**Introduction**

# **PKU Spring Semester CVDL homework**

Comparison between traditional method and deep Learning method

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We make a model classify Plant Seeding Using two method which are Traditional Method and Deep Learning method respectively. By comparing two method, check out each method of features and distinctions.

## **Dataset**

We use dataset of Kaggle (<https://www.kaggle.com/comp>

etitions/plant-seedlings-classification ) trainset images are 4750, testset images are 794, and there are 200-600 images per class. Classes are consisted of 12 classes. Image pixel is all consisted of (3,1899,1900). More description is described in data\_analysis.ipynb in github. (https://github.com/dwsmart32/DL\_Model\_collect/blob/master/Plant\_Seeding/data\_analysis.ipynb)

## **submission**

Traditional Method must have feature extraction and classifier. Deep Learning method must have network, optimizer, augmentation, reguralization.

## **Paper length**

# **Traditional method**

All text must be in a two-column format. The total allowable size of the text area is inches (17.46 cm) wide by inches (22.54 cm) high. Columns are to be inches (8.25 cm) wide, with a inch (0.8 cm) space between them. The main title (on the first page) should begin 1 inch (2.54 cm) from the top edge of the page. The second and following pages should begin 1 inch (2.54 cm) from the top edge. On all pages, the bottom margin should be inches (2.86 cm) from the bottom edge of the page for 8.5 × 11-inch paper; for A4 paper, approximately inches (4.13 cm) from the bottom edge of the page.

## **Margins and page numbering**

All printed material, including text, illustrations, and charts, must be kept within a print area inches (17.46 cm) wide by inches (22.54 cm) high. Page numbers should be in the footer, centered and inches from the bottom of the page. The review version should have page numbers, yet the final version submitted as camera ready should not show any page numbers.

## **Type style and fonts**

Wherever Times is specified, Times Roman may also be used. If neither is available on your word processor, please use the font closest in appearance to Times to which you have access.

MAIN TITLE. Center the title inches (3.49 cm) from the top edge of the first page. The title should be in Times 14-point, boldface type. Capitalize the first letter of nouns, pronouns, verbs, adjectives, and adverbs; do not capitalize articles, coordinate conjunctions, or prepositions (unless the title begins with such a word). Leave two blank lines after the title.

AUTHOR NAME(s) and AFFILIATION(s) are to be centered beneath the title and printed in Times 12-point, non-boldface type. This information is to be followed by two blank lines.

The ABSTRACT and MAIN TEXT are to be in a two-column format.

MAIN TEXT. Type main text in 10-point Times, single-spaced. Do NOT use double-spacing. All paragraphs should be indented 1 pica (approx. 1/6 inch or 0.422 cm). Make sure your text is fully justified—that is, flush left and flush right. Please do not place any additional blank lines between paragraphs.

Figure and table captions should be 9-point Roman type as in Figs. 1 and 2. Short captions should be centered.

Callouts should be 9-point Helvetica, non-boldface type. Initially capitalize only the first word of section titles and first-, second-, and third-order headings.

FIRST-ORDER HEADINGS. (For example, **1. Introduction**) should be Times 12-point boldface, initially capitalized, flush left, with one blank line before, and one blank line after.

SECOND-ORDER HEADINGS. (For example, **1.1 Database elements**) should be Times 11-point boldface, initially capitalized, flush left, with one blank line before, and one after. If you require a third-order heading (we discourage it), use 10-point Times, boldface, initially capitalized, flush left, preceded by one blank line, followed by a period and your text on the same line.

## **Footnotes**

Please use footnotes[[1]](#footnote-1) sparingly. Indeed, try to avoid footnotes altogether and include necessary peripheral observations in the text (within parentheses, if you prefer, as in this sentence). If you wish to use a footnote, place it at the bottom of the column on the page on which it is referenced. Use Times 8-point type, single-spaced.

## **References**

List and number all bibliographical references in 9-point Times, single-spaced, at the end of your paper. When referenced in the text, enclose the citation number in square brackets, for example [5]. Where appropriate, include page numbers and the name(s) of editors of referenced books. When you cite multiple papers at once, please make sure that you cite them in numerical order like this [1, 2, 4-6].

## **Illustrations, graphs, and photographs**

All graphics should be centered. Please ensure that any point you wish to make is resolvable in a printed copy of the paper. Resize fonts in figures to match the font in the body text, and choose line widths which render effectively in print. Readers (and reviewers), even of an electronic copy, may choose to print your paper in order to read it. You cannot insist that they do otherwise, and therefore must not assume that they can zoom in to see tiny details on a graphic.

