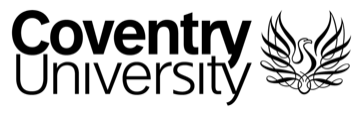
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Student Assignment Brief

**This document is intended for Coventry University Group students for their own use in completing their assessed work for this module. It must not be passed to third parties or posted on any website. If you require this document in an alternative format, please contact your Module Leader.**

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The work you submit for this assignment must be your own independent work, or in the case of a group assignment your own groups’ work. More information is available in the ‘[Assignment Task](#_Assignment_Task)’ section of this assignment brief.

# Assignment Information

**Module Name:** Artificial Neural Networks

**Module Code:** 6057CEM

**Assignment Title:** Coursework

**Assignment Due: 10/04/25 by 18.00hrs**

For assessments that are submitted through Turnitin, the University allows a 24-hour grace period for receipt of submission. Therefore, submission will only be accepted up until 11.04.2025 by 18.00hrs. This should NOT be viewed as extra time to complete the assessment but is provided to allow for any unforeseen technical issues that may occur around the submission deadline, especially when Turnitin is handling large numbers of submissions.

**Assignment Credit:** 20 credits

**Word Count (or equivalent):** 3000 words

You should state your word count at the end of written work. If you exceed the word limit by more than 10% (i.e. if you exceed 3300 words), then your work will only be read up to the allocated limit.

**Assignment Type:**

**Percentage Grade** (Applied Core Assessment). You will be provided with an overall grade between 0% and 100%. You have one opportunity to pass the assignment at or above 40%.

# Assignment Task

**Task**: Developing and Evaluating Neural Network Models for Real-World Data.

**Task Description:**

* **Dataset**:  
  For this coursework, you will use the Iris Dataset (available in the UCI Machine Learning Repository). The Iris dataset consists of 150 samples with four features: sepal length, sepal width, petal length, and petal width. The task is to classify these samples into one of three species: Setosa, Versicolour, or Virginica.
* Link: [Iris Dataset](https://archive.ics.uci.edu/ml/datasets/Iris)
* Features: sepal length, sepal width, petal length, petal width
* Target: species (Setosa, Versicolour, Virginica)
* **Model Development:**
* **Part A: Exploratory Data Analysis (EDA):**

Preprocess the data and perform EDA on Iris Dataset. This should include Data Visualization, Feature Scaling, and splitting into training, validation, and test sets.

* **Part B: Neural Network Design:**

Design two different neural network models; for example, Feed-Forward and Convolutional Neural Network. Compare both architectures and justify your choices based on dataset and problem at hand.

* **Part C: Model Training:**

Train the models with Keras by using appropriate learning techniques, such as backpropagation and Adam optimizer.

* **Part D: Evaluation:**

Evaluate the models using accuracy, precision, recall, F1-score, and confusion matrices. Discuss the results, limitations, and potential improvements for future models.

* **Code Submission:**All code should be committed regularly to a GitHub repository. Ensure:
* Frequent commits showing consistent progress.
* Well-documented code with comments explaining key functions.
* Inclusion of a README.md file with instructions for running the project.

### Submission Instructions:

**1. Technical Report (PDF or DOCX):**

* Sections: Introduction, Dataset Description, Model Design, Evaluation, and Conclusion (approximately 3000 words).
* Include links to:

‐ A demonstration video (max 5 minutes).

‐ Your GitHub repository.

**2. Codebase:**

Submit your GitHub repository link via Aula.

**3. GitHub**

A group account will be set up for this module on the university’s GitHub platform, and you will be added to it. Once added, you must create your own repository within the group account to submit and manage your coursework. The Module Leader will provide clear instructions on how you can set up your repository and manage your work throughout the module. Please make sure to follow these instructions carefully.

**Important Requirements:**

As part of the development process, you must commit your code regularly to GitHub. The final mark will be significantly influenced by both the frequency of commits and how they are distributed over the duration of the project.

Ensure your GitHub commits reflect consistent progress. Avoid submitting all changes at the last minute.

