Deep Learning - COSC2779

Introduction to Assignment 1

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Key Dates and Important Information

- **Due Date**: Week 7, Monday 7th September 2020, 05:00pm. Late submission policy on canvas.
- **Marks**: 30% of the final mark.
- **Assignment Type**: Individual Assigment.
- **Task**: Design a deep learning system for head pose prediction from face images, *critically analysing each key element* of your system.

Clarifications/updates may be made via announcements/relevant discussion forums.

"**Predict the head pose of a person given an input image captured from a camera placed directly in front of the person**"

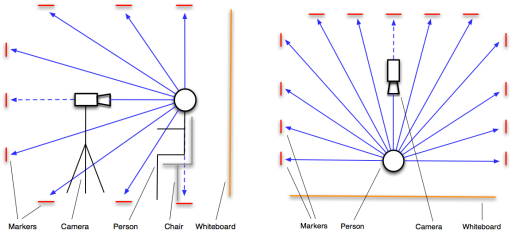
The head pose is quantified by two values:

- **Tilt** - Vertical angle of the head
- **Pan** - Horizontal angle of the head.

Applications: Driver monitoring, Attention recognition and Multi-view facial analysis. Example industrial application.

The original data is from Head Pose Image Database

Published with *N. Gourier, D. Hall, J. L. Crowley, "Estimating Face Orientation from Robust Detection of Salient Facial Features", Proceedings of ICPR International Workshop on Visual Observation of Deictic Gestures 2004.*



Face images of 15 persons with variations of pan and tilt angles from -90 to +90 degrees.
For every person, 2 series of 93 different poses are available.

Deliverable:

- **A report** (of no more than 3, plus up to 2 for appendices) critically analysing your approach and ultimate judgement. Should be in PDF format.
- Your **code** (Jupyter notebooks + python scripts) used to perform your analysis. Need to provide clear instructions and all the code necessary for someone to run you code. ZIP Format.
- A **set of predictions on the hold-out test data** from your ultimate judgement. Should be in CSV format as in `s1234567_predictions.csv`.

All to be uploaded to canvas before the due date.

Marking Guidelines

A detailed rubric is attached on canvas. In summary:

- Approach 40%;
- Ultimate Judgment & Analysis 20%;
- Performance on test set (Unseen data) 20%;
- Implementation 10%;
- Report Presentation 10%;

"This assignment isn't just about your code or model, but the thought process behind your work."

Academic Integrity and Plagiarism

You code and report will be screened using plagiarism checking software.

- Report: Turnitin
- Code: CodeQuiry

See section 6 on assignment specifications for more details.

Outline

Performance Metric for Test set

$$\mathcal{P} = \frac{1}{N}\sum_{i=1}^{N}\left|y_t^{(i)} - \hat{y}_t^{(i)}\right| + \frac{1}{N}\sum_{i=1}^{N}\left|y_p^{(i)} - \hat{y}_p^{(i)}\right|$$

$N \leftarrow$ Number of data points in the test set.

$y_t^{(i)} \leftarrow$ Ground-truth tilt for data point i.

$\hat{y}_t^{(i)} \leftarrow$ Predicted tilt for data point i.

$y_p^{(i)} \leftarrow$ Ground-truth pan for data point i.

$\hat{y}_p^{(i)} \leftarrow$ Predicted pan for data point i.

Things to Consider

- Have you selected appropriate baseline model with justification?
- Have you setup the evaluation framework correctly and justified?
- Did you improve the model based on evidence (make appropriate decisions)?
- Did you consider task specific issues?
- Evidence based ultimate judgment (Not just best MSE $\rightarrow$ Best model).
- Did you identify the issues with applying your model to real scenarios through model/output investigation?

Note: To get $\geq$ DI for approach, you need to demonstrate skills that goes beyond what is in lectures and labs.