

# Configuration Manual

MSc Research Project  
MSc Cyber Security

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**National College of Ireland**  
**MSc Project Submission Sheet**



**School of Computing**

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|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------|
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| <b>Programme:</b>           | MSc Cyber Security                                                                                                                          | <b>Year:</b>       | 2025     |
| <b>Module:</b>              | MSc (Research) Practicum                                                                                                                    |                    |          |
| <b>Lecturer:</b>            | Mr. Liam McCabe                                                                                                                             |                    |          |
| <b>Submission Due Date:</b> | 11-12-25                                                                                                                                    |                    |          |
| <b>Project Title:</b>       | LightKD-Detector: An Empirical Investigation into Lightweight Deepfake Detection via Knowledge Distillation under Computational Constraints |                    |          |
| <b>Word Count:</b>          | <b>901</b>                                                                                                                                  | <b>Page Count:</b> | <b>6</b> |

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.

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**Signature:**

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**PLEASE READ THE FOLLOWING INSTRUCTIONS AND CHECKLIST**

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# Configuration Manual

Govind Nhaloor

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## 1. Introduction

This configuration guide describes the technical procedures which should be followed to install, configure and run the LightKD-Fake deepfake detection system. The project uses the Knowledge Distillation framework in which a heavy knowledge-representing model (EfficientNet-B4) is used to transfer knowledge to a lightweight model (MobileNetV2). The system consists of a personal data processing pipeline, both model training scripts, and evaluation tools.

The manual will enable any researcher or external examiner to recreate the environment under which the development was done on a fresh windows system and confirm the findings presented in the dissertation.

## 2. System Requirements

The project was written and tested on a local computer with the following specification. The entire modelling, experimentation and evaluation processes were founded on the existing open-source tools so that the process could be replicated. Although lower-specifications can be used in inference, the models should be trained using a CUDA-enabled GPU with high VRAM. The entire experiment was done on a machine with an Intel i7- 11800H clocked at 2.30GHz base clock and 4.20GHz Boost clock, NVIDIA RTX 3060 with 6gb of VRAM, 16gb of 3200MHz RAM and Windows 11 version 25H2.

### 2.1. Hardware Requirements (Ideal)

- Processor: Intel i7 12<sup>th</sup> gen or higher / Ryzen 5000 series or higher
- Graphics Card: RTX 4080 with 16gb VRAM or higher
- RAM: 32 GB or higher
- Storage: 512GB or higher
- OS: Windows 11 (64bit)

Storage

954 GB

660 GB of 954 GB used

Graphics Card

6 GB

Multiple GPUs installed

Installed RAM

16.0 GB

Speed: 3200 MT/s

Processor

11th Gen Intel(R) Core(TM) i7-11800H @ 2.30GHz

2.30 GHz

Legion

Legion 5 Pro 16ITH6H

Rename this PC

Device specifications

Copy

Device name

Legion

Processor

11th Gen Intel(R) Core(TM) i7-11800H @ 2.30GHz (2.30 GHz)

Installed RAM

16.0 GB (15.8 GB usable)

Device ID

0A030A86-335C-4BC9-A887-CD6AB33022F1

Product ID

00342-42592-98986-AAOEM

System type

64-bit operating system, x64-based processor

Pen and touch

No pen or touch input is available for this display

Related links

Domain or workgroup

System protection

Advanced system settings

Windows specifications

Copy

Edition

Windows 11 Home Single Language

Version

25H2

Installed on

23-02-2025

OS build

26200.7462

Serial number

PF34HL66

Experience

Windows Feature Experience Pack 1000.26100.275.0

**Figure 1: About PC**

## 2.2. Software Prerequisites

- Python: 3.9 or higher
- Anaconda/ Miniconda
- Jupyter Notebook
- Cuda Toolkit
- Libraries:
  - Torch (PyTorch): 2.7.1 and above
  - Numpy: 2.0.1 and above
  - Json: 0.9.25 and above
  - Albumentations: 1.3.1 and above
  - Matplotlib: 3.9.4 and above
  - Scikit-learn: 1.6.1 and above
  - tqdm: 4.67.1 and above

### 3. Dataset

Obtain the FaceForensics++ (c23)<sup>1</sup> and Celeb-DF (v2)<sup>2</sup> datasets from their official sources.

### 4. Directory Structure

C:\Users\gokug\ProjectDeepfake\

```
|
|— data\                      # Stores datasets (created automatically or manually)
|   |— ffpp\                  # FaceForensics++ data
|       └─ celeb-df\          # Celeb-DF test data
|— dataset.py                  # Custom PyTorch Dataset class and Augmentations
|— models.py                   # Architecture definitions (Teacher & Student)
|— frame_extractor.py          # Script to convert video files to frames
|— train_teacher.py             # Training script for EfficientNet-B4
|— train_student_kd.py          # Knowledge Distillation training script
|— evaluate.py                  # Evaluation script for metrics
|— evaluate_student_visual.py   # Visual evaluation script (Student)
|— Deepfake_Detector.ipynb     # Jupyter Notebook for single-image inference
|— requirements.txt             # List of Python dependencies
└─ best_student.pth             # Trained student model weights
```

### 5. Installation and Setup

Follow the steps below to set up a fresh environment.

Step1: Download and install Anaconda.

Step 2: Open anaconda prompt and create a virtual environment running python 3.9 or higher.

Step 3: Install PyTorch with CUDA Support.

Step 4: Install the necessary dependencies provided in the requirements.txt.

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<sup>1</sup> <https://github.com/ondyari/FaceForensics/tree/master/images>

<sup>2</sup> <https://www.kaggle.com/datasets/reubensuju/celeb-df-v2>

Step 5: Obtain the FaceForensics++ (c23) and Celeb-DF (v2) datasets from their official sources.

Step 6: Place the raw video folders inside “data/ffpp/raw\_videos” and “data/celeb-df/test”.

## **6. Code Execution**

### **A. Setup Anaconda prompt**

Open Anaconda prompt and navigate to the directories where the code files are saved.

### **B. Extraction of Dataset**

Execute the parallel frame extractor to convert videos to images.

### **C. Train the Teacher Model**

Run the train\_teacher.py file to train the EfficientNet-B4 teacher model.

### **D. Train the Student Model**

Run the train\_student.py file to train the MobileNetV2 student model.

### **E. Run the evaluation code**

Run evaluation.py to run the evaluation code to get the evaluation metrics.

### **F. Open Jupyter Notebook**

Open Anaconda and start Jupiter notebook from there. This should open a browser window with the default directory.

### **G. Open Project Folder**

From the browser window, navigate to the folder where the project files have been stored.

### **H. Testing individual Images**

To test a specific image, run the Deepfake\_Detector.ipynb and insert the image address in the text box.