GBRAS_SW

Is a software for steganalysis in the spatial domain

User manual

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Contents

GBRAS-Net

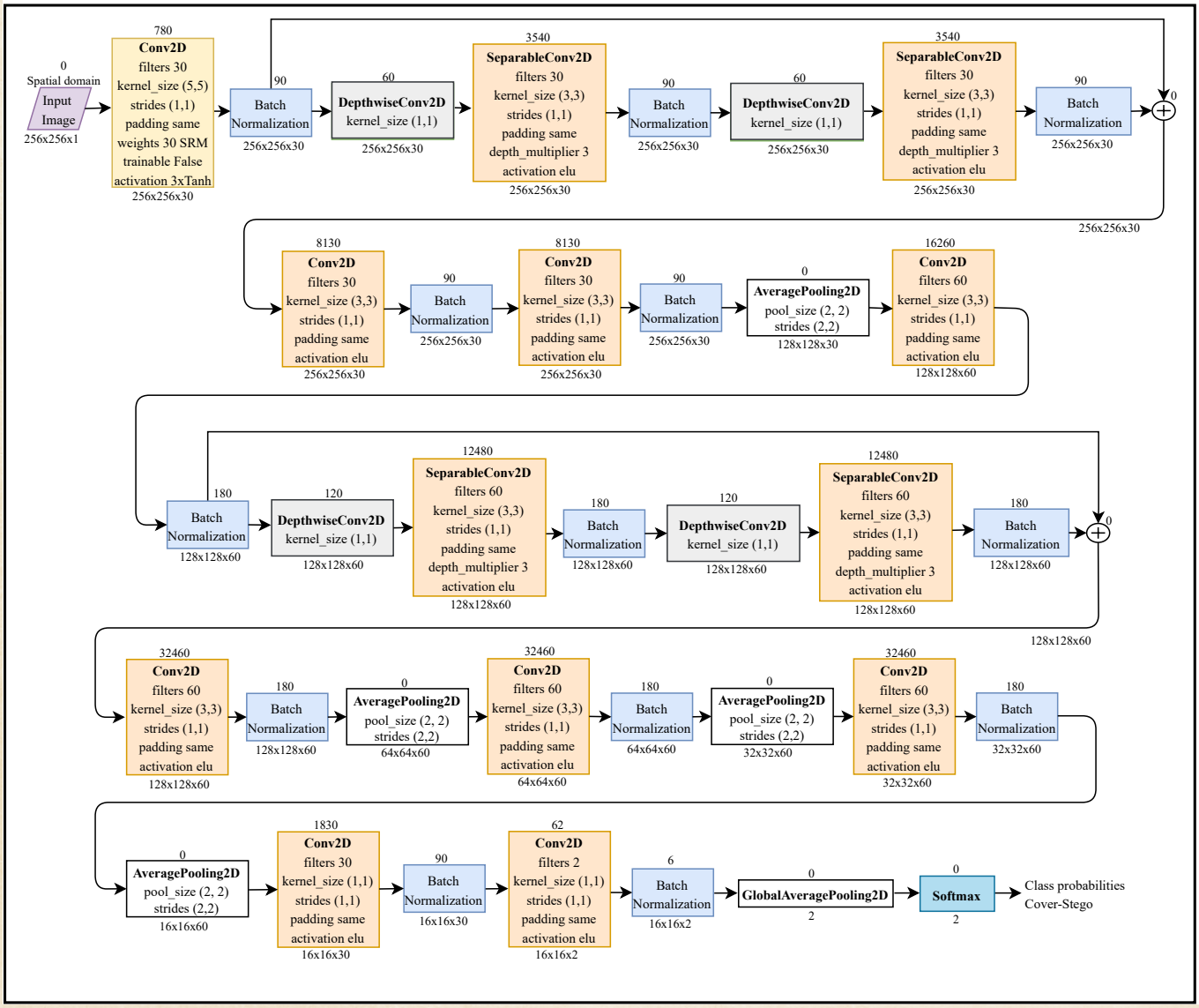

Figure 1: GBRAS-Net convolutional neural network based on [1]