Commit meaningful updates regularly, if you fail to commit regularly to GitHub, you must attend a **viva** to justify the originality of your work. Failure to attend the viva or provide sufficient justification for the originality of your work may result in **failure of the module**.

You must use Keras to train two different neural network models for this coursework.

You are not allowed to use:

* Statistical models such as [e.g., Logistic Regression, Decision Trees, or other traditional machine learning methods].
* Other deep learning frameworks or libraries like PyTorch or any non-Keras-based Python deep learning plugins.

Failure to follow these instructions will result in a loss of marks, and models implemented using disallowed methods will not be considered for grading. Ensure that your implementation strictly adheres to the requirements specified in the coursework brief.

Academic staff will not be responsible for removing submissions that are made in error. Therefore, please take care in checking your submission before uploading to the final assessment submission link. You may submit multiple times to the final assessment link but do remember that obtaining a similarity report may take up to 24 hours and this should not be attempted close to the deadline. You may also utilise the draft link in the community pages for checking your similarity scores prior to the deadline.

If you experience any technical problems when trying to submit your work, please consult Aula help via the question mark link.  If these problems are experienced at the time of the submission deadline and cannot be quickly resolved, please capture screenshots as evidence and email these and your completed assessment to the module leader as soon as possible**.** Whilst this cannot be marked it could be used as evidence that you’ve gained no time advantage on your work should this be needed for an appeal.

### ****Assessment Criteria:****

| **Criteria** | **Weight** |
| --- | --- |
| Data Preparation and EDA | 20% |
| Model Design and Implementation | 30% |
| Model Evaluation and Analysis | 20% |
| Critical Analysis of Trends | 10% |
| GitHub Usage and Documentation | 10% |
| Report Quality and Presentation | 10% |

# Development of Skills and Attributes

The coursework will enable the students to critically discuss and use appropriate language to share complex scientific information The coursework provides an opportunity for students to develop skills and behaviours that foster graduate attributes such as being able to adapt their approach, get things done and think creatively.

# Marking and Feedback

**How will my assignment be marked?**

Your assignment will be marked by the module team

**How will I receive my grades and feedback?**

Provisional marks will be released once internally moderated.

Feedback will be provided by the module team alongside grades release.

The students can access their feedback via the submission link, along with the marks.

Your provisional marks and feedback should be available within 2 weeks (10 working days).

**What will I be marked against?**

Details of the marking criteria for this task can be found at the [bottom of this assignment brief](#Marking_Rubric).

# Assessed Module Learning Outcomes

The Learning Outcomes for this module align to the [marking criteria](#Marking_Rubric) which can be found at the end of this brief. Ensure you understand the marking criteria to ensure successful achievement of the assessment task. The following module learning outcomes are assessed in this task:

1. Demonstrate a good understanding of the fundamental concepts of artificial neural networks including their biological inspiration.
2. Compare and contrast the different architectures and learning approaches available in neural network systems.
3. Design and develop different neural network models applying appropriate learning approaches for real world applications.
4. Use the available neural network simulators, develop solutions to real-world problems and appraise their limitations.
5. Critically evaluate the trends in neural network developments.

# Assignment Support and Academic Integrity

If you have any questions about this assignment please see the [Student Guidance on Coursework](https://share.coventry.ac.uk/students/Registry/Pages/Coursework.aspx) for more information.

### Spelling, Punctuation, and Grammar:

You are expected to use effective, accurate, and appropriate language within this assessment task.

### Academic Integrity:

The work you submit must be your own, or in the case of groupwork, that of your group. All sources of information need to be acknowledged and attributed; therefore, you must provide references for all sources of information and acknowledge any tools used in the production of your work, including Artificial Intelligence (AI). We use detection software and make routine checks for evidence of academic misconduct.

