# DeepCompress Instruction Manual

## Table of Contents

1. [Introduction](#introduction)
2. [Features](#features)
3. [System Requirements](#system-requirements)
4. [Installation](#installation)
5. [Model Training](#model-training)
6. [Using the Web App (Streamlit)](#using-the-web-app-streamlit)
7. [Using the Command Line Interface (CLI)](#using-the-command-line-interface-cli)
8. [File Descriptions](#file-descriptions)
9. [Troubleshooting](#troubleshooting)
10. [FAQ](#faq)
11. [Contact](#contact)

## 1. Introduction

DeepCompress is a toolkit for compressing and decompressing images using a Fully Convolutional Autoencoder (FCN). It provides both a user-friendly web interface and a command-line tool for batch processing. The project is suitable for research, education, and practical image compression tasks.

## 2. Features

* Compress images to a compact latent representation using deep learning.
* Decompress latent representations back to images with minimal loss.
* Web app (Streamlit) for interactive use.
* Command-line interface for automation and scripting.
* Support for custom training on your own datasets.
* Pretrained model available (via Git LFS).

## 3. System Requirements

* Python 3.7 or higher
* pip (Python package manager)
* Git and Git LFS (for pretrained model)
* Supported OS: Windows, macOS, Linux
* Recommended: CUDA-compatible GPU for training (optional for inference)

## 4. Installation

### 4.1. Clone the Repository

git clone <your-repo-url>  
cd deepcompress

### 4.2. Download Pretrained Model (if available)

Install Git LFS if not already installed: - [Git LFS Installation Guide](https://git-lfs.github.com/)

Then run:

git lfs pull

### 4.3. Install Python Dependencies

It is recommended to use a virtual environment:

python -m venv venv  
source venv/bin/activate # On Windows: venv\Scripts\activate  
pip install -r requirements.txt

## 5. Model Training

You can use the provided scripts to train the autoencoder model.

### 5.1. Training on CIFAR-10

Downloads and trains on the CIFAR-10 dataset:

python train\_cifar10.py

The trained model will be saved as fcn\_compression\_ae.pth.

### 5.2. Training on a Custom Dataset

Place your training images in ./data/train and run:

python train.py

This will also produce a .pth model file.

## 6. Using the Web App (Streamlit)

1. Ensure the model file (fcn\_compression\_ae.pth) is present in the project directory.
2. Start the web app:

* streamlit run app.py

1. Open the provided local URL in your browser.
2. Upload an image (JPG/PNG), set the output quality, and click “Compress & Decompress”.
3. Download the reconstructed image.

## 7. Using the Command Line Interface (CLI)

The CLI tool is provided in compress.py and supports both compression and decompression.

### 7.1. Compress an Image

python compress.py compress path/to/input.jpg -l path/to/output\_latent.npy

* path/to/input.jpg: Path to your input image.
* -l path/to/output\_latent.npy: (Optional) Output file for the latent representation (default: fcn\_compressed\_latent.npy).

### 7.2. Decompress an Image

python compress.py decompress path/to/output\_latent.npy -o path/to/reconstructed.jpg -q 85

* path/to/output\_latent.npy: Path to the latent file saved during compression.
* -o path/to/reconstructed.jpg: (Optional) Output image path (default: fcn\_reconstructed.jpg).
* -q 85: (Optional) JPEG quality (default: 85).

## 8. File Descriptions

* app.py: Streamlit web application.
* compress.py: CLI tool for compression and decompression.
* dataset.py: Dataset loader for training.
* model.py: Fully Convolutional Autoencoder model definition.
* train.py: Training script for custom datasets.
* train\_cifar10.py: Training script for CIFAR-10.
* requirements.txt: Python dependencies.
* fcn\_compression\_ae.pth: Pretrained model weights (downloaded via Git LFS).
* README.md: Quick start and usage guide.

## 9. Troubleshooting

* **Model file not found:**
  + Ensure you ran git lfs pull after cloning.
  + Check that fcn\_compression\_ae.pth is in the project directory.
* **CUDA errors:**
  + If you do not have a GPU, the code will automatically use CPU.
* **Streamlit not found:**
  + Run pip install -r requirements.txt to install all dependencies.
* **Image size errors:**
  + The model expects images with dimensions divisible by 8. Padding is handled automatically.

## 10. FAQ

**Q: Can I use my own images for training?** A: Yes. Place your images in ./data/train and run python train.py.

**Q: How do I change the model architecture?** A: Edit model.py and retrain the model.

**Q: Can I use this for grayscale images?** A: The current model is for RGB images. You can adapt it for grayscale by changing the input/output channels in model.py.

**Q: Is a GPU required?** A: No, but training is much faster with a CUDA-compatible GPU.

## 11. Contact

For questions, bug reports, or contributions, please contact: - Aviv Elbaz ([aviv000](https://github.com/aviv000)) - Ron Butbul ([RonButbul626](https://github.com/RonButbul626))

Or open an issue on the project repository.