* Websites for **Radon Barcode Algorithm** and **MNIST numbers dataset**

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| 1. Download    1. **Radon Barcode Algorithm (From research paper) [Matlab]**   <https://kimialab.uwaterloo.ca/kimia/index.php/data-and-code/>   * + 1. (Bottom of the page under the heading “Radon Barcodes”)        1. Can click below link to download directly           1. :: [Download the Code](https://kimialab.uwaterloo.ca/kimia/wp-content/uploads/2019/07/extractRBC.zip)     2. Opening the file requires Matlab to be installed        1. May need to download current version of Matlab from software portal           1. Complete install instructions           2. Login using account from first year   Account may be linked to the .uoit email   * 1. **Dataset(s)**      1. Dataset MNIST, 70,000 Handwritten digits' images:   <http://yann.lecun.com/exdb/mnist/>   |  | | --- | | “Four files are available on this site:  [train-images-idx3-ubyte.gz](http://yann.lecun.com/exdb/mnist/train-images-idx3-ubyte.gz): training set images (9912422 bytes)  [train-labels-idx1-ubyte.gz](http://yann.lecun.com/exdb/mnist/train-labels-idx1-ubyte.gz): training set labels (28881 bytes)  [t10k-images-idx3-ubyte.gz](http://yann.lecun.com/exdb/mnist/t10k-images-idx3-ubyte.gz): test set images (1648877 bytes)  [t10k-labels-idx1-ubyte.gz](http://yann.lecun.com/exdb/mnist/t10k-labels-idx1-ubyte.gz): test set labels (4542 bytes)” | |

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| 1. Put project files from google drive and dataset files in a project folder on your computer.    1. **Files from google drive**       1. ReadMNIST-2.py       2. ReadMNIST-4-Long.py       3. extractRBC.m (From radon paper, with minor edits)       4. RBC.py       5. RBC\_all.py       6. tryMNIST.m       7. allMNIST.m    2. **Dataset files you downloaded**       1. train-images.idx3-ubyte       2. train-labels.idx1-ubyte |

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| 1. Prepare Handwritten Image Dataset for use    * Extract the 4 downloaded files (7-zip)      + This removes the .gz from the end of the file names    * If applicable      + Rename train-images.idx3-ubyte to train-images-idx3-ubyte      + Rename train-labels.idx1-ubyte to train-labels-idx1-ubyte |

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| 1. Install/Run   **Steps** | **Side Notes** |
| |  | | --- | | Check if python 3.7 is installed | | 1. open regular command prompt as administrator 2. type: conda install anaconda-navigator (Check if not installed) 3. type: conda search python (Extra – List versions) | | * MatLab link requires python 3.7 |
| * Start **>** Anaconda Navigator (Anaconda3)   + Launch the CMD.exe Prompt     - conda create -n py37 python=3.7     - y     - conda create -n py38 python=3.8     - y     - conda create -n py39 python=3.9     - y     - conda activate py37     - conda install numpy     - y     - conda activate py38     - conda install numpy     - y     - conda activate py39     - conda install numpy     - y     - conda activate py37     - pip install python-MNIST     - conda install mlxtend --channel conda-forge     - y   From: (<http://rasbt.github.io/mlxtend/installation/#conda>) | * First, use ‘create’ to obtain python versions 3.7, 3.8, and 3.9. * Second, use ‘activate’ to start working with version 3.7, and install numpy   + Repeating for other versions of python. (Extra steps) * Third, go back to using 3.7, and install ‘python-MNIST’ * Fourth, install ‘mlxtend’, which is needed for ‘ReadMNIST-4-Long.py’ |
| * Start **>** Anaconda Navigator (Anaconda3)   + Launch the CMD.exe Prompt (May need to run as **admin**)  |  | | --- | | Enable Matlab R2020a - python extension | | 1. type: conda activate py37 2. type: cd c:\program files\matlab\R2020a\extern\engines\python 3. type: python setup.py install | | * \*Make sure python 3.7 is activated for package installs related to the matlab part of this project as it is needed to make the Python extension work |
| * Start **>** Anaconda Navigator (Anaconda3)   + Launch the CMD.exe Prompt     - conda activate py37     - cd C:\ \_\_\_(put your project directory name here)\_\_\_     - dir \*.py     - python ReadMNIST-2.py       * (This should show row #4 from the database which is 9)     - python ReadMNIST-4-Long.py       * note this will run for a while,  it copies the entire image database and converts to csv     - python RBC.py       * This generates a matlab barcode       * Flashes matlab plot on screen briefly         + This uses the radon barcode generator from paper     - python RBC\_all.py       * should produce a message every 1000 lines  indicating the line number and image   + Minimize the command prompt | * Next ‘activate’ python 3.7 * Then, navigate to your project files directory * Now, use ‘python’ to access the file ‘ReadMNIST-2.py’   + Repeat for ‘ReadMNIST-4-Long.py’   + Repeat for ‘RBC.py’   + Repeat for ‘RBC\_all.py’ |
| * Launch MATLAB R2020a   + Open tryMNIST.m     - It opens the csv file (containing all records)  extracts row 4 (image of number 9) generates a barcode using the radon barcode generator   + Open allMNIST.m     - It reads the database shows the number of lines loops through all lines (60,000) creates barcodes for all of them without a plot should output to barcode.csv |  |
| * Return to anaconda command prompt   + python RBC\_all.py     - should produce a message every 1000 lines  indicating the line number and image |  |

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| Set-up/Run in Visual Studio Code |
| * In VS code, open ReadMNIST-4-Long.py * click the green arrow in the top corner (terminal automatically uses 2:Python)   + (ignore error shown) * input following lines in terminal:   + cd C:\ \_\_\_(put your project directory name here)\_\_\_   + conda activate py37 * then click Run icon again   + (data prints and image window appears) |