GBRAS_SW

GBRAS_SW is a software for the detection of steganographic images in the spatial domain. An in-depth explanation of GBRAS_SW can be found in [1]. The convolutional neural network of this software is shown in **Figure 1**. This software for preprocessing stage maintain the 30 SRM filters (see **Figure 2**) and has a 3xTanH activation function. GBRAS_SW uses the ELU activation function in all feature extraction convolutions. GBRAS_SW uses shortcuts for feature extraction and separable and depthwise convolutions. This software does not use fully connected layers; the network uses a softmax directly after global average pooling.

Prerequisites

The GBRAS_SW requires the following libraries and frameworks:

TensorFlow
numPy
OpenCV
argparse
glob
XlsxWriter
os
datetime

GBRAS-SW was developed in the Python3 (3.8) programming language.

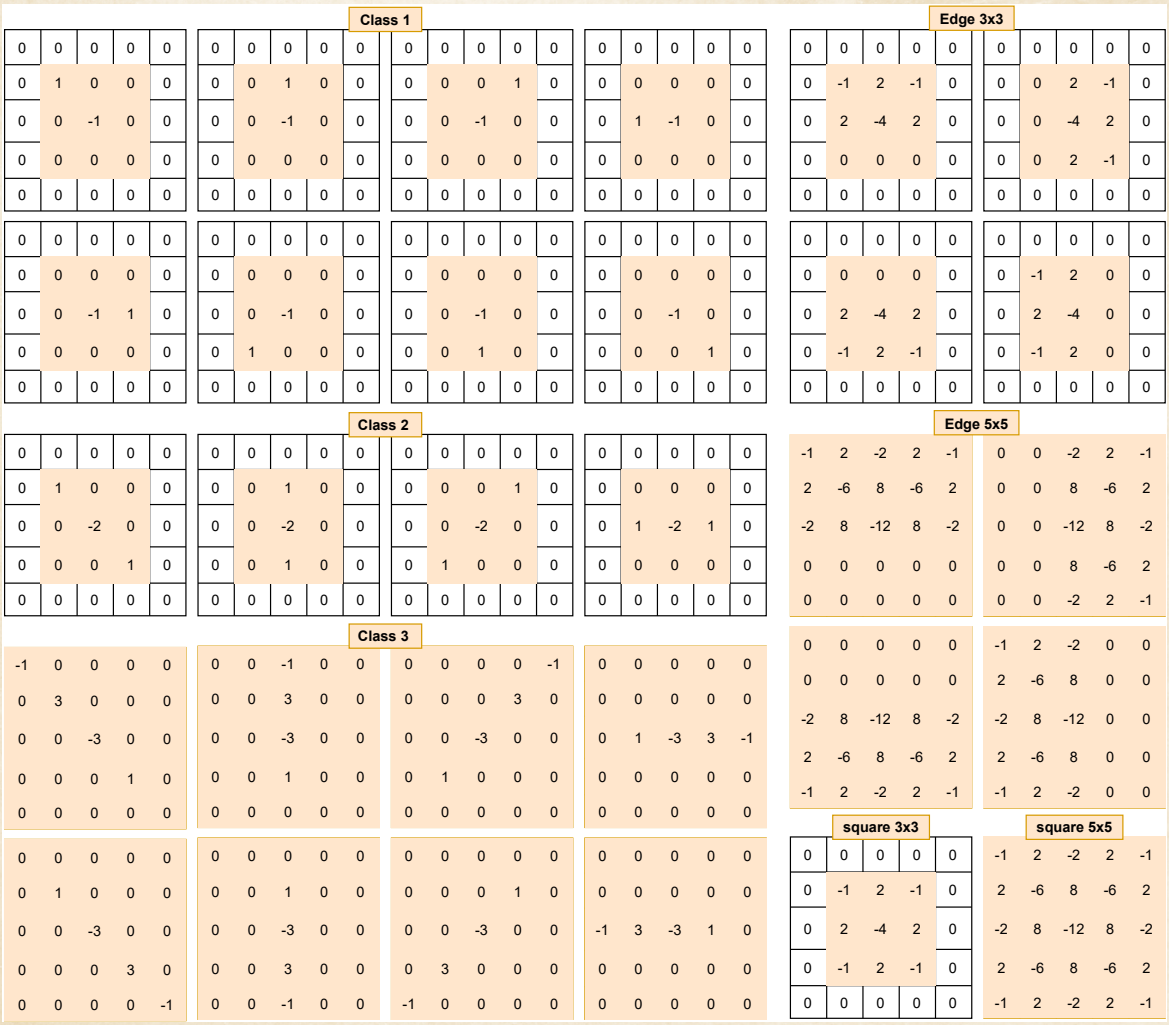

Figure 2: 30 SRM based on [1]

INSTALLATION

We highly recommend to use and install Python packages within an Anaconda enviroment. To create, execute the command below:
conda create –name GBRAS_SW python=3.8
So, activate it:
conda activate GBRAS_SW
installed the framework:
conda install -c anaconda keras-gpu==2.4.3
Now, install the libraries:
pip install opencv-python
pip install scikit-image
conda install -c conda-forge argparse
conda install -c conda-forge xlsxwriter
conda install -c jmcmurray os
conda install -c trentonoliphant datetime

GBRAS_SW EXECUTION

After installing all the prerequisites, you must clone the repository of the current version of GBRAS_SW using.
git clone https://github.com/BioAITeam/GBRAS_SW.git
Then you might run as following:
python GBRAS_SW.py -i ./images -m ./models/S-UNIWARD_0.4bpp.hdf5
