Subhajit Chaudhury

CONTACT INFORMATION

Corporate L'Espoir Bldg B-104,
1 Chome 51-1 Suenaga, Kawasaki, Japan
Website: https://subhajitchaudhury.github.io/

Phone : +81 7021837790
Email : subhajitiitb14@gmail.com

RESEARCH INTEREST

I am working as a researcher at IBM Research-Tokyo and pursuing my Ph.D. at the University of Tokyo. My research interests lie in computer vision and reinforcement learning. At IBM, I am working on vision based imitation learning in artificial agents. In my Ph.D. work, I am focusing on exploring interpretability in neural network models for computer vision applications.

EDUCATION

The University of Tokyo, Japan — April 2018 - Present
Ph.D., Information Science and Technology
Advised by Prof. Toshihiko Yamasaki

Indian Institute of Technology, Bombay, India — July 2012 - June 2014
M.Tech, Department of Electrical Engineering
GPA : **9.81 out of 10**
Advised by Prof. Subhasis Chaudhuri

Jadavpur University, India — July 2008 - June 2012
B.E.(Hons.) Department of Electrical Engineering
GPA - **8.90 out of 10** (**Rank: 3rd/125**)
Advised by Prof. Amitava Chatterjee

PUBLICATIONS

1) Daiki Kimura, *Subhajit Chaudhury*, Ryuki Tachibana and Sakyasingha Dasgupta, **Internal Model from Observations for Reward Shaping**, International Conference of Machine Learning(ICML), Adaptive Learning Agents Workshop (ALA), 2018

2) Phongtharin Vinayavekhin, *Subhajit Chaudhury*, Asim Munawar, Don Joven Agravante, Giovanni De Magistris, Daiki Kimura and Ryuki Tachibana, **Focusing on What is Relevant: Time-Series Learning and Understanding using Attention**, International Conference on Pattern Recognition (ICPR), 2018

3) Tadanobu Inoue, *Subhajit Chaudhury*, Giovanni De Magistris and Sakyasingha Dasgupta, **Transfer learning from synthetic to real images using variational auto-encoders for robotic applications**, IEEE International Conference on Image Processing (ICIP), 2018

4) *Subhajit Chaudhury*, Sakyasingha Dasgupta, Asim Munawar, Md. Salam Khan and Ryuki Tachibana, **Conditional generation of multi-modal data using constrained embedding space mapping**, International Conference on Machine Learning (ICML), Implicit Models Workshop, 2017

5) *Subhajit Chaudhury*, Sakyasingha Dasgupta, Asim Munawar, Md. Salam Khan, Ryuki Tachibana, **Text to image generative model using constrained embedding space mapping**, IEEE International Workshop on Machine Learning for Signal Processing (MLSP), 2017 (**Oral**)

6) *Subhajit Chaudhury*, Gaku Nakano, Jun Takada, Akihiko Iketani, **Spatial-temporal motion field analysis for crack detection on concrete surfaces**, IEEE Winter Conference on Applications of Computer Vision (WACV) 2017

7) *Subhajit Chaudhury* and Hiya Roy, **Can fully convolutional networks perform well for general image restoration problems?**, Intl. Conf. on Machine Vision Applications, 2017

8) Vijay Daultani, *Subhajit Chaudhury*, Kazuhisa Ishizaka, **Convolutional Neural Network Layer Re-ordering for acceleration**, 20th Workshop on Synthesis And System Integration of Mixed Information (SASIMI), Kyoto, Japan, 2016

9) Sourav Saha, Pritha Ganguly, *Subhajit Chaudhury*. **Vision based human pose estimation for virtual cloth fitting**. Proceedings of the 2014 Indian Conference on Computer Vision Graphics and Image Processing (ICVGIP)

10) *Subhajit Chaudhury*, Subhasis Chaudhuri, **Volume preserving haptic pottery**, 2014 IEEE Haptics Symposium (HAPTICS), Houston, TX, 2014, pp.129-134. (**Oral**)

Professional activities

- Reviewer for International Conference on Robotics and Automation (ICRA), 2018
- Reviewer for International Conference on Intelligent Robots and Systems (IROS), 2018
- Reviewer for IEEE Transactions on Multimedia, 2018.

