Hemant Tyagi

Contact Information

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Current position Research fellow at the Alan Turing Institute London. Also affiliated to the School of Mathematics, University of Edinburgh.

Research Interests High dimensional data with intrinsic low dimensional models, Approximation Theory, Online Optimization, Learning Theory, Compressed Sensing.

Education

ETH Zürich, Switzerland

Ph.D, Theoretical Computer Science, June, 2016.

- Dissertation Topic: "On low-dimensional models for functions in high dimensions".
- Advisor: Bernd Gärtner.

Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland

M.S., Communication Systems, July, 2011.

- Thesis Topic: "Local sampling analysis for quadratic embeddings of Riemannian manifolds".
- Advisor: Pascal Frossard.

National Institute of Technology, Surathkal (NITK), Karnataka, India

B.E., Electrical and Electronics Engineering, June, 2006.

Honors and Awards

Gold Medal for securing 1^{st} Rank in B.E Electrical & Electronics Engineering, in the Final Degree Examinations held in 2006.

M.R Shenoy Memorial Prize for best student of the final year in B.E Electrical & Electronics Engineering, during the year 2005-2006.

Certificate of Merit from the Institution of Engineers (Students Chapter), NITK Surathkal for securing 1^{st} Rank in the years 2003-04, 2004-05 in B.E Electrical & Electronics Engineering.

Keerthy Trophy Gold Medal and *Incident 1981 Committee Prize* for Best Student in Electrical & Electronics Engineering, during the year 2005-06, for having secured the highest percentage of marks in I to VII Semester B.E Examinations.

Selected for the *Summer Fellowship Programme* in the Indian Institute of Technology, Madras (June - August, 2005).

Alan Turing Institute Research Fellowship from September 2016 - August 2019.

Teaching Experience Teaching assistance in the following courses taught at ETH Zürich.

- Informatik II – Spring 2013.
- Informatik für Mathematiker und Physiker – Fall 15.
- Machine Learning – Fall 2013.
- Data Mining for Large Data Sets – Spring 2014.
- Geometry: Combinatorics & Algorithms – Fall 2014, 2015.
- Modelling and Simulation – Spring 2015.

Organizational work

- Co-organize the Theory and algorithms for data science (TADS) seminar at Turing Institute London.
- Co-organized the *Approximating high dimensional functions* workshop from $18 - 19$ December, 2017 at Turing Institute with Aretha Teckentrup.

Conference Publications

Hemant Tyagi, Rajesh M Hegde, Hema A. Murthy, and Anil Prabhakar, Automatic identification of bird calls using spectral ensemble average voice prints, 13^{th} European Signal Processing Conference (EUSIPCO), 2006, 1-5.

Hemant Tyagi and Volkan Cevher, Learning ridge functions with randomized sampling in high dimensions, 37^{th} International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2012, 2025-2028.

Hemant Tyagi and Volkan Cevher, Active Learning of Multi-Index Function Models, Advances in Neural Information Processing Systems (NIPS), 2012, 1475-1483.

Hemant Tyagi, Elif Vural and Pascal Frossard, Tangent space estimation bounds for smooth manifolds, 10^{th} International Conference on Sampling Theory and Applications (SAMPTA), 2013, 452-455.

Hemant Tyagi and Bernd Gärtner, Continuum armed bandit problem of few variables in high dimensions, Proc. 11^{th} Workshop on Approximation and Online Algorithms (WAOA), 2014, LNCS 8447, 108-119.

Hemant Tyagi, Andreas Krause and Bernd Gärtner, Efficient Sampling for Learning Sparse Additive Models in High Dimensions, Advances in Neural Information Processing Systems (NIPS), 2014, 514-522.

Hemant Tyagi, Anastasios Kyrillidis, Bernd Gärtner and Andreas Krause, Learning Sparse Additive Models with Interactions in High Dimensions, 19^{th} International Conference on Artificial Intelligence and Statistics (AISTATS), 2016, 111-120 (**oral presentation**).

Mihai Cucuringu and Hemant Tyagi, On denoising modulo 1 samples of a function, 21^{st} International Conference on Artificial Intelligence and Statistics (AISTATS), 2018 (to appear).

Journal Publications

Hemant Tyagi, Elif Vural and Pascal Frossard, Tangent space estimation for smooth embeddings of Riemmanian manifolds, Information and Inference, 2013, 2:1, 69-114. (**Second prize at the Information and Inference best paper prize meeting**)

Hemant Tyagi and Volkan Cevher, Learning non-parametric basis independent models from point queries via low-rank methods, Applied and Computational Harmonic Analysis (ACHA), 2014, 37:3, 389-412.

Hemant Tyagi, Sebastian Stich and Bernd Gärtner, On two continuum armed bandit problems in high dimensions, Theory of Computing Systems (TOCS), 2014, 58:1, 191-222.

Hemant Tyagi, Anastasios Kyrillidis, Bernd Gärtner and Andreas Krause, Algorithms for learning SPAMs with interactions in high dimensions, Information and Inference: A Journal of the IMA, 2017 (to appear).

Preprints

Hemant Tyagi and Jan Vybiral, Learning non-smooth sparse additive models from point queries in high dimensions, 2018.

Talks

Learning multi ridge functions in high dimensions via low rank matrix recovery. Mittagsseminar, ETH Zürich, April, 2012.

Tangent space estimation for smooth embeddings of manifolds. Mittagsseminar, ETH Zürich, January, 2013.

Continuum armed bandit problem of few variables in high dimensions. Mittagsseminar, ETH Zürich,

July, 2013.

Continuum armed bandit problem of few variables in high dimensions. 11th Workshop on Approximation and Online Algorithms (WAOA), September, 2013.

The adversarial multi-armed bandit problem. Mittagsseminar, ETH Zürich, December, 2013.

Interpolation with cubic splines. Mittagsseminar, ETH Zürich, May, 2014.

Efficient sampling for learning SPAMs in high dimensions. Mittagsseminar, ETH Zürich, October, 2014.

Tangent space estimation for smooth embeddings of manifolds. Information and Inference best paper prize meeting, University of Oxford, UK, August, 2015.

Learning SPAMs with pairwise interaction terms.

- Mittagsseminar, ETH Zürich, November, 2015.
- 19th International Conference on Artificial Intelligence and Statistics (AISTATS), Cadiz, Spain, May 11, 2016
- ANC Seminar, School of Informatics, University of Edinburgh, UK, October 25, 2016
- ACM Seminar, School of Mathematics, University of Edinburgh, UK, October 26, 2016
- Algorithms Day, Alan Turing Institute, London, UK, March 17, 2017
- Numerical Analysis Seminar, University of Oxford, UK, February 14, 2017
- Minisymposia on "Learning functions from data" at the 27th Biennial Numerical Analysis Conference at Glasgow, 27 30 June, 2017.

Professional Experience

Senior Engineer, **ITTIAM Systems**, Bangalore, India. **July,** 2006 **- July,** 2008

Worked in the Video Technology Solutions Team. Involved in the development of ITTIAMs MPEG-2 Video Decoder and the MPEG-2 and MPEG-4 Video Encoder.

Other Positions

Intern, Laboratory of Information and Inference Systems, EPFL, Switzerland. **August,** 2011 **- February,** 2012

Intern, Signal Processing Laboratory, LTS4, EPFL, Switzerland. **April,** 2012 **- May,** 2012

References

Available on request.