In the repository, there are two folders, one with images and the other with models. The images folder contains eighty cover and stego images for testing the software. Can add more images to the folder to test the software's accuracy in detecting cover and stego image in the spatial domain. The format of the images is Portable Gray Map (PGM). In the model folder, there are four models S_UNIWARD and WOW, with two payloads, 0.4 and 0.2 bpp, respectively. Can choose any of the four models to perform a cover or stego image prediction, Example:
python GBRAS_SW.py -i ./images -m ./models/WOW_0.4bpp.hdf5

AUTHORS

Reinel Tabares Soto received a B.S. degree in electronic engineering from Universidad Nacional de Colombia in 2009, a B.S. degree in systems

and computer engineering from Universidad de Caldas, Colombia, in 2016, and a M.S. degree in engineering from Universidad Nacional de Colombia in 2017. He is currently pursuing a Ph.D. degree in computer science at Universidad Autónoma de Manizales, Colombia, where he has been Coordinator in the Department of Electronics since 2014. His main research interests include steganalysis, machine learning, deep learning, bioinformatics, and high-performance computing.

Harold Brayan Arteaga Arteaga is an undergraduate student in electronic engineering at Universidad Autónoma de Manizales since 2017. He has received highest honor roll and top-class distinctions and was valedictorian in 2016. He has been a member of the research group on Bioinformatics and Artificial Intelligence since 2018. He has participated as speaker in research meetings with RREDSI network and the first Congress of Biomedical Engineering and Bioengineering in 2019. He was accepted as a young researcher for 2021 by Minciencias, Colombia. He is co-author of chapter 12 of Digital Media Steganography (Mahmoud Hassaballah, 2020). His current research interests include the application of convolutional neural networks to steganalysis, the classification of flow patterns in gas-liquid systems, estimating petrophysical properties from seismic data using machine learning, glioblastoma identification, detecting cancer through deep learning, detecting respiratory system diseases from chest X-Ray imaging, and bioinformatics.

