Spatial Transforming Network for chest MRI images preprocessing

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Abstract

Abstract. Brief and self-contained text. One paragraph (roughly 4–6 sentences) describing the motivation and key results of your project.

Between abstract and Introduction you must insert the links to your **github repo** and **video presentation** of the project.

Github repo: https://github.com/bizzare-hub/Chest-Xray-alignment-using-STN.git

1. Introduction

Introduction. A gentle introduction to the topic of your report, deeper explanation of motivation (mentioning some recent related work on your topic). The introduction must end with the phrase **the main contributions of this report are as follows** and following concise but still very clear list of 2-4 tasks, problems, improvements, replications, experiments (listed as bullet points) that you performed in your project. This is a usual practice to make the contributions explicit to readers and reviewers. For example, see (Arjovsky et al., 2017; Wehenkel & Louppe, 2019) or almost any other conference paper.

2. Related work

Related work Review of old, recent and state-of-the art methods for solving the problem students encounter in their project. At least 4-5 references should be mentioned with a brief discussion of their drawbacks and advantages.

3. Algorithms and Models

Algorithms and Models and **Experiments and Results.**

Two main sections describing key students' results. All the relevant content should be distributed among these sections based on the topic of project, stated goals, project plan and students' decision. In general, these sections should contain clear experimental setup and a link to a **github repo** (again!) with a fully reproducible code. **Projects without a github repo with a reproducible code will be graded as zero.**

Students have to explicitly describe the algorithms, models, methods, approaches they used for solving their project's problem. Students should explain the motivation for choosing the models, possible benefits and drawbacks of the choice in application to their problem. The used metrics for accessing the quality of the results should also be described.

The section(s) must contain a **complete description of the datasets** used for experiments with all the required download links. This includes number of features, samples, types of features (categorial, real, pixels, etc.), description of key features, etc. If well-known datasets are used, e.g. MNIST, CIFAR, etc., it is enough to put a link to a dataset (or related paper) without a detailed description.

All the **preprocessing** and data-handling steps should be presented in these sections. Make sure to answer relevant questions, e.g. the following ones: How data was normalized? How data augmentation was done? How data was cleaned from outliers or anomalies? How the data was splitted for train, test, validation?

All **training parameters** should be listed. Which methods did you try and with which parameters (e.g. neural network architectures, weight initialization, optimizers, optimizer parameters, number of epochs, iterations, cross validation, exact number of restarts, etc.)?

4. Experiments and Results

We highly encourage students to additionally present experimental results in a form of **tables and plots** (e.g. generated images for projects related to image generation, segmented images for project related to segmentation, table with scores for projects related to prediction, etc.). All the experimental results must be properly discussed and explained. If you experience problems with creating tables in LaTeX, use e.g. this online tool or any its analog. In Python's *Pandas* library there are also methods to convert **pd.DataFrame** to LaTeX.

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5. Conclusion

Conclusion Concise description of experimental results and outcomes, including possible directions for further work.

Filling appendices A and B is mandatory. **Projects with empty or incomplete appendices will be graded as zero.**

References

Arjovsky, M., Chintala, S., and Bottou, L. Wasserstein gan. *arXiv preprint arXiv:1701.07875*, 2017.

Wehenkel, A. and Louppe, G. Unconstrained monotonic neural networks. In Wallach, H., Larochelle, H., Beygelzimer, A., d Alche-Buc, F., Fox, E., and Garnett, R. (eds.), *Advances in Neural Information Processing Systems 32*, pp. 1545–1555. Curran Associates, Inc., 2019. URL http://papers.nips.cc/paper/8433-unconstrained-monotonic-neural-networks.pdf.

A. Team member's contributions

Explicitly stated contributions of each team member to the final project.

Name 1 (20% of work)

- Reviewing literate on the topic (3 papers)
- Coding the main algorithm
- Experimenting with model parameters on MNIST dataset
- Preparing the GitHub Repo
- Preparing the Section N of this report
- ...

Name 2 (25% of work)

- ...

Name 3 (55% of work)

- ...

B. Reproducibility checklist

Answer the questions of following reproducibility checklist. If necessary, you may leave a comment.

1. A ready code was used in this project, e.g. for replication project the code from the corresponding paper was used.

   ☑ Yes.
   ☐ No.
   ☐ Not applicable.

   General comment: If the answer is **yes**, students must explicitly clarify to which extent (e.g. which percentage of your code did you write on your own?) and which code was used.

   Students' comment: None

2. A clear description of the mathematical setting, algorithm, and/or model is included in the report.

   ☐ Yes.
   ☐ No.
   ☐ Not applicable.

   Students' comment: None

3. A link to a downloadable source code, with specification of all dependencies, including external libraries is included in the report.

   ☐ Yes.
   ☐ No.
   ☐ Not applicable.

   Students' comment: None

4. A complete description of the data collection process, including sample size, is included in the report.

   ☐ Yes.
   ☐ No.
   ☐ Not applicable.

   Students' comment: None

5. A link to a downloadable version of the dataset or simulation environment is included in the report.

   ☐ Yes.
   ☐ No.
   ☐ Not applicable.

   Students' comment: None

6. An explanation of any data that were excluded, description of any pre-processing step are included in the report.

   ☐ Yes.
   ☐ No.
   ☐ Not applicable.

   Students' comment: None

7. An explanation of how samples were allocated for training, validation and testing is included in the report.

   ☐ Yes.
   ☐ No.
   ☐ Not applicable.

   Students' comment: None

8. The range of hyper-parameters considered, method to select the best hyper-parameter configuration, and specification of all hyper-parameters used to generate results are included in the report.

   ☐ Yes.
   ☐ No.
   ☐ Not applicable.

   Students' comment: None

9. The exact number of evaluation runs is included.

   ☐ Yes.
   ☐ No.
   ☐ Not applicable.

   Students' comment: None

10. A description of how experiments have been conducted is included.

    ☐ Yes.
    ☐ No.
    ☐ Not applicable.

    Students' comment: None

11. A clear definition of the specific measure or statistics used to report results is included in the report.

    ☐ Yes.
    ☐ No.
    ☐ Not applicable.

    Students' comment: None

12. Clearly defined error bars are included in the report.

    ☐ Yes.
    ☐ No.
    ☐ Not applicable.

    Students' comment: None

13. A description of the computing infrastructure used is included in the report.

    - ☐ Yes.
    - ☐ No.
    - ☐ Not applicable.

    Students' comment: None