

## CSCS 460 – Machine Learning

### Assignment 2 (Task 3)

Deadline: Thursday 30<sup>th</sup> March 2023 11:59 PM

#### Submission Guidelines:

- Submit all three tasks together as a single zip file on Moodle. All three tasks should have separate folders. Submit actual code files and not the snapshots.
- Only one member of the group has to submit on Moodle.
- Mention Roll numbers in the zip file name e.g., 23123123\_2351551.zip
- A viva will be conducted during office hours after the submission.

#### Task 1 Submission Checklist

- Use your images dataset with same preprocessing as before (i.e., resize images to 32x32 and flatten each image into one vector). Do this for both train and test split.
- Use age as a label
- Use sklearn **Linear Regression to train a model (aka OLS regression)** using training split. Print the learned regression coefficients (aka parameters, aka weights, aka thetas).
- Save the trained model on hard drive. You can use pickle dump to save the model object.
- Get prediction using the trained model for testing split.
- Compute  $R^2$  and MSE for predictions.
- Submit the code files.

#### Task 2 Submission Checklist

- Use your images dataset with same preprocessing as before (i.e., resize images to 32x32 and flatten each image into one vector). Do this for both train and test split.
- Use age as a label
- Use sklearn **SGD Linear Regression to train a model** using training split. Print the learned regression coefficients (aka parameters, aka weights, aka thetas).
- Save the trained model on hard drive.
- Get prediction using the trained model for testing split.
- Compute  $R^2$  and MSE for predictions.
- Compare the  $R^2$  and MSE with OLS Linear Regression model trained in task 1.
- Submit the code files.

#### Task 3

- 1) From task 1, you should have trained OLS Linear Regression model saved on hard drive.
- 2) From task 2, you should have trained SGD Linear Regression model saved on hard drive
- 3) Any machine learning model is eventually deployed in real-world. In this task, you are

require to use two models above to predict age in real-time using webcam. (You can also use your android mobile phone as a IP webcam by installing an app called IP Webcam and then connecting your laptop and the mobile phone on the same network. But using built-in laptop webcam is more convenient).

- a) Write a python script that loads two models that you saved in task 1 and task 2.
  - b) Open webcam in Python and read the webcam video stream.
  - c) For each frame in the webcam stream, get prediction for age from both models.
  - d) Display age predicted from model 1 to the left corner of the frame and display age predicted from model 2 to the right corner of the frame.
  - e) Show the video stream with predictions in real-time on screen.
  - f) If we press q or esc, the on-screen display should close and webcam should be closed.
- 4) **Optional: If you want, you can also use your model from Assignment 1 to show the prediction for your name ("your name", "unknown").**

### Task 3 Submission Checklist

- Submit the code file/s that perform the required functionalities for task 3.

### Some Helpful Libraries and Modules

- **Sklearn:** `LinearRegression`, `SGDRegressor`, `r2_score`
- **Numpy:** `flatten`, `reshape`
- **Cv2:** `resize`, `imread`, `imshow`, `VideoCapture`, `waitKey`, `destroyAllWindows`
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