Vignesh Srinivasan

ML researcher on score-based generative models

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Date of Birth: 10.12.1988

Education

- **Dr.-Ing | Towards Robustifying Deep Neural Networks** — Oct. 2016 – Nov. 2021
  Advisor: Prof. Dr. Klaus-Robert Müller | Technische Universität Berlin — *Berlin, Germany*
- **Master of Science in Information and Communication Engineering** — Oct. 2011 – Apr. 2014
  Technische Universität Darmstadt — *Darmstadt, Germany*
- **Bachelor of Engineering in Electrical and Electronics** — Sep. 2006 – Apr. 2010
  Anna University — *Trichy, India*

Work Experience

- **Zalando Research** — Berlin, Germany
  Applied Scientist — *Jan. 2022 - Now*
  - **Digital Human with Garment Try-on**: Synthesizing high resolution images of digital humans with desired input conditions and properties using generative models.
    - Design generative models like diffusion models and modify the architecture that could solve the problem.
    - Stakeholders management including requirement acquisition and communication of the findings.
    - Optimize the machine learning pipeline to minimize effort and cost throughout the process of content generation.
- **Fraunhofer HHI** — Berlin, Germany
  Research Scientist — *Apr. 2015 - Dec. 2021*
  - **Score-based Generative Modeling**: Improving the generalization performance of DNNs.
    - Robustifying classification-based models against adversarial examples with a novel sampling algorithm called MALADE—Metropolis-adjusted Langevin algorithm for defense [3], [13].
    - Robustifying domain translation methods to fringe examples by Langevin cooling (L-Cool), i.e. cooling the input test distribution [1], [6], [10].
    - Generalization of decision-based blackbox attacking strategies that can better explore the data manifold to craft sparser adversarial examples [12].
  - **ML4Health**: Designing auditable DNNs for medical imaging.
    - Evaluating the robustness of pretraining strategies using exaplainability for diabetic retinopathy [2].
    - Contribution to standardization for a robust and safe AI lifecycle at ITU/WHO [4], [11].
    - Hybrid DNN-Shearlet model for learning the invisible in limited angle tomography [7], [8].
    - Force and velocity estimation for real-time sensorless robotic surgery [9], [14], [16].
  - **Action Recognition**: Evaluating the robustness of action recognition models in compressed domain and explaining their predictions to understand their effectiveness. [17], [18].
  - **Sauber**: Large scale data acquisition, processing and real-time forecasts of air quality for the next 48 hours in Germany using machine learning [5].
- **Technicolor** — Rennes, France
  Summer Intern — *May. 2014 - Oct. 2014*
- **AGT-International** — Darmstadt, Germany
  Research Assistant — *Oct. 2012 - Mar. 2014*

Thesis Supervision

Ashwin Nair (2016), Talmaj Marinč (2018), Csaba Roher (2020), Sara Mirzavand (2022), Yuyin Yang (Ongoing).

Programming Skills

- **Languages**: Pytorch, Tensorflow, Python.
- **Environments**: Linux(Ubuntu), Git, Emacs, Latex, Anaconda, Amazon Mechanical Turk, AWS, Slurm, Singularity, Docker, Weights and Biases

Review Contributions

TNNLS, DSP, PLOS One, NeurIPS 2020, ICLR 2021, ICML2022

References

- **Dr. Wojciech Samek**
  Head of Artificial Intelligence Department, Head of Explainable AI Group
  Fraunhofer HHI
  wojciech.samek@hhi.fraunhofer.de
- **Dr. Shinichi Nakajima**
  Senior Researcher, Berlin Big Data Center
  Technische Universität Berlin
  nakajima@tu-berlin.de

Publications

[1] **Vignesh Srinivasan**, K.-R. Müller, W. Samek, and S. Nakajima, "Langevin cooling for unsupervised domain translation," *IEEE Transactions in Neural Network and Learning Systems (**TNNLS**)*, 2022.

[2] **Vignesh Srinivasan**, N. Strodthoff, J. Ma, A. Binder, K.-R. Müller, and W. Samek, "To pretrain or not? a systematic analysis of the benefits of pretraining in diabetic retinopathy," ***PLoS ONE***, 2022.

[3] **Vignesh Srinivasan**, C. Rohrer, A. Marban, K.-R. Müller, W. Samek, and S. Nakajima, "Robustifying models against adversarial attacks by langevin dynamics," ***Neural Networks***, 2021.

[4] P. Balachandran, F. Cabitza, S. C. Ramirez, A. C. Filho, F. Eitel, J. Extermann, J. Fehr, S. Ghozzi, L. Gilli, G. Jaramillo-Gutierrez, Q.-A. Kester, S. Kurapati, S. Konigorski, J. Krois, C. Lippert, J. Martin, A. Merola, A. Murchison, S. Niehaus, L. Oala, K. Ritter, W. Samek, B. Sanguinetti, A. Schwerk, and **Vignesh Srinivasan**, "Data and artificial intelligence assessment methods (daisam) reference," in ***ITU/WHO** FG-AI4H-I-035, Geneva, Switzerland*, May 2020.

