Srijan Das | Curriculum Vitae

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Currently, I am a Postdoctoral Associate at State University of New York in Stony Brook. My research work aims at designing systems for understanding humans in videos that can be successfully deployed in daily-living environments encompassing challenges typical of real-world settings.

Research Interests

Machine Learning/Deep Learning (3D Convolutional Neural Networks, Recurrent Neural Networks, Transformers) for Computer Vision applications (action classification, temporal action detection, deep fake detection, anomaly detection, etc).

Education

- **Université Côte d'Azur (Lab: INRIA, Sophia Antipolis)** — **France**
  Ph.D. Computer Science — *2017–2020*
  Supervisor : Dr. Francois Bremond & Dr. Monique Thonnat
- **National Institute of Technology, Rourkela** — **India**
  M.Tech Computer Science & Engineering , GPA - 9.17/10 — *2015–2017*
- **St. Thomas' College of Engineering & Technology, Kolkata** — **India**
  B.Tech Computer Science & Engineering , GPA - 8.99/10 — *2011–2015*

Current & Previous Employment

- **Stony Brook University** — **USA**
  Robotics Lab, Postdoctoral Associate — *April 2021–Current*
  I am working on "learning self-supervised video representation" with Dr. Michael Ryoo.
- **INRIA** — **France**
  STARS Team, Ph.D. — *August 2017–November 2020*
  I have been specifically working on "cross-modal attention for understanding Activities of daily Living".
- **INRIA** — **France**
  STARS Team, Masters' Internship — *January 2017–April 2017*
  I have been working on solving the real-world challenges in action recognition of elderlies in a smarthome environment.
- **National Institute of Technology** — **India**
  Computer Science Department, Teaching Assistant — *July 2016–December 2016*
  I was conducting Lab sessions on "Advanced Data Structures and DBMS".

Projects

- **Postdoctoral Projects:** *'Self-supervised Video Representation'*

  This project specifically focuses on building data augmentations that improve the quality of learned self-supervised video representations while requiring less training data. In addition, we also aim at learning self-supervised video representation that is invariant to unseen camera viewpoints.

- **PhD Thesis:** *'Spatio-temporal Attention for Human Action Recognition'*

  This thesis targets recognition of human actions in videos. Action recognition is a complicated task in the field of computer vision due to its high complex challenges. In order to address these challenges, we have made several contributions. First, we have proposed three variants of spatio-temporal attention mechanisms exploiting RGB and 3D pose modalities (i) to recognize fine-grained actions with short and subtle motion, and (ii) to disambiguate actions with similar visual appearance differing in motion patterns. Then we have proposed a Temporal Model on top of our aforementioned attention model. The video representation retaining dense temporal information enables the temporal model to model long complex actions which is crucial for Activities of Daily Living. Currently, we are integrating these algorithms in a software called "SUP" for monitoring patients suffering from Alzheimer's in Nice Hospital.

- **Project in collaboration with Toyota Motors Europe:** *'Toyota Smarthome: Real-world Activities of Daily Living'*

  In this work, we developed a large real-world video dataset for activities of daily living: Toyota Smarthome. The dataset consists of 16K RGB+D clips of 31 activity classes, performed by seniors in a smarthome. Unlike previous datasets, videos were fully unscripted. As a result, the dataset poses several real-world challenges. As recent activity recognition approaches fail to address the challenges posed by Toyota Smarthome, we developed a novel activity recognition method with attention mechanism.

- **Project in collaboration with NIT Rourkela:** *'Weakly Supervised Video Anomaly Detection'*

  Video representation for discriminating anomalies from normal visual patterns is a challenging task in video surveillance domain. In this work, we proposed a weakly supervised two-branch model performing joint anomaly detection and classification. We also proposed a two-level attention mechanism to take the saliency of the unlabelled video clips with anomalous events into account for a global video representation.

- **Master's Project:** *'Lip Biometric Template Security Framework Using Spatial Steganography'*

  Developed a framework for the whole lip biometric system using both physical and texture features. A preprocessing of lip images has been done using a special type of contrast enhancement in order to reduce the quantum jumps. In the proposed framework, SIFT is used for recognizing purpose. Spatial domain steganographic algorithm is used to embed the identifiers of the lips into their respective images.

