Weakly Supervised Learning for Findings Detection in Medical Images

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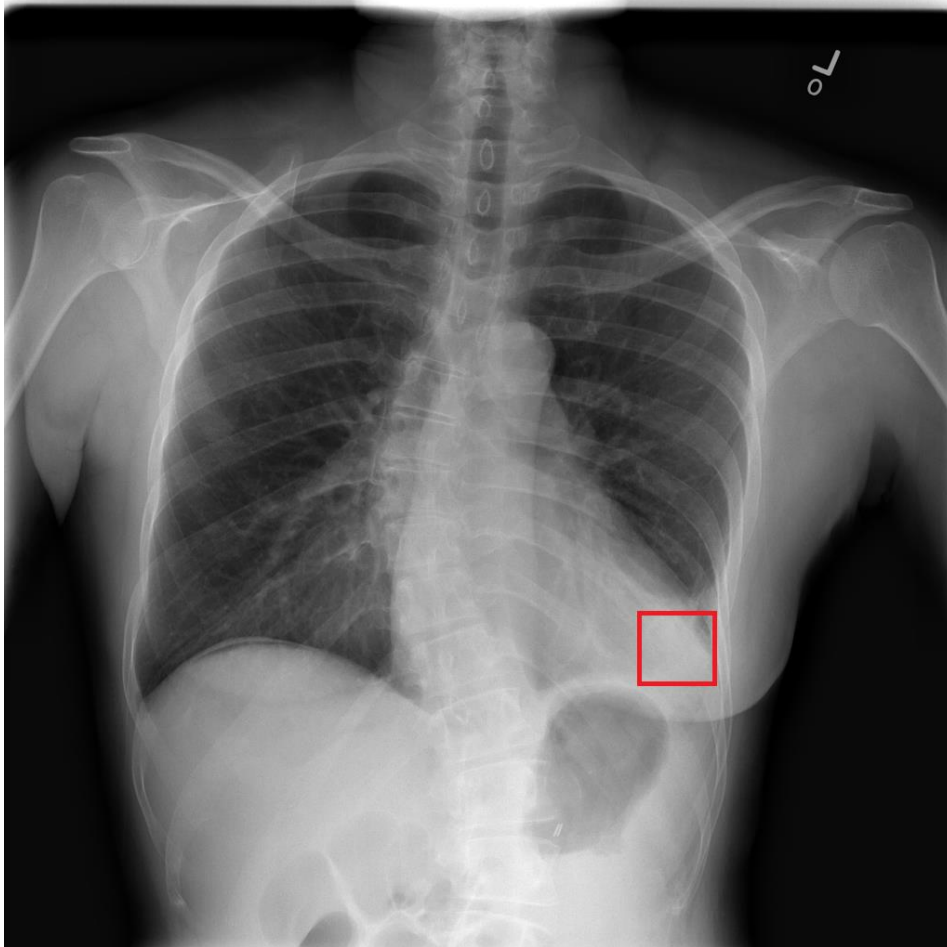
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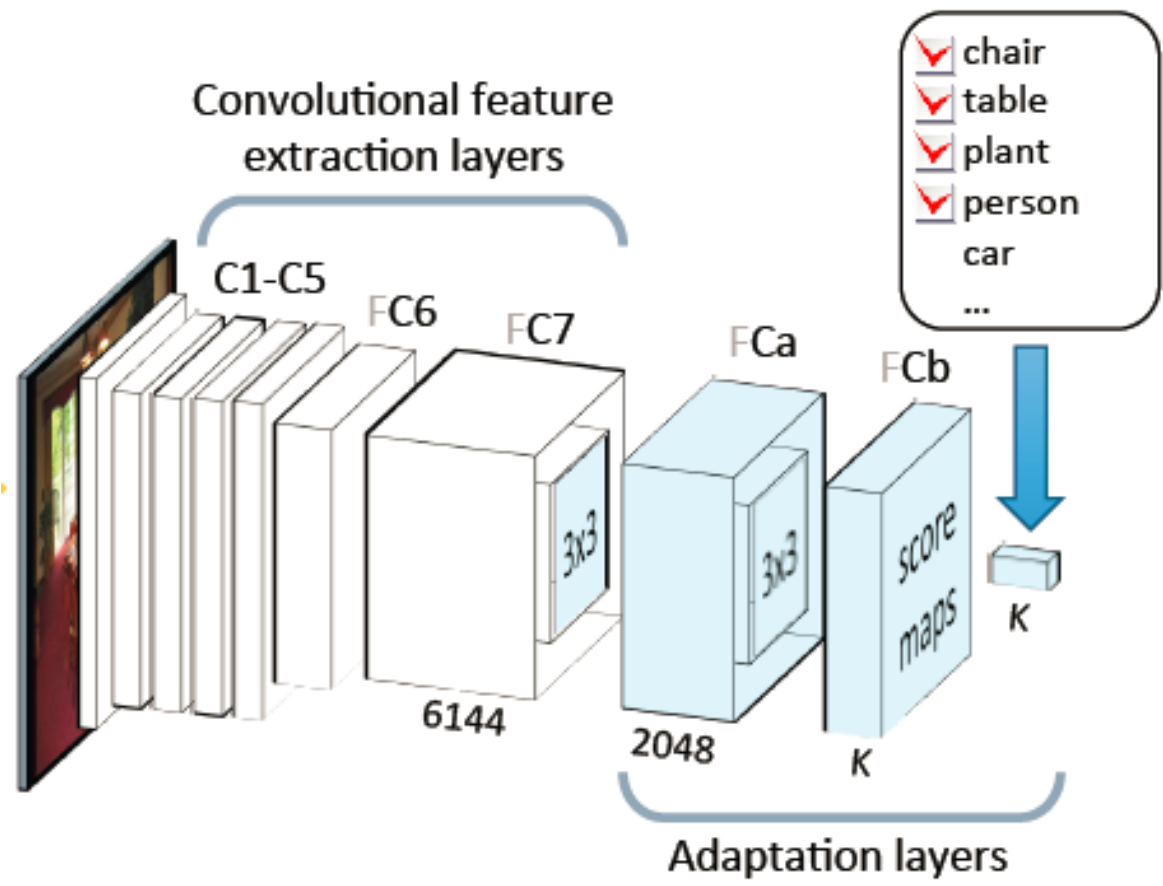
Task