Definitions of academic misconduct, including plagiarism, self-plagiarism, and collusion can be found [on the Student Portal](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fshare.coventry.ac.uk%2Fstudents%2FRegistry%2FPages%2FEssential-definitions.aspx&data=05%7C01%7Cab5576%40coventry.ac.uk%7C96dc42ffe3484dd999e808db0e964c5d%7C4b18ab9a37654abeac7c0e0d398afd4f%7C0%7C0%7C638119810903032146%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=%2FggkmIN9ZackqogiKZxEXKYD3QaXAk0jCME%2F1ne82YU%3D&reserved=0). All cases of suspected academic misconduct are referred for investigation, the outcomes of which can have profound consequences to your studies. For more information on academic integrity please visit the [Academic and Research Integrity](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fshare.coventry.ac.uk%2Fstudents%2FRegistry%2FPages%2FAcademic-and-Research-Integrity.aspx&data=05%7C01%7Cab5576%40coventry.ac.uk%7C96dc42ffe3484dd999e808db0e964c5d%7C4b18ab9a37654abeac7c0e0d398afd4f%7C0%7C0%7C638119810903032146%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=%2BPYuaO%2FDqY2x3ajLRlKjxHoEvTPzEqm%2B8wuQ%2FMvxlZk%3D&reserved=0) section of the Student Portal.

It is your responsibility to keep a record of how your thinking has developed as you progress through to submission. Appropriate evidence could include version-controlled documents, developmental sketchbooks, or journals. This evidence can be called upon if we suspect academic misconduct.

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### AI Use Guidance for your Coursework

Students are encouraged to responsibly incorporate AI tools into their coursework to enhance learning and productivity. You may use AI for tasks like cleaning and preparing data, identifying missing values, or visualizing trends, as these can help streamline your work. AI-powered resources, such as tutorials or concept explanations, are excellent tools for building your understanding of techniques or methodologies. Additionally, AI can assist in generating boilerplate code, troubleshooting errors, or improving the clarity and grammar of your reports using tools like Grammarly. However, any output from AI tools must be thoroughly reviewed, understood, and customized to meet the specific needs of your project.

While using AI tools, it is essential to avoid any practices that compromise academic integrity. Students must never rely on AI to complete an entire task, such as implementing complete models, writing entire reports, or performing evaluations without their input. Misusing AI in this way undermines your learning process and violates academic policies. Furthermore, it is strictly prohibited to fabricate results, evaluations, or trends using AI tools. Academic work must reflect your own efforts, understanding, and critical analysis, ensuring the final submission is authentic and meaningful.

Proper acknowledgment is key when incorporating AI into your coursework. Always disclose how and where AI tools have been used in your work to maintain transparency. Submitting AI-generated work as your own without acknowledgment is considered plagiarism and will result in penalties. By using AI tools responsibly and honestly, you can maximize their benefits while upholding academic integrity and ensuring your work reflects your own skills and understanding.

### How to Acknowledge AI Use

If using Artificial Intelligence (AI) tools in the development of your assignment, you must reference which tools you have used and for what purposes you have used them. This information must be acknowledged in your final submission. This could include the use of the following table:

|  |  |
| --- | --- |
| Tool​ | Usage |
| e.g. GitHub Copilot​ | |  | | --- | | Suggesting code snippets for implementing a login system. |  |  | | --- | |  | |
| e.g. ChatGTP | |  | | --- | | Explaining complex algorithms like backpropagation in neural networks. |  |  | | --- | |  | |
| e.g. Google Gimini | Improving grammar and sentence structure in a technical report. |

### Support for Students with Disabilities or Additional Needs:

If you have a disability, long-term health condition, specific learning difference, mental health diagnosis or symptoms and have discussed your support needs with health and wellbeing you may be able to access support that will help with your studies.

If you feel you may benefit from additional support, but have not disclosed a disability to the University, or have disclosed but are yet to discuss your support needs it is important to let us know so we can provide the right support for your circumstances. Visit [the Student Portal](https://livecoventryac.sharepoint.com/sites/students-healthandwellbeing/SitePages/Disabilities.aspx) to find out more.

