

# ABHISHEK SINGH SAMBYAL

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## RESEARCH INTERESTS

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

## EDUCATION

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### Indian Institute of Technology Ropar

Ph.D. Computer Science and Engineering

*Advisors: Dr. Deepti R. Bathula & Dr. Narayanan C. Krishnan*

*Courses taken: Computer Vision, Digital Image Processing, Machine Learning, Artificial Neural Networks*

Rupnagar

July 2019 - present

### Bangalore Institute of Technology

Master of Technology (M.Tech.) Computer Science and Engineering

*First Class with Distinction 74.16%*

Bangalore

2012 - 2014

## EXPERIENCE

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### Central University of Jammu

*Assistant Professor, Department of Computer Science & IT*

Jammu

Jan 2017 - June 2018

### Kudos Knowledge - Syncordia

*Software Engineer*

Bangalore

Aug 2014 - Jul 2016

## PROJECTS

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1. **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.
2. **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.
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

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### Attended Oxford Machine Learning Summer School 2020

*Saïd Business School (SBS), The University of Oxford*

17-25 Aug, 2020

## ADD-ON COURSES

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

## PROFESSIONAL SKILLS

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<b>Languages/Frameworks:</b>	Python, Pytorch, Tensorflow, Fastai, C
<b>Libraries:</b>	Numpy, Pandas, Matplotlib, Seaborn, Scikit-learn
<b>Softwares/Tools:</b>	WandB, Git, MongoDB, MATLAB, Vim, L <sup>A</sup> T <sub>E</sub> X
<b>Familiar:</b>	DIGITS, JavaScript, CasperJS, C++, nodejs

## PUBLICATIONS/CONFERENCES/WORKSHOPS

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<b>Advances in Deep Learning Techniques for Medical Image Analysis</b>	
<i>Usma Niyaz, Abhishek Singh Sambyal, Devanand</i>	
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
<b>Evaluation of Deep Learning model with Optimizing and Satisficing metrics for Lung Segmentation</b>	
<i>Usma Niyaz, Abhishek Singh Sambyal, Devanand</i>	
8th International Conference on Soft Computing for Problem Solving - SocProS 2018	Springer
<i>Proceedings in Advances in Intelligent Systems and Computing (AISC), Springer.</i>	Dec 17 - 19, 2018
<b>NVIDIA Deep Learning Institute (DLI) Workshop</b>	IIT Jammu
Topics: Classification, Object Detection Techniques & DIGITS framework	Jan 25 - 26, 2018
<b>Knowledge Abstraction from Textural Features of Brain MRI Images for Diagnosing Brain Tumor using Statistical Techniques and Associative Classification</b>	
<i>Abhishek Singh Sambyal, Dr. Asha T.</i>	
IEEE ISBN 978-1-4673-7666-5	IIT Kharagpur
2016 International Conference on Systems in Medicine and Biology (ICSMB)	Jan 4 - 7, 2016

## COMPETITION/EXTRA-CURRICULAR

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<b>HackerEarth: Identify the Animal - Deep Learning Competition</b>
Rank: 12, Acc: 94.91% - <i>Competition Leaderboard</i>
<b>Child Rights &amp; You - CRY</b>
Volunteer with CRY for the upliftment of children.

## REFEREES

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- Dr. Deepti R. Bathula**  
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