Assignment: Kaggle Competition Peer Review

You passed!
Congratulations. You earned 30 / 30 points. Review the feedback below and continue the course when you are ready. You can also help more classmates by reviewing their submissions.

Review Classmates' Work (/learn/predictive-analytics/peer/7A5tl/kaggle-competition-peer-review/give-feedback)

Instructions (/learn/predictive-analytics/peer/7A5tl/kaggle-competition-peer-review)

My submission (/learn/predictive-analytics/peer/7A5tl/kaggle-competition-peer-review/submit)

Discussions (/learn/predictive-analytics/peer/7A5tl/kaggle-competition-peer-review/discussions)

Thank you for completing a peer reviewed assignment! Please take this survey to help us improve your experience. (https://www.surveymonkey.com/r/Z8KFSCC?c=assignmentId%3Dd-HQgXm0EeWupg5ku0S64Q%401&c=courseId%3D3mA6QTlyEeWsOA5fzAmxbw&c=itemId%3D7A5tl&c=submissionId%3D-2v4f70YEeWGphLhfbPAyQ&c=userId%3D3871654)

Facial Keypoints detection

January 17, 2016

Shareable Link (https://www.coursera.org/learn/predictive-analytics/peer/7A5tl/kaggle-competition-peer-review/review/-2v4f70YEeWGphLhfbPAyQ)

Part 1: Problem Description. Give the name of the competition you selected and write a few sentences describing the competition problem as you interpreted it. You want your writeup to be self-contained so your peer-reviewer does not need to go to Kaggle to study the competition description. Clarity is more important than detail. What's the overall goal? What does the data look like? How will the results be evaluated?

Example: "The task is to predict whether a given passenger survived the sinking of the Titanic based on various attributes including age, location of the passenger's cabin on the ship, family members, the fare they paid, and other information. Solutions are evaluated by comparing the percentage of correct answers on a test dataset."

The task is to automatically locate specific key-points (e.g. left eye center, nose tip, mouth right corner, etc.) on facial images.
Training dataset contains 7,049 grayscale facial images (96 x 96 pixels) with xy co-ordinates of 15 key-points.
Test dataset contains 1,783 images without any key-points location(s).
Results are evaluated based on distance of predictions from pre-computed locations (not available in the data). Lower score indicates closer predictions. The competition description does not disclose methodology of the evaluation metric (or maybe I missed it)

Is the problem description clear and comprehensible?

- 0 pts
  The submission makes no real attempt to describe the problem.
- 2 pts
  The submission makes an attempt to describe the problem, I don't really understand what is being described.

Help Center

5 pts
The problem description is clear enough; I understand what is going on.

Part 2: Analysis Approach. Write a few sentences describing how you approached the problem. What techniques did you use?

Example: "I split the data by gender and handled each class separately. For the females, I trivially classified all of them as "survived." For the males, I trained a random forest as a classifier. I ignored the pclass atribute that indicated the location of the passenger's cabin because I didn't think it was relevant."

I followed the suggestion provided by the competition organizers of extracting a patch (21 x 21) of pixels around each keypoint and computing their mean pixel pattern.

The mean pixel pattern is then compared against a query patch. Comparison metrics include correlation and Minkowski similarities (Minkowski L1 distance is identical to Manhattan distance, Minkowski L2 distance is identical to Euclidan distance, etc.).

Would like to investigate the option of using external pre-trained classifiers (e.g. opencv haartraining).

Is the approach to the problem described clearly? Do you have some idea how you might employ these techniques to solve the problem?

0 pts
No real attempt was made to describe the approach to the problem.

2 pts
There's a description, but I don't fully understand what it's saying.

5 pts
The description is clear enough; I understand the approach.

Part 3: Initial Solution. Write a few sentences describing how you implemented your approach. What languages and libraries did you use? What challenges did you run into?

Example: "I partitioned the data by gender manually using Excel. I used Weka to build the random forest."

