improved DL model (2c) with baseline (2b) over validation/test set using the evaluation metrics in (2d).
5. Documentation:
 - a. Discuss in detail the data analysis and your observations (using plots, tables, statistical reports, etc.)
 - b. Provide a detailed description of the model you selected, evaluation metrics, and the baseline results.
 - c. Provide details of the selected deep model learning procedure (including details of train/validation/test, hyperparameters, augmentations if any, loss curves, validation performance curve, ...).
 - d. Discuss in detail the methods used for improving the baseline and justify the selection.
 - e. Discuss your observations and potential problems and possible improvements to your current solution.

Note: you can select and use any language, framework, and environment for the implementation based on your preference.

III. Submission Guidelines

- Use the ISIS CV4RS portal to submit your materials. You can find the submission instruction [HERE](#).
- Submit the source code (either git link, Google Colab link, attached zip-file), the code needs to be executable. Add a README with clear instructions on how to run the code.
- Necessary documentation (either as a pdf document or inline code documentation, e.g. inside a notebook)
- Analysis and the evaluation results as mentioned in **II.5** (either as a pdf document report or within the notebook)
- The **deadline** for submitting your materials is **27/04/2022 at 23:59**.

IV. Evaluation Criteria

According to the submitted materials, the following criteria will be evaluated:

- Coding skills
- Basic knowledge in the domain

- Representation skills

Note: The final score will be the overall of all skills, therefore, we highly encourage you to submit any sort of material (in terms of code, result, and written document), even in the case they have not finalized yet.