Technical skills

- **Programming Languages:** Proficient in: C, C++, Python, Matlab, TeX, Java, R.
- **Packages:** Pandas, Scikit-learn, TensorFlow, Keras, Pytorch

Talks & Teaching

- Talk on "Vision for understanding Activities of Daily Living" at SciTech Talks. (September 4, 2021)
- Seminar talk on "How to combine modalities for understanding Activities of Daily Living? " for CSE 600 at Stony Brook University, NY, USA. (April 30, 2021)
- Seminar talk on "How to combine RGB & Poses for understanding Activities of Daily Living?" at Université Lumière Lyon 2 (November 23, 2020).
- Conducted 2 Lectures at SKFGI Webinar series 2020 on "Surviving the Deep Learning Apocalypse" (August 2020)
- Conducted 3 Lectures on Deep Learning for Computer Vision at 3IA Cote d'Azur for students of MSc of Data Science and Artificial Intelligence (2019-20)
- Talk on "Spatio-temporal attention mechanisms for Activities of Daily Living" at Nice Data Science meetup (November 28, 2019)
- Talk on "Activity Recognition for Healthcare" at Summer School Brain Innovation Generation @ UCA (August 30, 2018)

Publications

Patents

- **Srijan Das**, Rui Dai, Francois Bremond, Luca Minciullo, Lorenzo Garattoni, Gianpiero Francesca. METHOD FOR RECOGNIZING ACTIVITIES USING SEPARATE SPATIAL AND TEMPORAL ATTENTION WEIGHTS. Publication Number WO/2021/069945, International Application No PCT/IB2019/001142 (Publication date 04.15.2021).

- **Srijan Das**, Rui Dai, Francois Bremond, Luca Minciullo, Lorenzo Garattoni, Gianpiero Francesca. METHOD AND SYSTEM FOR DETECTING AN ACTION IN A VIDEO CLIP. European Patent Application EP20306343.3, filed in 2020 (Patent Pending).

Conferences

- **Srijan Das** and Michael Ryoo, "ViewCLR: Learning Self-supervised Video Representation for Unseen Viewpoints" under *Review* (arXiv).

- **Srijan Das** and Michael Ryoo, "STC-mix: Space, Time, Channel mixing for Self-supervised Video Representation" under *Review* (arXiv).

- Rui Dai, **Srijan Das**, Kumara Kahatapitiya, Michael Ryoo, Francois Bremond, "MS-TCT: Multi-Scale Temporal ConvTransformer for Action Detection" under *Review* (arXiv).

- Rui Dai, **Srijan Das**, Francois Bremond, "CTRN: Class Temporal Relational Network For Action Detection", In Proceedings of the 32nd British Machine Vision Conference, BMVC 2021, United Kingdom, Virtual, November 22-25, 2021.

- Rui Dai, **Srijan Das**, Francois Bremond, "Learning an Augmented RGB Representation with

Cross-Modal Knowledge Distillation for Action Detection", In Proceedings of the IEEE International Conference on Computer Vision, ICCV 2021, Virtual, October 11-17, 2021.

- Snehasis Majhi, **Srijan Das** and Francois Bremond, "DAM: Dissimilarity Attention Module for Weakly-supervised Video Anomaly Detection", In Proceedings of the 17th IEEE Int'l Conf on Advanced Video and Signal-based Surveillance, AVSS 2021, video, Virtual, November 16-19, 2021.

- Abhijit Das, **Srijan Das** and Antitza Dantcheva, "Demystifying Attention Mechanisms for Deep Fake Detection", In Proceedings of the IEEE International Conference on Automatic Face and Gesture Recognition, FG 2021, Virtual, Jodhpur, India, December 15-18, 2021.

- Snehasis Majhi, **Srijan Das**, Francois Bremond, Ratnakar Dash and Pankaj Kumar Sa, "Weakly-supervised Joint Anomaly Detection and Classification", In Proceedings of the IEEE International Conference on Automatic Face and Gesture Recognition, FG 2021, Virtual, Jodhpur, India, December 15-18, 2021.

- Rui Dai, **Srijan Das**, Luca Minciullo, Lorenzo Garattoni, Gianpiero Francesca and Francois Bremond, "PDAN: Pyramid Dilated Attention Network for Action Detection", In Proceedings of the IEEE Winter Conference on Applications of Computer Vision, WACV 2021, Virtual, January 5-9, 2021.

- **Srijan Das**, Saurav Sharma, Rui Dai, Monique Thonnat, Francois Bremond, "VPN: Learning Video-Pose Embedding for Activities of Daily Living", In Proceedings of the 16^{th} European Conference on Computer Vision, ECCV 2020, Virtual, August 23-28, 2021.

- **Srijan Das**, Monique Thonnat, Francois Bremond, "Looking deeper into Time for Activities of Daily Living Recognition", In Proceedings of the IEEE Winter Conference on Applications of Computer Vision, WACV 2020, in Snowmass Village, Colorado, March 2-5, 2020.

- **Srijan Das**, Rui Dai, Michal Koperski, Luca Minciullo, Lorenzo Garattoni, Francois Bremond, Gianpiero Francesca, "Toyota Smarthome: Real-World Activities of Daily Living", In Proceedings of the IEEE International Conference on Computer Vision, ICCV 2019, in Seoul, South Korea, October 27 - November 2, 2019.

- **Srijan Das**, Arpit Chaudhary, Francois Bremond, Monique Thonnat, "Where to Focus on for Human Action Recognition?", In Proceedings of the IEEE Winter Conference on Applications of Computer Vision, WACV 2019, in Waikoloa Village, Hawaii, January 7-11, 2019.

