Abhishek Singh Sambyal

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Research Interests

Medical Image Analysis, Computer Vision, Machine Learning, Deep Learning

Education

Indian Institute of Technology Ropar — Rupnagar
Ph.D. Computer Science and Engineering — *July 2019 - present*
Advisors: Dr. Deepti R. Bathula & Dr. Narayanan C. Krishnan
Courses taken: Computer Vision, Digital Image Processing, Machine Learning, Artificial Neural Networks

Bangalore Institute of Technology — Bangalore
Master of Technology (M.Tech.) Computer Science and Engineering — 2012 - 2014
First Class with Distinction 74.16%

Experience

Central University of Jammu — Jammu
Assistant Professor, Department of Computer Science & IT — Jan 2017 - June 2018

Kudos Knowledge - Syncordia — Bangalore
Software Engineer — Aug 2014 - Jul 2016

Projects

1. ***Autoencoder*** *[Pytorch]* [Code]
   In this project, nuances of the autoencoder training were looked over.
   - Autoencoder end-to-end training for classifying MNIST dataset.
   - Autoencoder Layer Wise Pre-training (Stacking) for Fashion-MNIST.
   - DRIVE (Digital Retinal Images for Vessel Extractions) dataset patchwise segmentation using Autoencoder.
   - Sparse Denoising Autoencoder (SDAE) for classification of MNIST dataset.
2. ***Self supervised learning by context prediction*** *[Pytorch]* [Code]
   Pre-training from the dataset itself using context prediction. In this approach, we train the model without the given labels, instead we use pseudo labels based on the pre-text task. This is an implementation of *Unsupervised Visual Representation Learning by Context Prediction (ICCV)* paper.
3. ***Style Transfer*** *[Pytorch]* [Code]
   Style of one image is transferred to the other. Used gram matrix to extract the style of the image calculated from the convolution layers of the VGG19 network. This is an implementation of *Image Style Transfer Using Convolutional Neural Networks Gatys (CVPR)* paper.
4. ***Class Activation Maps*** *[Pytorch]* [Code]
   A class activation maps for a particular category indicates the discriminative image regions used by the CNN to identify that category. They are generated using the global average pooling (GAP) in CNNs to interpret the model whereas Grad-CAM uses the gradient information to understand each neuron for a decision of interest. This is an implementation of *Learning Deep Features for Discriminative Localization (CVPR)* and *Grad-CAM (ICCV)* paper.
5. ***Visualize-CNN*** *[Pytorch]* [Code]
   Visualization of CNN layers activations and weights on CIFAR-10 dataset.
6. ***Knowledge Discovery from Brain MRI Images using Statistical Techniques and Associative Classification*** *[MATLAB]* [Code]
   M. Tech. project designed and implemented for finding tumors in the brain. We used supervised learning where different textural features were taken and among those, important features were selected using cut points. Those features with their corresponding classes were fed to classifier predicting the correct class.

Machine Learning Summer School

Attended Oxford Machine Learning Summer School 2020 — *17-25 Aug, 2020*
Said Business School (SBS), The University of Oxford

Add-on Courses

Deep Learning for Visual Computing — IIT-Kgp
Pytorch Scholarship Challenge from Facebook — Udacity (2018)
Deep Learning with Pytorch - Recipient of the Facebook Pytorch Scholarship Program
Deep Learning with Python and PyTorch — edx (2018)
Practical Deep Learning for Coders — Fasi.ai (2018)
Machine Learning - Stanford — Coursera (2016)
Image and video processing: From Mars to Hollywood with a stop at the hospital - Duke University — Coursera (2014)

Professional Skills

Languages/Frameworks:	Python, Pytorch, Tensorflow, Fastai, C
Libraries:	Numpy, Pandas, Matplotlib, Seaborn, Scikit-learn
Softwares/Tools:	WandB, Git, MongoDB, MATLAB, Vim, LaTeX
Familiar:	DIGITS, JavaScript, CasperJS, C++, nodejs

Publications/Conferences/Workshops

Advances in Deep Learning Techniques for Medical Image Analysis
Usma Niyaz, ***Abhishek Singh Sambyal****, Devanand*
2018 Fifth International Conference on Parallel, Distributed and Grid Computing (PDGC)
Special Session on Recent Advance in Biometrics, Deep Learning and Wireless Sensor Networks. — IEEE, Dec 20 - 22, 2018

Evaluation of Deep Learning model with Optimizing and Satisficing metrics for Lung Segmentation
Usma Niyaz, ***Abhishek Singh Sambyal****, Devanand*
8th International Conference on Soft Computing for Problem Solving - SocProS 2018
Proceedings in Advances in Intelligent Systems and Computing (AISC), Springer. — Springer, Dec 17 - 19, 2018

NVIDIA Deep Learning Institute (DLI) Workshop — IIT Jammu
Topics: Classification, Object Detection Techniques & DIGITS framework — Jan 25 - 26, 2018

Knowledge Abstraction from Textural Features of Brain MRI Images for Diagnosing Brain Tumor using Statistical Techniques and Associative Classification
Abhishek Singh Sambyal*, Dr. Asha T.*
IEEE ISBN 978-1-4673-7666-5
2016 International Conference on Systems in Medicine and Biology (ICSMB) — IIT Kharagpur, Jan 4 - 7, 2016

Competition/Extra-Curricular

HackerEarth: Identify the Animal - Deep Learning Competition
Rank: 12, Acc: 94.91% - *Competition Leaderboard*

Child Rights & You - CRY
Volunteer with CRY for the upliftment of children.

Referees

1. **Dr. Deepti R. Bathula**
   Assistant Professor, Department of Computer Science & Engineering
   Indian Institute of Technology Ropar
   Ropar, Punjab, India
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2. **Dr. Narayanan C. Krishnan**
   Assistant Professor, Department of Computer Science & Engineering
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3. **Dr. Shivanand M. Handigund**
   Professor & Head, Department of Computer Science & Engineering
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   Bengaluru, Karnataka, India
   Email: smhandigund@iitbombay.org