My implementation was in R utilizing ggplot2 (image plotting), proxy (matrix similarity computations) & caret (cross-validation & algorithms).

Challenges included figuring out how to create ggplots for image matrices (geom_raster on the reversed image vector) & overlaying the actual locations & query locations (used different shapes & colors for actual vs. query)

Is the initial solution implementation clearly described? Are the tools, languages, and libraries used reasonable?

0 pts
No significant attempt was made to answer the question.

2 pts
The implementation is described, but I don't fully understand how it works.

5 pts
The implementation is well-described; I understand how it works.

Part 4: Initial Solution Analysis. Write a few sentences assessing your approach. Did it work? What do you think the problems were?

Example: "My approach did not work so well, achieving a score of 0.65. This is less than the sample solution. I suspect I should not have ignored the pclass attribute."

Initial solution once again was plagiarized from the competition notes which involved computing the mean location of all keypoints across the training images. This was used as the prediction for all test images which resulted in a score of 3.9654.

Is the initial solution analysis comprehensible and reasonable?

- 0 pts
  No significant attempt was made to assess the approach.
- 2 pts
  There's an assessment, but I don't really understand what is being described.
- 5 pts
  The assessment is adequately described; I understand what's going on.

Part 5: Revised Solution and Analysis. Write a few sentences describing how you improved on your solution, and whether or not it worked.

Example: "I included the pclass attribute and ignored the ticket number attribute. My score improved to 0.68."

Initially I just focused on left_eye_center detection due to time & computing throughput constraints. The predictions for all other key-points defaulted to the training mean locations.

1. Extract mean pixel patch (21 x 21) around the keypoint location in the training data set

2. For each training image:

- Extract pixel patches for each center in a 5 x 5 grid around the keypoint location
- Compute similarity metrics for these 25 patches with the keypoint mean patch
  - correlation after transforming the patch matrix into a single vector
  - Minkowski distance (L1, L2 & L3) for matrices

3. Output patch center & associated metrics from all training images with a label as “training” input to a classifier

- label is “left_eye_center” for keypoint location
- label is “none” for all other patch centers

4. For each test image:

- Extract pixel patches for each center in a 5 x 5 grid around the keypoint mean location
- Compute similarity metrics

5. Output patch center & associated metrics from all test images as “test” input to a classifier

6. Train a GLMnet classifier on training patches

7. Predict labels for test patches

- Utilizing correlation resulted in a score of 3.93942 (0.66 %) improvement
  - not worth all that work !!!
  - but learnt a lot

Is the revised solution and analysis presented clearly?

- 0 pts
  No significant attempt was made to describe an improved solution.

2 pts
There's a description, but I don't fully understand it.

5 pts
The improvement is adequately described; I understand it.

Overall evaluation-Given the description provided, do you feel you would be able to reproduce the result?

0 pts
No, the description is too sketchy, incomplete, or unclear for me to be able to reproduce this result.

2 pts
No, but primarily because I don't have a strong enough background in the area; there is a fair amount of jargon used.

4 pts
Yes, I think I could reproduce the result with some effort.

5 pts
Yes, the solution is clearly and thoroughly described -- I could follow them easily.

Evaluating the analyses of others' is a great way to pick up new insights and viewpoints. What is one helpful thing you got out of reviewing this submission? (e.g. maybe ideas on analyzing solutions, incentive to go try this competition, etc.)?

Philip Olenyk
Learned about GLMnet. Need to try this method on my problem. Great work!

Muthu Kesavan
learnt some techniques first time, since i am new to this field.

Kelvin Rawls
Very nice and succinct. Well done explanation and very easy to understand. Use of bullets and indentation to highlight key-points used to good affect. Overall, is very well done.

(This question will not affect the submitter's score.) You're not expected to actually try and reproduce the submitter's result, but you may choose to do so. Did you try to reproduce the result?

No

Yes, but my result was different

Yes, and my result was the same.

Edit submission

Comments
Visible to classmates

share your thoughts...