

TERM: M2-RAIA

SEMESTER: 3

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ARTIFICIAL INTELLIGENCE - PART 3

LAB MANUAL



Higher Institute of Technological Studies of Bizerte

Available at <https://github.com/a-mhamdi/isetbz/>

--- HONOR CODE ---

THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

Department of Physics and Astronomy

<http://physics.unc.edu/undergraduate-program/labs/general-info/>

“During this course, you will be working with one or more partners with whom you may discuss any points concerning laboratory work. However, you must write your lab report, in your own words.

Lab reports that contain identical language are not acceptable, so do not copy your lab partner’s writing.

If there is a problem with your data, include an explanation in your report. Recognition of a mistake and a well-reasoned explanation is more important than having high-quality data, and will be rewarded accordingly by your instructor. A lab report containing data that is inconsistent with the original data sheet will be considered a violation of the Honor Code.

Falsification of data or plagiarism of a report will result in prosecution of the offender(s) under the University Honor Code.

On your first lab report you must write out the entire honor pledge:




The work presented in this report is my own, and the data was obtained by my lab partner and me during the lab period.

On future reports, you may simply write “Laboratory Honor Pledge” and sign your name.”

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In order to activate the virtual environment and launch **Jupyter Notebook**, we recommend you to proceed as follow

- ① Press simultaneously the keys  &  on the keyboard. This will open the dialog box **Run**;
- ② Then enter `cmd` in the command line and confirm with  key on the keyboard;
- ③ Type the instruction `jlai.bat` in the console prompt line;



- ④ Finally press the  key.

LEAVE THE SYSTEM CONSOLE ACTIVE.

1

Student's name	.....	.....	.....

Score /20	.....	.....	.....

Detailed Credits

Anticipation (4 points)	.....	.....	.....
Management (2 points)	.....	.....	.....
Testing (7 points)	.....	.....	.....
Data Logging (3 points)	.....	.....	.....
Interpretation (4 points)	.....	.....	.....



The notebook is available at <https://github.com/a-mhamdi/cosnip/> → Julia → deep-learning → ***.jl

2 | Project Assessment

The final project will offer you the possibility to cover in depth a topic discussed in class which interests you, and you like to know more about it. The overall goal is to provide you with a challenging but achievable assessment that allows you to demonstrate your knowledge and skills in deep learning.

Some possible topics that can be covered include, but not limited to:

Artificial Neural Networks: These are the foundation of deep learning, and are used to build models that can process and analyze large amounts of data.

Convolutional Neural Networks: These are a type of neural network that are particularly well-suited for image and video processing tasks.

Recurrent Neural Networks: These are a type of neural network that are designed to process sequential data, such as time series or natural language.

Autoencoders: These are a type of neural network that can learn to compress and reconstruct data, and are often used for dimensionality reduction and anomaly detection tasks.

Generative Adversarial Networks: These are a type of neural network that are used to generate new, synthetic data that is similar to a given input dataset.

Transfer Learning: This is the process of using a pre-trained neural network as a starting point for a new task, and fine-tuning the network on the new task using a smaller dataset.

Hyperparameter Optimization: This involves finding the best set of hyperparameters (such as learning rate and regularization strength) for a neural network in order to improve its performance on a given task.

Evaluation and Comparison of Deep Learning Models: This involves using various techniques and metrics (such as accuracy, precision, and recall) to evaluate the performance of deep learning models, and comparing the results of different models to choose the best one for a given task.

You have to provide all necessary resources, such as sample code, relevant datasets, as well as creating a set of slides to present your work. You are expected to demonstrate your understanding of the material covered throughout this course, as well as familiarizing yourselves with relevant programming languages and libraries. The final project is comprised of:

1. proposal;

2. report documenting your work, results and conclusions;
3. presentation;
4. source code (*You should share your project on **GITHUB**.*)

PROJECT PROPOSAL

It is about two pages long. It includes:

- Title
- Datasets (*If needed!*)
- Idea
- Software (*Not limited to what you have seen in class*)
- Related papers (*Include at least one relevant paper*)
- Teammate (*Teams of three to four students. You should highlight each partner's contribution*)

PROJECT REPORT

It is about ten pages long. It revolves around the following key takeaways:

- Context (*Input(s) and output(s)*)
- Motivation (*Why?*)
- Previous work (*Literature review*)
- Flowchart of code, results and analysis
- Contribution parts (*Who did what?*)

Typesetting using \LaTeX is a bonus. You can use **LyX** (<https://www.lyx.org/>) editor. A template is available at <https://github.com/a-mhamdi/graduation-report/tree/main/lyx/en-report>. Here what your report might contain:

1. Provide a summary which gives a brief overview of the main points and conclusions of the report.
2. Use headings and subheadings to organize the main points and the relationships between the different sections.
3. Provide an outline or a list of topics that the report will cover. Including a table of contents can help to quickly and easily find specific sections of your report.
4. Use visuals: Including visual elements such as graphs, charts, and tables can help to communicate the content of a report more effectively. Visuals can help to convey complex information in a more accessible and intuitive way.

I will assess your work based on the quality of your code and slides, as well as your ability to effectively explain and demonstrate your understanding of the topic. I will also consider the creativity and originality of your projects, and your ability to apply what you have learned to real-world situations. I also make myself available to answer any questions or provide feedback as you work on your projects.

The overall scope of this manual is to introduce **Artificial Intelligence (AI)** , through some numeric simulations, to the students enrolled at the master's program **RAIA**.

The topics discussed in this manuscript are as follow:

① Structure & Design of a CNN

***, ***.

② ***

***, ***.

③ ***

***, ***.

④ ***

***, ***.

Julia; REPL; Pluto; Flux; CUDA; artificial intelligence; cnn; vae.