[5] L. Petry, H. Herold, G. Meinel, T. Meiers, I. Müller, E. Kalusche, T. Erbertseder, H. Taubenböck, E. Zaunseder, **Vignesh Srinivasan**, *et al.*, "Air quality monitoring and data management in germany-status quo and suggestions for improvement," *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences (**ISPRS**)*, vol. 44, pp. 37–43, 2020.

[6] **Vignesh Srinivasan**, K.-R. Müller, W. Samek, and S. Nakajima, "Benign examples: Imperceptible changes can enhance image translation performance," in *Proceedings of the Thirty-Fourth **AAAI** Conference on Artificial Intelligence*, 2020.

[7] T. A. Bubba, G Kutyniok, M Lassas, M März, W Samek, S Siltanen, and **V Srinivasan**, "Learning the invisible: Limited angle tomography, shearlets and deep learning," *Numerical Computations: Theory and Algorithms **NUMTA***, p. 103, 2019.

[8] T. A. Bubba, G. Kutyniok, M. Lassas, M. März, W. Samek, S. Siltanen, and **Vignesh Srinivasan**, "Learning the invisible: A hybrid deep learning-shearlet framework for limited angle computed tomography," ***Inverse Problems***, vol. 35, no. 6, p. 064 002, 2019.

[9] A. Marban, **Vignesh Srinivasan**, W. Samek, J. Fernández, and A. Casals, "A recurrent convolutional neural network approach for sensorless force estimation in robotic surgery," ***Biomedical Signal Processing and Control***, vol. 50, pp. 134–150, 2019.

[10] T. Marinč, **Vignesh Srinivasan**, S. Gül, C. Hellge, and W. Samek, "Multi-kernel prediction networks for denoising of burst images," in *2019 IEEE International Conference on Image Processing (**ICIP**)*, IEEE, 2019, pp. 2404–2408.

[11] W. Samek, **Vignesh Srinivasan**, L. Oala, and T. Wiegand, "Robustness - safety and reliability in ai4h," in ***ITU/WHO** FG-AI4H-E-025, Geneva, Switzerland*, May 2019.

[12] **Vignesh Srinivasan**, E. E. Kuruoglu, K.-R. Müller, W. Samek, and S. Nakajima, "Black-box decision based adversarial attack with symmetric α-stable distribution," in *2019 27th European Signal Processing Conference (**EUSIPCO**)*, IEEE, 2019, pp. 1–5.

[13] **Vignesh Srinivasan**, A. Marban, K.-R. Müller, W. Samek, and S. Nakajima, "Defense against adversarial attacks by langevin dynamics," in ***ICML**'19 Workshop on Uncertainty Robustness in Deep Learning*, 2019.

[14] A. Marban, **Vignesh Srinivasan**, W. Samek, J. Fernández, and A. Casals, "Estimation of interaction forces in robotic surgery using a semi-supervised deep neural network model," in *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**)*, IEEE, 2018, pp. 761–768.

[15] W. Pronobis, D. Panknin, J. Kirschnick, **Vignesh, Srinivasan**, W. Samek, V. Markl, M. Kaul, K.-R. Müller, and S. Nakajima, "Sharing hash codes for multiple purposes," *Japanese Journal of Statistics and Data Science (**JJSD**)*, vol. 1, no. 1, pp. 215–246, 2018.

[16] A. Marban, **Vignesh Srinivasan**, W. Samek, J. Fernández, and A. Casals, "Estimating position & velocity in 3d space from monocular video sequences using a deep neural network," in *Proceedings of the IEEE International Conference on Computer Vision (**ICCV**)*, 2017, pp. 1460–1469.

[17] **Vignesh Srinivasan**, S. Lapuschkin, C. Hellge, K.-R. Müller, and W. Samek, "Interpretable human action recognition in compressed domain," in *2017 IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**)*, IEEE, 2017, pp. 1692–1696.

[18] **Vignesh Srinivasan**, S. Gul, S. Bosse, J. T. Meyer, T. Schierl, C. Hellge, and W. Samek, "On the robustness of action recognition methods in compressed and pixel domain," in *2016 6th European Workshop on Visual Information Processing (**EUVIP**)*, IEEE, 2016, pp. 1–6.

[19] **Vignesh Srinivasan**, F. Lefebvre, and A. Ozerov, "Shot aggregating strategy for near-duplicate video retrieval," in *2015 23rd European Signal Processing Conference (**EUSIPCO**)*, IEEE, 2015, pp. 1825–1829.

[20] T. L. van Kasteren, B. Ulrich, **Vignesh Srinivasan**, and M. E. Niessen, "Analyzing tweets to aid situational awareness," in *European Conference on Information Retrieval (**ECIR**)*, Springer, 2014, pp. 700–705.