Task

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- 14 Findings (classes)

- Predict bounding box + class

- Training data has only class labels

Naïve method

Dataset

- We use NIH ChestX-ray 14 dataset
  https://nihcc.app.box.com/v/ChestXray-NIHCC

- Training set (111240)
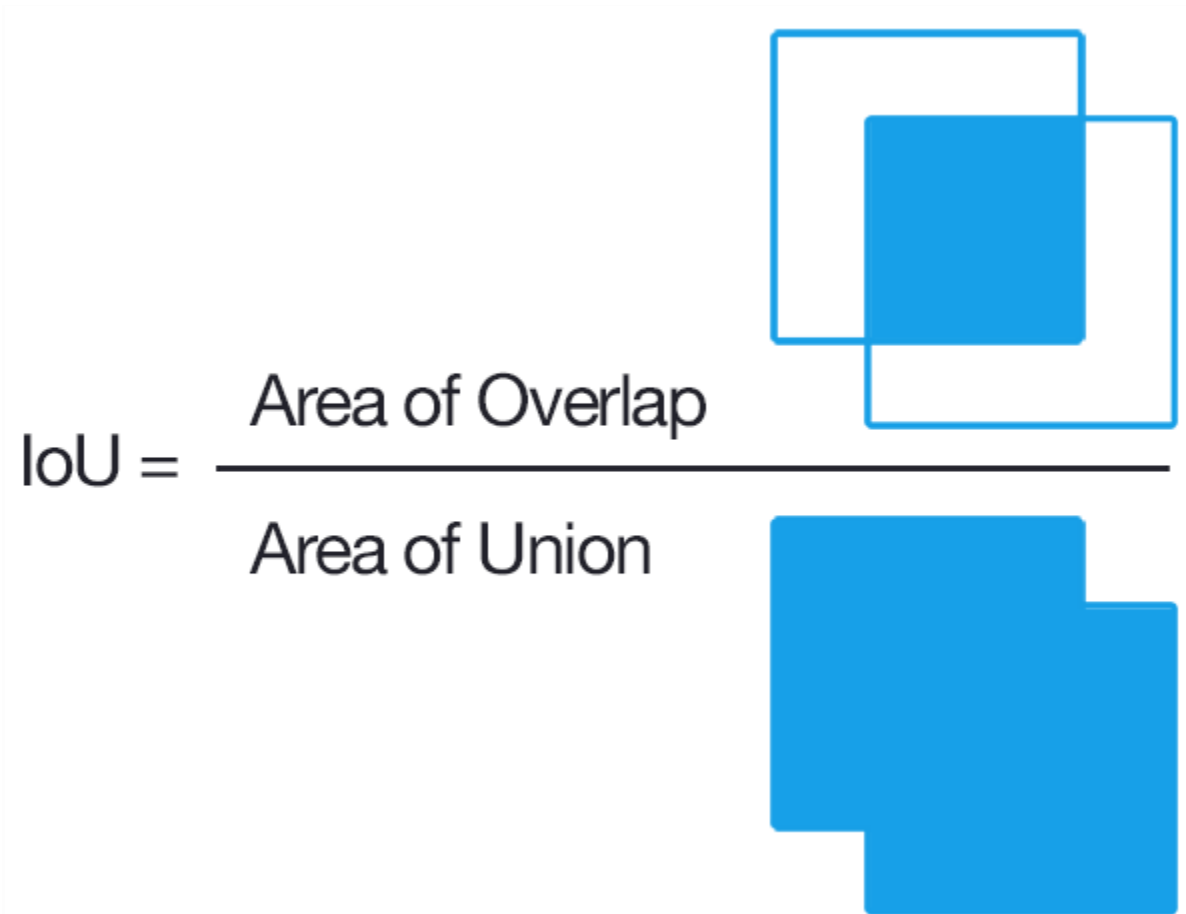
- Validation set (440)