### Unable to Submit on Time?

The University wants you to do your best. However, we know that sometimes events happen which mean that you cannot submit your assessment by the deadline or sit a scheduled exam. If you think this might be the case, guidance on understanding what counts as an extenuating circumstance, and how to apply is [available on the Student Portal.](https://livecoventryac.sharepoint.com/sites/students-registry-extensions-deferrals/SitePages/CU-Extensions-and-Deferrals-Guidance.aspx)

# Administration of Assessment

**Module Leader Name:** Manizheh Montazerian

**Module Leader Email:** ae4322@coventry.ac.uk

**Assignment Category:** Practical Project

**Attempt Type:** Standard

**Component Code:** CW

## Assessment Marking Criteria

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Grade** | **Data Preparation and EDA (20%)** | **Model Design and Implementation (30%)** | **Model Evaluation and Analysis (20%)** | **Critical Analysis of Trends (10%)** | **GitHub Usage and Documentation (10%)** | **Report Quality and Presentation (10%)** |
| **First (≥70)**  **76-78** | Innovative techniques, exceptional cleaning, and advanced EDA with insights well connected to the objectives. | Advanced model design with creative techniques, extensive optimization, and thorough justifications. | Comprehensive evaluation using advanced metrics, clear comparisons, and critical insights. | Exceptional critical analysis of trends, with insightful, original observations and integration of theoretical concepts. | Exemplary GitHub usage with meaningful, frequent commits, comprehensive documentation, and proper version control. | Outstanding report with exceptional structure, vocabulary, diagrams, and references, meeting or exceeding academic standards. |
| **72-76** | Excellent data cleaning, comprehensive visualizations, and meaningful insights with minor gaps. | Well-designed model with advanced techniques and detailed implementation, with slight areas for improvement. | Detailed evaluation with multiple metrics, effective comparisons, and meaningful analysis. | Detailed analysis of trends with critical observations and supported insights. | Comprehensive GitHub usage with frequent commits and detailed documentation. | High-quality report with strong presentation, excellent diagrams, and a polished style. |
| **68-72** | Good cleaning, feature engineering, and visualizations but less extensive than required for excellence. | Effective model design with reasonable optimizations, but lacking some advanced elements or creativity. | Good evaluation using key metrics, with some comparative analysis and trends identified. | Good analysis of trends with reasonable explanations and minor critical observations. | Well-maintained repository with good documentation and sufficient commits. | Well-structured report with clear explanations, relevant diagrams, and proper referencing. |
| **64-68** | Data cleaning and EDA are adequate but limited, with missing details or superficial insights. | Functional model with minor optimizations but limited exploration of advanced techniques. | Adequate evaluation using standard metrics, with limited comparative analysis or trends discussion. | Some analysis of trends, but lacking depth or critical observations. | Functional GitHub repository but with basic documentation and few meaningful commits. | Report is clear and mostly well-structured but could improve in clarity, depth, or polish. |
| **60-64** | Basic data cleaning and visualizations with incomplete or inconsistent insights. | Basic model design with minimal optimizations or justifications. | Basic evaluation with limited metrics, lacking meaningful analysis or trends. | Basic observations of trends with little analysis. | Repository contains limited commits, documentation, or structure. | Report lacks clarity in some areas, with minimal diagrams or weak referencing. |
| **50-58** | Superficial or inconsistent EDA with notable gaps in data preparation or cleaning. | Poorly designed model with limited functionality and no optimizations. | Incomplete evaluation with minimal metrics or analysis. | Minimal trend analysis with basic observations and no critical engagement. | GitHub repository is poorly maintained, with no meaningful documentation or version control. | Report is basic, lacking structure, diagrams, or clarity in presentation. |
| **Fail (<40)** | Significant omissions in data preparation and EDA, with little to no visualizations or insights. | Model is non-functional or implemented incorrectly, with no optimization or explanation. | Minimal or no evaluation provided, with significant errors in metrics or analysis. | No analysis of trends provided, or analysis is irrelevant or incorrect. | GitHub repository is absent or lacks any meaningful content or documentation. | Report is unclear, unstructured, and fails to meet the basic requirements of presentation and referencing. |