- **Srijan Das**, Monique Thonnat, Kaustubh Sakhalkar, Michal Koperski, Francois Bremond, Gianpiero Francesca, "A New Hybrid Architecture for Human Activity Recognition from RGB-D videos", In Proceedings of the 25th International Conference on MultiMedia Modeling, MMM 2019, in Thessaloniki, Greece, January 8-11, 2019.

- **Srijan Das**, Kaustubh Sakhalkar, Michal Koperski, Francois Bremond, "Spatio-temporal Grids for Daily Living Action Recognition", In Proceedings of the Indian Conference on Computer Vision, Graphics and Image Processing, ICVGIP'18, Hyderabad, India, 19-21 December 2018.

- **Srijan Das**, Michal Koperski, Francois Bremond, Gianpiero Francesca, "Deep-Temporal LSTM for Daily Living Action Recognition", In Proceedings of the 14th IEEE International Conference on Advanced Video and Signal-Based Surveillance, AVSS 2018, in Auckland, New Zealand, 27-30 November 2018.

- **Srijan Das**, Michal Koperski, Francois Bremond, Gianpiero Francesca, "Action Recognition based on a mixture of RGB and Depth based skeleton", In Proceedings of the 14th IEEE International Conference on Advanced Video and Signal-Based Surveillance, AVSS 2017, in Lecce, Italy, 29 August - 1st September, 2017.

- **Srijan Das**, Saurav Sharma, Sambit Bakshi, Imon Mukherjee, "A Framework for Pixel Intensity Modulation Based Image Steganography", In Proceedings of International Conference on Advanced Computing and Intelligent Engineering, ICACIE 2016, Bhubaneswar, India, 21-23 December 2016.

- Imon Mukherjee, Biswajita Datta, Reeturaj Banerjee, **Srijan Das**, "DWT Difference Modulation Based a Novel Steganographic Algorithm", In Proceedings of 11th International Conference on Information Systems Security, ICISS 2015, Kolkata, India, 16-20 December 2015.

Journals

- **Srijan Das**, Rui Dai, Di Yang, Francois Bremond, "VPN++: Rethinking Video-Pose embeddings for understanding Activities of Daily Living", In Transactions on Pattern Analysis and Machine Intelligence, TPAMI-2021-05-0786.R1,ISSN: 0162-8828, DOI: 10.1109/TPAMI.2021.3127885, PAMI 2021.

- Rui Dai, **Srijan Das**, Saurav Sharma, Luca Minciullo, Lorenzo Garattoni, Francois Bremond, Gianpiero Francesca, "Toyota smarthome untrimmed: Real-world untrimmed videos for activity detection" submitted to TPAMI (in *major revision*)

- **Srijan Das**, Khan Muhammad, Sambit Bakshi, Imon Mukherjee, Pankaj K Sa, Arun Kumar Sangaiah, Andrea Bruno, "Lip Biometric Template Security Framework Using Spatial Steganography", In Pattern Recognition Letters, 2018.

- **Srijan Das**, Arpita Dutta, Saurav Sharma, Sanghratna Godboley, "A Comparative Analysis of a novel Anomaly Detection algorithm with Neural Networks", In the International Journal of Rough Sets and Data Analysis (IJRSDA) vol. 4, issue 4.

Awards

- **DEC 2017 - NOV 2020:** Recipient of National Scholarship from UCA ED STIC.
- **OCT 2019:** Granted Student Travel Award at ICCV 2019.
- **JUNE 2018:** Selected in FADEX Program 2018 Edition on Artificial Intelligence 2018.
- **OCT-DEC 2017:** Certificate of Outstanding Reviewer for FGCS and CEE Journal (elsevier).
- **AUG 2015 - JUN 2017:** Recipient of MHRD Scholarship through GATE 2015.

- **AUGUST 2014:** Cognizant Certified Student

Academic Activities

- Session chair for Image Understanding & Activity Recognition session at IPAS 2020.
- Mentored for B.E.N.J.I. in GirlScript Summer of Code 2019 edition.
- Mentor for the Emerging Technology Business Incubator (ETBI) Led by NIT Rourkela, a platform envisaged to transform the start-up ecosystem of the region.
- Reviewer at ICACIE 2017, 2018, SETIT 2018, KCST 2019, ICAML 2019, AVSS 2019, WACV 2020, 2021, 2022, CVPR 2021, 2022, ICCV 2021, IROS 2021.
- Reviewer at TPAMI, Patter Recognition, Elsevier Journal of CVIU, Elsevier Journal of FGCS, Elsevier Journal of Computer & Electrical Engineering, MTAP, and Journal of Signal Processing: Image Communication.
- Volunteer at ICACNI 2014, ICACNI 2016, ICCV 2019, ICLR 2020 & ICML 2020.