COMP1801	**Machine Learning**	**Faculty Header ID:**	**Contribution 100% of course**
Course Leader **Dr. Mihai Polceanu**	**COMP1801 Coursework**		**Deadline Date:** **11/12/2020**
This coursework should take an average student who is up-to-date with tutorial work approximately 30 hours Feedback and grades are normally made available within 15 working days of the coursework deadline			
Learning Outcomes: 1. Demonstrate knowledge and understanding of the major approaches to machine learning. 2. Understand the different types of learning algorithms. 3. Critically evaluate the merits and limitations of machine learning approaches and algorithms and evaluate the choice of algorithms for specific real-world contexts and requirements. 4. Apply machine learning algorithms to selected real-word problems in practice and understand the processes involved in their deployment.			

Plagiarism is presenting somebody else's work as your own. It includes: copying information directly from the Web or books without referencing the material; submitting joint coursework as an individual effort; copying another student's coursework; stealing coursework from another student and submitting it as your own work. Suspected plagiarism will be investigated and if found to have occurred will be dealt with according to the procedures set down by the University. Please see your student handbook for further details of what is / isn't plagiarism.

All material copied or amended from any source (e.g. internet, books) must be referenced correctly according to the reference style you are using.

Your work will be submitted for plagiarism checking. Any attempt to bypass our plagiarism detection systems will be treated as a severe Assessment Offence.

Coursework Submission Requirements

- An electronic copy of your work for this coursework must be fully uploaded on the Deadline Date using the link on the coursework Moodle page for COMP1801.
- For this coursework you must submit a single PDF document. In general, any text in the document must not be an image (i.e. must not be scanned) and would normally be generated from other documents (e.g. MS Office using "Save As .. PDF"). An exception to this is hand written mathematical notation, but when scanning do ensure the file size is not excessive.
- There are limits on the file size (see the relevant course Moodle page).
- Make sure that any files you upload are virus-free and not protected by a password or corrupted otherwise they will be treated as null submissions.
- Your work will not be printed in colour. Please ensure that any pages with colour are acceptable when printed in Black and White.
- You must NOT submit a paper copy of this coursework.
- All courseworks must be submitted as above. Under no circumstances can they be accepted by academic staff

The University website has details of the current Coursework Regulations, including details of penalties for late submission, procedures for Extenuating Circumstances, and penalties for Assessment Offences.

See http://www2.gre.ac.uk/current-students/regs

Detailed Coursework Specification

Designing a machine learning solution requires considering several aspects of the problem, the nature of the problem addressed, model choice, evaluation among others. It is important for our students to be up to date with current practices and Machine Learning techniques used in the modern software that drives many computers and devices today and be familiar with their strengths and limitations. Adding these skills to their portfolio will increase the employability of our graduates and will help them to aim for higher paying jobs in industry, as well as academia.

Tasks:

1. **Practical Assignment (60 Marks)** (complete code, trained model and data to replicate the results). The source code must be **error free** (i.e. no debugging necessary to run). Minimum requirements:
   - Coherent implementation (no errors, sound training pipeline),
   - Above random accuracy (at least slightly better than flipping a coin (i.e. no model)),
   - Sound evaluation
2. **Written Report (40 Marks)** (2-4 pages of detailed description of the steps taken in carrying out the project):

- Document in IEEE conference format (Use template available online: https://www.ieee.org/conferences/publishing/templates.html)
- Should include references (citing other work) where appropriate (when images, data, code, or any other resources have been used from other sources)
- Document structure:
    - **Introduction**: Introduce the problem to be solved (motivation, expectances, goals, implications)
    - **Related work**: Short survey of other existing work that is closely connected with your subject/problem
    - **Dataset preparation**: Describe data collection, processing and partitioning (sources, augmentation techniques, training setup, …)
    - **Proposal**: Motivate model-related choices, explain the model fitting process (motivate decisions during training, plots, …)
    - **Evaluation**: Evaluate and present model performance (demo, speed/accuracy comparison, plots, …) highlighting the pros and cons of your approach (focus on both good and bad: an unsatisfactory result, if well explained, can help others focus on working solutions)
    - **Future work**: Reflections on how your work could be extended in the future
    - **References**: All existing works and resources (code/images/etc) you used or talked about in your report must be cited properly

Deliverables:

An admissible coursework submission needs to include:

- All source code, data and trained models must be archived into a single file and uploaded by the Deadline Date using the link on the coursework Moodle page for COMP1801.
- The final written report must be uploaded by the Deadline Date using the link on the coursework Moodle page for COMP1801.

Grading Criteria

For a distinction (mark over 70) the following is required:

- A very good implementation, showing a system with all requirements implemented; all components are working and provide a good result.
- A very good report and demonstrating a good understanding of motivating, building and evaluating a working machine learning application.

Note: In order to be eligible for very high marks (**80 and over**) you will need to have:

- An excellent implementation, showing all requirements are implemented to a higher standard. The components should be working properly and provide an excellent result; potentially extra credit features implemented.
- An excellent report with excellent portfolio, demonstrating a thorough understanding of motivating, building and evaluating a working machine learning application.

For a mark in the range 60 to 69 the following are required:

- A good implementation, showing a system with minimum requirements implemented: coherent implementation (no errors, sound training pipeline), above random accuracy (at least slightly better than flipping a coin (i.e. no model)), sound evaluation; components are working and provide a reasonable result.
- A good report demonstrating a good understanding of motivating, building and evaluating a working machine learning application.

For a mark in the range 50 to 59 the following are required:

- An implementation showing a system with at least following minimum requirements implemented: coherent implementation (no errors, sound training pipeline), above random accuracy (at least slightly better than flipping a coin (i.e. no model)), sound evaluation.
- A satisfactory report showing some understanding of motivating, building and evaluating a working machine learning application.

For a mark below 50:

- A system with a very few requirements implemented.
- A poor report showing little understanding of motivating, building and evaluating a working machine learning application.

Assessment Criteria

The practical assessment = 60 Marks

Marks will be given for:

- Features implemented.
    - The extent to which a successful training and evaluation pipeline was implemented will have an important effect on your overall mark.

- The quality of the system you produce.
    - Credit will be given for excellent robust design, complexity of the implementation, components that are working in various situations

without giving any errors and reliably producing good result; possible enhancements to the system.

The report = 40 Marks

Marks will be given for:

- Critical understanding of relevant concepts and appropriate explanation and discussion
- Quality of the report
    - Are all the required sections included and completed properly? Is the report clear, well formatted and easy to read? Does it have a logical structure? Does it have a discussion on design decisions? Is the evaluation realistic, does it show that you have really thought about your system and how you went about developing it?