

Rohit Thakur

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OBJECTIVE

I believe that deep learning is very powerful and one day we can make computer's instructions less literal. I find it very fascinating how deep learning networks find patterns in the data. I want to work with the new algorithms and try to understand why those specific techniques and formulas work and how I can improve them.

EDUCATION

Masters of Computer Applications (July 2017 - August 2020)

Shanmugha Arts, Science, Technology & Research Academy (SASTRA), Thanjavur

Bachelor of Computer Applications (July 2014 - May 2017)

Vivekananda Institute of Professional Studies, New Delhi.

Guru Gobind Singh Indraprastha University

HSC, Class 12 (March 2013 - March 2014)

Notre Dame School, Badarpur, New Delhi

SSC, Class X (March 2011 - March 2012)

Notre Dame School, Badarpur, New Delhi

EXPERIENCE

Tata Consultancy Services, TCS Research & Innovation Lab (August 2020 - Present)

Tata Consultancy Services, Analytics & Insights unit, New Delhi (February 2019 - July 2020)

Tata Consultancy Services, Ignite Lab, Chennai (July 2017 - January 2019)

PROJECTS

Face Recognition & Detection System

A real time application which facilitates attendance using face recognition

One shot learning approach to train on single image

Results: A real time application which facilitates attendance for 570 associates with an accuracy of ~87%.

Detection of hamlets on Satellite Images

Target to build dataset for boundaries of each habitation in India to improve growth monitoring from satellite images

Performed supervised learning using Random Forest for classification on Landsat 8 images in Google Earth Engine

Results: Detected hamlets in Uttar Pradesh with an accuracy of ~79%.

VisualSat Search Platform

A platform which from a user selected tile can automatically mark all tiles with similar shapes and pattern on a map instantly

Built by using Geoserver and transfer learning on ResNet 18 architecture on PlanetScope images of 3 meters resolution

Results: Detected objects on satellite image with an accuracy of ~75%.

Anomaly detection in Sewage Pipelines

Detection of cracks, joints, holes, connections, vermin, infiltration, deposits, junction and surface damage from pipeline videos

Automated data preparation from sewage pipeline videos and performed transfer learning using VGG16 architecture

Results: Anomaly marked video of sewage pipelines with an accuracy of ~86%.

ID Validation and Fraud Detection

Validate and check tampered passports, national IDs using MRZ validation, font detection and face recognition

Built by using akaze perspective transformation, template matching and tesseract OCR

Results: Detection of tampered passports and national IDs with an accuracy of ~91%.

Credit Card PanMasking

Mask the first 12 digits with cvv on credit card before storing the image in database for customer's privacy

Did transfer learning on MaskRCNN with Resnet101 backbone and created the python service using unicorn and supervisor.

Deployed the service in AWS using ASG and ALB for high availability and decreased the time for response from 8 seconds to 2 seconds.

Created a Jenkins Pipeline to automatically checkout code from git and update the service in ASG.

Results: Successfully masked the first 12 digits and cvv on credit card with an accuracy of ~89%.

SKILLS

Deep Learning, Machine Learning,
Data Analysis, Data Processing,
Python Scripting, Python Deployment,
AWS, Azure, Automation, IOT, Devops,
Linux, Git, Docker

INTEREST

Deep Learning, Computer Vision
Activation Functions, Fraud Analysis,
Face Recognition, Raspberry,
Hyperspectral Images

LANGUAGES

Python, Java

FaceReco Python Package

Python Package that does face detection & recognition by using the one shot learning method.

Created easy to use python package with class structure, 1 line commands operation and simple installation using pypi .

Download command: [pip install FaceReco](#)

Results: Python Package which is simple, easy to use and can be trained with single image.

PigCount

A realtime application running on the edge on raspberry pi 4 with a camera module that helps to detect the number of pigs present at a particular time in a barn and send the count to AZURE IOT hub for processing in AZURE stream analytics and send the email alerts to user based on the condition specified using AZURE logic app. The model was trained on SSD network.

Results: A real time application running on edge which counts pig in barn and send alerts with an accuracy of ~93%.

RESEARCH

Learning deep spectral features for hyperspectral data using convolution over spectral signature shape

Idea: Transform the n dimensional pixel vector to two - dimensional graph in xy plane, and use the image of the spectral signature as an input to solve the hyperspectral problem similar to digit recognition.