Mario Alejandro Bravo Ortiz Biomedical and Electronical engineering from Universidad Autónoma de Manizales. He has been a member of the research group on Bioinformatics and Artificial Intelligence since 2018. He has participated as speaker in research meetings with RREDSI network and the first Congress of Biomedical Engineering and Bioengineering in 2019. He is co-author of chapter 12 of the book Digital Media Steganography (Mahmoud Hassaballah, 2020). His current research interests include the application of convolutional neural networks to steganalysis and the detection of cancer through deep learning.

Alejandro Mora Rubio is an undergraduate student in Biomedical and Electronical engineering at Universidad Autónoma de Manizales. He has been a member of research group on Bioinformatics and Artificial Intelligence since 2018. He has worked on projects involving electrophysiological signals classification using Machine Learning. He has supported projects involving the application of deep learning techniques to digital media steganalysis and detecting respiratory system diseases from chest X-Ray imaging.

Daniel Arias Garzon Biomedical and Electronical engineering from Universidad Autónoma de Manizales. He has been a member of the Automatic Research Hotbed in the line of Artificial Intelligence since 2018. He has worked on projects involving human pose estimation and artificial vision using Machine Learning. He has supported the project by applying deep learning techniques in digital media steganalysis and detecting respiratory system diseases from chest X-Ray imaging.

Jesus Alejandro Alzate Grisales is an undergraduate student in Biomedical and Electronical engineering at Universidad Autónoma de Manizales. He has been member of the research group on Bioinformatics and Artificial Intelligence since 2018. He has worked on projects involving electrophysiological signals classification using Machine Learning. He has supported projects as applying deep learning techniques in digital media steganalysis, detecting Alzheimer's from 3D magnetic resonance, and detecting respiratory system diseases from chest X-Ray imaging.

Simon Orozco Arias received a B.S. degree in system and computing engineering from Universidad de Caldas, Colombia, in 2016, and is currently pursuing a Ph.D. in engineering (bioinformatics) from the same university. He has worked on bioinformatics for the last four years, using supercomputing techniques and data analysis. He has contributed to the solution of biological problems, especially, related to plant DNA. He is currently interested in the application of machine learning techniques to automatically extract knowledge from DNA data.

Gustavo Isaza received a B.S. degree in system and computing engineering from Universidad Autónoma de Manizales, Colombia, in 1997. He obtained a master's degree in networking software development from Universidad de los Andes, Colombia, in 1998, and M.Sc./DEA and Ph.D. degrees from Universidad Pontificia de Salamanca, Spain, in 2008 and 2010, respectively. He is Full Professor/Senior Researcher at Universidad de Caldas and a member of the GITIR Research Group. He has published over 40 papers and conferences related to machine learning in

cybersecurity, bioinformatics, AI in videogames, and distributed computing.

Raul Ramos Pollan received a Ph.D. degree in computer engineering (analysis of biomedical images) from the University of Porto, Portugal. He is a Professor and a Researcher in artificial intelligence and machine learning with Universidad de Antioquia. He has developed his career in both industry and academia, working as the Director of the CETA Computing Center, CIEMAT, Extremadura, Spain, a Software Engineer with the European Center for Particle Physics, a Java Architect with Sun Microsystems Switzerland, and the Co-Founder of Pildo Labs, an SME in aeronautics and software sector based in Barcelona. He moved to Colombia in 2012, initially as a Guest Researcher in image analytics with the MindLab Group, Universidad Nacional de Colombia, Bogotá, then, he moved to Universidad Industrial de Santander in 2013, and, most recently, moved to his current position with Universidad de Antioquia in 2018.

References

[1] T. -S. Reinel et al., "GBRAS-Net: A Convolutional Neural Network Architecture for Spatial Image Steganalysis," in IEEE Access, vol. 9, pp. 14340-14350, 2021, doi: 10.1109/ACCESS.2021.3052494.

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