Research experience

IBM Research-Tokyo, Japan April 2017- Present
Topic : *Vision based reinforcement learning*
Position : ***Staff Researcher****, Cognitive Robot Innovation Laboratories*

- **Temporal segmentation of rally scenes in table tennis videos** : Developed a deep learning based event detection system that segments rally scenes from table tennis videos captured in the wild from arbitrary viewing angles. Our methods demonstrate average F1-score performance above 90% while also being robust to noise like camera shaking and occlusions.

- **Imitation learning from high dimensional observations** : Developed an imitation learning method that learns action policies from high dimensional expert observations (like raw videos) in the absence of reward signal. Our method can imitate raw YouTube videos with similar performance to the case when true reward signal is available.

- **Transfer learning from synthetic to real images using VAEs for robotic applications** : Developed a method to transfer object detection learned in a simulation environment to the real world by performing a two-stage training on variational auto-encoders (VAE). The proposed method is 6 to 7 times more precisely than baseline methods and robust to lighting conditions.

- **Conditional generation of multi-modal data using constrained embedding space mapping** : Developed a multi-modal generative method that maps multiple data modalities to a common latent space enabling simple cross modal inference. Proposed method can synthesize images from text and raw audio input while producing better PSNR values than baseline methods.

NEC Central Research Labs, Japan Oct 2014- March 2017
Topic : *Deep learning based predictive infrastructure maintenance*
Position : ***Researcher****, Predictive Infrastructure Maintenance group*

- **Spatial-temporal motion analysis for invisible crack detection** : Developed a crack detection algorithm that identifies internal cracks by finding discontinues in dense 2D motion fields using energy minimization on a Conditional Random Fields (CRF). Improved F1 score by 0.22 compared to state-of-the-art image based methods.

- **Deep learning for image-based crack detection** : Developed a fully convolutional network based system for pixel-level crack localization from raw images. Collaborated with Texas Department of Transportation (TxDOT) for application on real captured road videos with real-time performance (16fps for VGA images) with similar localization accuracy to state-of-the-art methods.

- **Accelerating convolutional neural nets by layer re-ordering** : Obtained computational speed-up of 4x in activation units with 5% overall improvement, in convolutional neural networks inference by rearranging pooling and activation layer ordering.

Academic research projects

Indian Institute of Technology (IIT), Bombay July 2012- June 2014
Master of Technology (M. Tech) thesis, India Prof. Subhasis Chaudhuri

- **Volume preserving haptic pottery** : Developed a realistic deformation model for interactive rendering of semi-solid clay based virtual pottery with volume preservation. Proposed model enabled real time visual feedback at 25 fps and tactile feedback at 1000 Hz which is much faster than prior works.

- **Feel Chat : 3D interactive virtual chat room with touch** : Developed a virtual reality chatting system using virtual reality headsets and wearable tactile suit where users can touch the surrounding virtual environment by tactile feedback.

- **Web-cam based virtual trial room** : Developed a real-time virtual cloth fitting using generic web camera input by structurally aligning the input garment to the skeletal joints using OpenCV.

Jadavpur University, India July 2008 - June 2012
Undergraduate (B.E.) project Prof. Amitava Chatterjee

- **Vision based door detection** : Developed a door detection algorithm for mobile robot navigation by generating proposals for candidate door-like structures based on geometric features.

Awards and Achievements

- Secured All India Rank **33 out of 110,125** students in Electrical Engineering, GATE-2012.
- Secured All India Rank **125 out of 72,680** students in Electrical Engineering, GATE-2011.
- Secured rank **86/80,000** in West Bengal Joint Entrance Examination, 2008 for Engineering.
- Received academic excellence award for **1st** position in high school for both class 10 (ICSE-2006) and class 12 (ISC-2008) national board exam.
- Awarded **1st** position prize for winning Don-Bosco Inter-School coding competition.

Relevant Courses

Electrical Engineering: Wavelets, Statistic Signal Processing , Applied Linear Algebra , Digital Signal Processing, Number Theory and Cryptography, Digital Message Transmission

Computer Science: Computer Vision, Foundations of Machine Learning, Computer Graphics, Advanced Computer Graphics

Computer Skills

- **Programming Languages** : *Python, C++, C, Java*
- **Tools** : *Matlab, ROS, Gazebo, OpenCV, CUDA, OpenGL,*
- **Machine learning Tools** : *Tensorflow, Keras, Pytorch, scikit-learn*

Extra curricular activities

- Executive Council member of IIT Bombay Alumni Association in Tokyo (2015-2018)
- Passed Japanese Language Proficiency Test, N4 level
- Member of IIT Bombay swimming club (2012-2014)