## **Color**

Please refer to the author guidelines on the CVPR 2022 web page for a discussion of the use of color in your document.

If you use color in your plots, please keep in mind that a significant subset of reviewers and readers may have a color vision deficiency; red-green blindness is the most frequent kind. Hence avoid relying only on color as the discriminative feature in plots (such as red *vs.* green lines), but add a second discriminative feature to ease disambiguation.

# **Deep Learning Method**

## **Model**

We used transfer learning for saving time.

Model : Resnet 50

Params size (MB): 97.49

Estimated Total Size (MB): 1415.87

## **Optimizer**

We tried 3 kinds of Optimizer which are SGD, Adam, Adagrad. But Adam was the most efficient Optimizer. So, We chose Adam in this model. We also set learning rate as 0.002 by tuning hyperparameter.

Optimizer : Adam (lr : 0.002, betas : (0.5, 0.99))

## **Augmentation**

Firstly, I use resizezing method. Since Resnet50 network is based on (224,224) image. We make input images to (224, 224) size.

Secondly, We make all pictures normalize. All dataset of pixel mean value is 0.3 and standard variation value is 0.1. Using these values, we make all pixels value normalize.

Thirdly, We also use Centercrop, GaussianBlur, Flip, But performace is worse. So we decide to choose resizing and normalization. Details is in data\_analysis.ipynb file.

Resize : (224, 224)

Normalizez(RGB) : ((0.3, 0.3, 0.3), (0.1. 0.1, 0.1))

## **Regularization**

We use weight decay for avoiding weight differs dramatically and set gamma value as 0.1.

Weight decay(gamma) : 0.1

## **Other Specification**

For Hyperparamter tuning we use torch.manual\_seed(10).We also use loss function CrossEntropyLoss as loss function. And set epochs as 30. Batch size is 32 and output layer is 12. Experiment is done in condition which is AMD Ryzen 5 3600 CPU, NVDIA GeForce GTX 1660 SUPER.

## **Performance and Result**

Accuracy and Loss of test and valid data is below

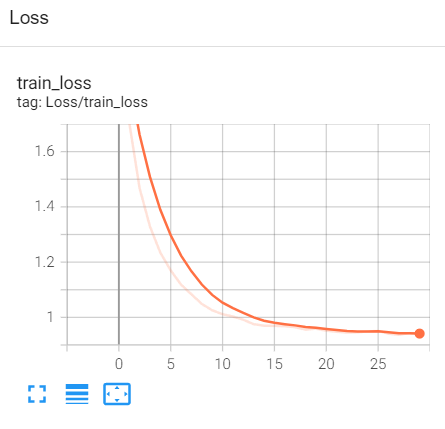


Figure 1 Loss of traindataset

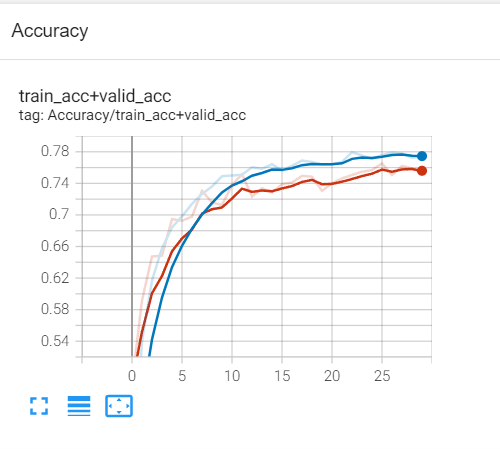


Figure 2 Accuracy of datasets

Train dataset loss : 0.94 (at epoch 30)

Train dataset acc : 0. 78

Valid dataset acc : 0.77

Testdata set is tested and result is recored in sample\_submission.csv file. Submission name is DongwookRhee.

Test dataset acc : 0.70780

Spend time in training : 570 (sec)

# **Conclusion**

# **References**

1. Pytorch\_tutorial:https://pytorch.org/tutorials/beginner/blitz/cifar10\_tutorial.html
2. tensorflow\_tutorial:https://www.tensorflow.org/tutorials/images/classification
3. vlfeat开源library: https://www.vlfeat.org/
4. sklearn开源library: https://scikit-learn.org
5. opencv开源library: https://opencv.org/

1. This is what a footnote looks like. It often distracts the reader from the main flow of the argument. [↑](#footnote-ref-1)