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# EEEM071 Advanced Topics in Computer Vision and Deep Learning Coursework Assignment (2025)

## Vehicle Re-identification

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**Deadline: 4:00PM, Friday 11 April 2025 (week 10)**

**What to submit:** You should submit a single PDF-format report, along with the running evidence, *e.g.*, the log file. You must format your submission strictly following the provided template and convert the final report to the PDF format for submission.

Note, do NOT provide any other unrelated documents that might flood your submission and mislead the assessment process to lower the marks.

This coursework is worth **25%** of overall mark for EEEM071.

### 1 Introduction

Vehicle re-identification (Re-ID) is a challenging computer vision task that aims to match vehicle images captured from non-overlapping camera views. The goal is to identify the same vehicle instance across multiple camera views, which can be useful for traffic management and law enforcement applications. Vehicle Re-ID has several challenges, including variations in viewpoint, illumination, occlusion, and camera hardware differences. Researchers have proposed various approaches to tackle these challenges, including deep learning-based methods that leverage powerful feature representations to match similar vehicles. The performance of vehicle Re-ID has improved significantly in recent years, but it remains an active area of research due to its practical importance and technical difficulty.

The purpose of this coursework is to gain real-world development experience in design, training, and evaluation of a Convolution Neural Network (CNN) for vehicle Re-ID. This will be achieved through the Google Colab with PyTorch as the framework.

#### 1.1 Required Resources for this Coursework

To do this coursework you will need to connect to Google Colab. Please refer to your lab sheets of **W5-W10** for more tutorials.

#### 1.2 Getting Started

To better understand the motivation, definition, basic methods, and evaluation metrics of Re-ID, we suggest reading these two surveys before you start:

- [Deep Learning for Person Re-Identification: A Survey and Outlook \[3\]](#) (In particular, Sec.1 Introduction and Sec.2 Closed-World Person Re-Identification)
- [Trends in Vehicle Re-Identification Past, Present, and Future: A Comprehensive Review \[1\]](#) (In particular, Sec.1.3 Re-Identification, Sec.2.4 Vision-Based Vehicle Re-Identification and Sec.3 Vision-Based State-of-the-Art Vehicle Re-Identification Approaches)

We have lab sessions provided on the tutorial of PyTorch to train and test CNNs for image classification, coupled with knowledge from the associated lectures. The PyTorch Introductory lab sheet and the lecture slides from these sessions remain available on SurreyLearn in case you missed any classes. All these are helpful for this coursework assignment.

### 1.3 Support for Coursework Starting

We have provided a reference code base in this [Github repo](#) and a [Colab](#) demo to show how to start. For any problems, please feel free to open an issue in the repo.

## 2 Deliverables

It is recommended that you run your project in the Colab to undertake the task in this coursework. For the report, you must document the experiments performed using your software. The University has moved to **electronic submission of the coursework on SurreyLearn**.

## 3 Plagiarism

**You must complete this coursework individually.** If you copy code or text from the web, or another student, and include it in your project without clear attribution, then you have committed plagiarism. Undetected plagiarism degrades the quality of your degree, as it interferes with our ability to assess you and prevents you learning through properly attempting the coursework. Consequently if we suspect plagiarism you will be referred to an Academic Misconduct Panel which may carry with it academic sanctions.

## 4 Dataset

We provide a dataset (VeRi) for this coursework [\[2\]](#). It contains around 11K images of 776 vehicles captured by 20 cameras covering a  $1.0 \text{ km}^2$  area in 24 hours, which makes the dataset scalable enough for vehicle Re-ID research.

### 4.1 Dataset Access

[Click here to download](#)

**Please don't distribute this dataset or use it for any other purposes.**

## 5 Starting Early!

It takes quite time to train a deep learning model. For instance, training a specific ResNet on this task will take a while depending on the GPU resource. You should start this coursework project early to reduce the stress level of completing the deadline.

## 6 Feedback

This will comprise an overall mark and some written feedback.

## 7 Extensions

No extensions will be granted to this coursework unless in exceptional circumstances. Even then, extension requests must be made via the Extenuating Circumstances (ECs) process as your lecturer is not permitted to grant adhoc extension requests whatever the reason.

## References

- [1] Jianhua Deng, Yang Hao, Muhammad Saddam Khokhar, Rajesh Kumar, Jingye Cai, Jay Kumar, and Muhammad Umar Aftab. Trends in vehicle re-identification past, present, and future: A comprehensive review. *Mathematics*, 9(24):3162, 2021. 2
- [2] Xinchun Liu, Wu Liu, Huadong Ma, and Huiyuan Fu. Large-scale vehicle re-identification in urban surveillance videos. In *International Conference on Multimedia and Expo (ICME)*. IEEE, 2016. 2
- [3] Mang Ye, Jianbing Shen, Gaojie Lin, Tao Xiang, Ling Shao, and Steven CH Hoi. Deep learning for person re-identification: A survey and outlook. *IEEE transactions on pattern analysis and machine intelligence*, 44(6):2872–2893, 2021. 2