- Testing set (440)

Download

- Data_Entry_2017_v2.csv
  Image-level annotation for all images.

- Bbox_List_2017.csv
  Bounding box annotation for validation / testing images.

- train.txt / valid.txt / test.txt
  Lists of images in each set.

Grading

- 60% accuracy

- 40% novelty & report or poster

Intersection over Union

$$IoU = \frac{\text{Area of Overlap}}{\text{Area of Union}}$$

Accuracy

- For each ground truth box in a test image, we'll check if there is an output box correctly locate this box.
  - Class label is correctly predicted.
  - IoU of ground truth box and predicted box >= T(IoU).
- The ratio of successful ground truth boxes in an image is the score of the image.
- The average score of all images is the score of a specific T(IoU).
- The final score is the average of T(IoU)=0.25 and T(IoU)=0.5.
- You must output up to 10 bounding boxes per image.

Typical workflow of a submission

1. Call get_file_names() to get the list of files.
2. Load your model.
3. For each image, inference the answer.
4. Call get_output_file_object() to get the output file object.
5. Write the output.
6. Call judge() to get the result.

Note that the timestamp created when judge() is called is used for judging if the submission is on time.

Submission

- Submission for evaluating on testing data
  - During this competition, you can submit your model to be evaluated on testing data.

- Final submission
  - After you complete your project, you should submit your whole project so that we can verify your result.

Final Submission

- Your final submission should contain the following:
  - Trained model & Whole Code
  - Document & report

Task Restrictions

- Keras / PyTorch / TensorFlow / MXNet / CNTK
- You can only submit a single archive containing all the codes and model. This archive must not exceed 1GB in size.

Restrictions on Dataset

- Stick to the dataset provided by link.

- The bounding boxes of validation / testing set are publicly disclosed, but you may not use them to train your model.

- You are allowed to use only the following extra context:
  Patient Age / Patient Gender / View Position

Pre-trained Model

- The pre-trained model should only be trained by the ImageNet dataset for classification and localization.

- You can download any available pre-trained model from the internet
  - Make sure that it is only trained by the ImageNet dataset for classification and localization.
  - Make sure you have the rights to use the model.

- You can create your own pre-trained model, but it should be trained from randomly-initialized parameters.

Rules

- The final model must only rely on the training / validation set. The bounding boxes of the validation set can only be used to validate your model.
- For grading, you must submit your model / algorithm to the submission site before the deadline following the submission rules.
- All submitted materials must be created by the team members or the team members must have proper rights to use them.
- All novelty must be created solely by the team members. No assistance from outside of the team is allowed.
- Course regulations, the contract, and school regulations bust be followed.

Contacts

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- In general, we will announce your questions and our answers to all students instead of replying to each email.