Findings: Spectral shape features show improvement over one-dimensional pixel vector. The features learned are consistent with spectroscopic interpretation. Spectral feature hierarchy can be created using this approach with the CapsuleNets.

Result: Patent filed for Method and system for learning spectral features of hyperspectral data using dcnn.

Paper published in IEEE Whispers 2021, <https://www.ieee-whispers.com>

Importance of spatial hierarchy in convolution neural networks

Idea: Find out about the importance of spatial hierarchy in the convergence of convolution neural network.

Findings: Analyzed how CNNs learns spatial relations between objects in an image and how when trained on the same architecture the group of data with less number of high level primitives led to faster convergence of the model by 31% .

Result: Paper published in CSAG, <https://tinyurl.com/y5j6h5fl>

Leveraging spatial structure with CapsuleNets for identification of the land use classes

Idea: Propose a CapsuleNet based neural network architecture that learns the structure of the land use class automatically. We define the land use class as a collection of its constituent parts arranged in a specific spatial order. The proposed neural architecture learns the spatial relation between parts of the land use class using correct land use class labels given to a training image.

Findings: Research shows interesting possibility of “parsing” the land use class for its detection. The results of CapsuleNet provide improvement over conventional CNN for detecting the land use classes.

Result: Paper published in SPIE Remote Sensing, <https://doi.org/10.1117/12.2573980>

Comparative Assessment of Different Deep Learning Models for Aircraft Detection

Idea: Focus on the comparative study of three different models namely YoloV3, SSD and RCNN. We have tested all the three models to find out which model performed best for the task of airplane detection when trained on aerial images and tested for small object detection (airplanes in our case) on satellite images.

Findings: SSD (Single Shot Detection) method is best suited for detecting wide range, scale and orientations of objects inside an image with high accuracy and low computation speed..

Result: Paper published in IEEE, <https://ieeexplore.ieee.org/abstract/document/9153981>

PUBLICATIONS/ARTICLES

Step By Step VGG16 Implementation In Keras For Beginners - <https://link.medium.com/3OH5BkAiD3>

Transfer Learning From Scratch Using Keras - <https://link.medium.com/qKmpvgBiD3>

Step-By-Step R-CNN Implementation From Scratch In Python - <https://link.medium.com/c5RhLVniD3>

Step by Step Face Recognition Code Implementation From Scratch In Python - <https://link.medium.com/RVb5qJeGEbb>

Comparative Assessment of Different Deep Learning Models for Aircraft Detection

- <https://ieeexplore.ieee.org/abstract/document/9153981>

Leveraging spatial and spectral mixture of urban objects for land use classification

- <https://tinyurl.com/yy3fk4dx>

Leveraging spatial structure with CapsuleNets for identification of the land use classes

- <https://doi.org/10.1117/12.2573980>

Importance of spatial hierarchy in convolution neural networks

- <https://tinyurl.com/y5j6h5fl>

Learning deep spectral features for hyperspectral data using convolution over spectral signature shape

- Accepted and Published to IEEE Whispers 2021, <https://www.ieee-whispers.com/>

Achievements

Patent filed for Method and system for learning spectral features of hyperspectral data using dcnn
Automated the manual task of masking PAN number of bank cards which saves client ~50,000 \$ yearly
Step By Step VGG16 Implementation In Keras For Beginners article on Medium with over 150k views
RCNN Implementation in Python on Github with 35 stars and 35 forks
Github Arctic Code Vault Contributor
Writer at Towards Data Science and The Startup publications
Computer Science Expert at Chegg

Certification

Deep Learning Specialization
Convolutional Neural Networks
Improving Deep Neural Networks: Hyperparameter Tuning
Regularization and Optimization
Neural Networks and Deep Learning
Sequence Models
Structuring Machine Learning Projects
TensorFlow in Practice Specialization
Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning
Convolutional Neural Networks in TensorFlow
Natural Language Processing in TensorFlow
Sequences, Time Series and Prediction
Ultimate AWS Certified Solutions Architect Associate 2021
Google Earth Engine Advance Developer Certification

EXTRA-CURRICULAR ACTIVITIES

Got bronze in 5000m race in South Zone Delhi
Participated in State level 3000m race
Organized annual fest for the college **Spandan 2016**, Delhi
Active Member of Tensorflow User Group New Delhi