Technische Universität Berlin

URKUNDE

Die Fakultät IV – Elektrotechnik und Informatik
With this certificate, the Faculty IV – Electrical Engineering and Computer Science

der Technischen Universität Berlin verleiht mit dieser Urkunde
of the Technische Universität Berlin confers upon

Herrn/Mr. Vignesh Srinivasan
geboren am/*born on* 10. Dezember 1988 in Trichy, Indien

den akademischen Grad
the academic degree

DOKTOR DER INGENIEURWISSENSCHAFTEN (Dr.-Ing.)

nachdem er im ordnungsgemäßen Promotionsverfahren durch seine Dissertation
after he has successfully completed the doctoral requirements, on the basis of his thesis

"Towards Robustifying Deep Neural Networks against Adversarial, Fringe and Distorted Examples"

und durch die wissenschaftliche Aussprache am 30. November 2021 mit dem
and of his oral defense on November 30th, 2021, with the

Gesamturteil „sehr gut bestanden" (magna cum laude)
overall evaluation "very good" (magna cum laude),

seine wissenschaftliche Befähigung erwiesen hat.
thus demonstrating his academic competence.

Berlin, den 20.12.2021

Der Präsident der
Technischen Universität Berlin

Der Dekan der Fakultät IV
Elektrotechnik und Informatik

This doctoral degree is comparable to the degree "Doctor of Philosophy (PhD)" in the Anglo-American educational system.

Fraunhofer
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Herrn
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Berlin,
17.05.2022

Arbeitsbescheinigung

Wir bestätigen, dass Herr Vignesh Srinivasan, geboren am 10.12.1988, vom 01.10.2016 bis 31.12.2021 als wissenschaftlicher Mitarbeiter im Fraunhofer Institut für Nachrichtentechnik, Heinrich-Hertz-Institut, in Vollzeit mit 39h/W beschäftigt war.

Fraunhofer-Gesellschaft zur Förderung
der angewandten Forschung e. V.

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Darmstadt, 12. März 2015

Referenz

Sehr geehrte Damen und Herren,

Herr Vignesh Srinivasan, geb. am 10. Dezember 1988, war vom 7. Oktober 2012 bis 4. Mai 2014 als studentische Hilfskraft in unserem Unternehmen in Darmstadt tätig. Er hat in diesem Zeitraum mehr als 500 Arbeitsstunden für uns gearbeitet.

Zu Herrn Srinivasans Hauptaufgaben zählten Beiträge zu den Themenfeldern:

- Computer Vision: Activity Recognition
- Machine Learning

Die von uns übertragenen Aufgaben erledigte er stets zu unserer vollsten Zufriedenheit. Herr Srinivasans geschäftsbezogenes und persönliches Verhalten war stets einwandfrei. Er war wegen seiner kundenorientierten, freundlichen und verlässlichen Art sehr geschätzt und beliebt.

Wir empfehlen Herrn Srinivasan jederzeit gerne weiter und wünschen ihm viel Glück und Erfolg auf seinem weiteren Berufs- und Lebensweg

Mit freundlichem Gruss

HR Manager
Rainer Müller

technicolor

CERTIFICATE
To whom it may concern

I, Laurence Piquet, Responsible for the internships within

TECHNICOLOR R&D France
975 Avenue des Champs Blancs
CS 17616
35576 Cesson Sévigné Cedex,
N° SIRET : 341 399 558 00087
Code APE : 7112B

Hereby certifies that:

Vignesh SRINIVASAN

Has undergone a period of internship from May 12th to Oct 11th, 2014 in our company in the frame of his training at the TU in Darmstadt, Germany

The subject of this internship was: **Shot aggregating strategy for near-duplicate video retrieval**

Done in Cesson-Sévigné on March 11th, 2015

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Laurence PIQUET

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TECHNISCHE UNIVERSITÄT DARMSTADT

MASTER
of Science

The Technische Universität Darmstadt
hereby awards to

Mr. Vignesh Srinivasan

born December 10, 1988 in Trichy
after successful completion of all examination requirements
in the degree program

Information and Communication Engineering

the academic degree of

Master of Science (M.Sc.)

with all rights and privileges pertaining to this degree
accorded by the
Technische Universität Darmstadt
The degree awarded corresponds to the academic university degree
DIPLOM-INGENIEURIN / DIPLOM-INGENIEUR (Dipl.-Ing.).

Darmstadt, April 30, 2014

PRÄSIDENT DER TECHNISCHEN UNIVERSITÄT · DARMSTADT ·

Prof. Dr. Hans Jürgen Prömel
The President of the TU Darmstadt

Prof. Dr.-Ing. Abdelhak M. Zoubir
The Dean of the Department Electrical Engineering and Information Technology

Anna University

Reg. No.81906105054/RG

The Syndicate of the Anna University hereby makes known that **VIGNESH S** *has been admitted to the* **DEGREE OF BACHELOR OF ENGINEERING** *in* **ELECTRICAL AND ELECTRONICS ENGINEERING** *under the Faculty of Electrical Engineering, having completed the prescribed programme of study and having been certified by the duly appointed examiners to be qualified to receive the same, and has been placed in* **FIRST CLASS** *at the Examination held in* **APRIL 2010.**

Given under the Seal of the University

Chennai 600 025
India
December 2010

Controller of Examinations *Registrar* *Vice-Chancellor*

GUM310509764