**Assignment 2 (Task 3)**                                   **Deadline: Tuesday 24th October 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, putText
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