

# Hemant Tyagi

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CONTACT INFORMATION	The Alan Turing Institute, British Library, 96 Euston Road, London NW1 2DB	<i>E-mail:</i> htyagi@turing.ac.uk <i>Web-page:</i> <a href="https://hemant-tyagi.github.io/">https://hemant-tyagi.github.io/</a>
CURRENT POSITION	Research fellow at the Alan Turing Institute, London; 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	<b>ETH Zürich</b> , Switzerland Ph.D, Theoretical Computer Science, June, 2016. <ul style="list-style-type: none"><li>• Dissertation Topic: “On low-dimensional models for functions in high dimensions”.</li><li>• Advisor: Bernd Gärtner.</li></ul> <b>Ecole Polytechnique Federale de Lausanne (EPFL)</b> , Lausanne, Switzerland M.S., Communication Systems, July, 2011. <ul style="list-style-type: none"><li>• Thesis Topic: “Local sampling analysis for quadratic embeddings of Riemannian manifolds”.</li><li>• Advisor: Pascal Frossard.</li></ul> <b>National Institute of Technology, Surathkal (NITK)</b> , Karnataka, India B.E., Electrical and Electronics Engineering, June, 2006.	
HONORS AND AWARDS	<i>Gold Medal</i> for securing 1 <sup>st</sup> Rank in B.E Electrical & Electronics Engineering, in the Final Degree Examinations held in 2006. <i>M.R Shenoy Memorial Prize</i> for best student of the final year in B.E Electrical & Electronics Engineering, during the year 2005-2006. <i>Certificate of Merit</i> from the Institution of Engineers (Students Chapter), NITK Surathkal for securing 1 <sup>st</sup> Rank in the years 2003-04, 2004-05 in B.E Electrical & Electronics Engineering. <i>Keerthy Trophy Gold Medal</i> and <i>Incident 1981 Committee Prize</i> 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 <i>Summer Fellowship Programme</i> 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. <ul style="list-style-type: none"><li>• Informatik II – Spring 2013.</li><li>• Informatik für Mathematiker und Physiker – Fall 15.</li><li>• Machine Learning – Fall 2013.</li><li>• Data Mining for Large Data Sets – Spring 2014.</li><li>• Geometry: Combinatorics &amp; Algorithms – Fall 2014, 2015.</li><li>• Modelling and Simulation – Spring 2015.</li></ul> Co-taught (with Armin Eftekhari) a module titled <i>Parsomonius representations in data science</i> as part of the course “Research skills in computational applied mathematics” at University of Edinburgh	

in March 2018.

ORGANIZATIONAL  
WORK

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

CONFERENCE  
PUBLICATIONS

H. Tyagi, R.M. Hegde, H.A. Murthy, and A. Prabhakar, Automatic identification of bird calls using spectral ensemble average voice prints, 13<sup>th</sup> European Signal Processing Conference (EUSIPCO), 2006, 1-5.

H. Tyagi and V. Cevher, Learning ridge functions with randomized sampling in high dimensions, 37<sup>th</sup> International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2012, 2025-2028.

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

H. Tyagi, E. Vural and P. Frossard, Tangent space estimation bounds for smooth manifolds, 10<sup>th</sup> International Conference on Sampling Theory and Applications (SAMP TA), 2013, 452-455.

H. Tyagi and B. Gärtner, Continuum armed bandit problem of few variables in high dimensions, Proc. 11<sup>th</sup> Workshop on Approximation and Online Algorithms (WAOA), 2014, LNCS 8447, 108-119.

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

H. Tyagi, A. Kyrillidis, B. Gärtner and A. Krause, Learning Sparse Additive Models with Interactions in High Dimensions, 19<sup>th</sup> International Conference on Artificial Intelligence and Statistics (AISTATS), 2016, 111-120 (**oral presentation**).

M. Cucuringu and H. Tyagi, On denoising modulo 1 samples of a function, 21<sup>st</sup> International Conference on Artificial Intelligence and Statistics (AISTATS), 2018, 1868-1876.

A. Eftekhari, J. Tanner, A. Thompson, B. Toader, and H. Tyagi, Non-negative super-resolution is stable, Proc. of IEEE Data Science Workshop, EPFL, June 2018.

JOURNAL  
PUBLICATIONS

H. Tyagi, E. Vural and P. 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**)

H. Tyagi and V. 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.

H. Tyagi, S. Stich and B. Gärtner, On two continuum armed bandit problems in high dimensions, Theory of Computing Systems (TOCS), 2016, 58:1, 191-222.

H. Tyagi, A. Kyrillidis, B. Gärtner and A. Krause, Algorithms for learning SPAMs with interactions in high dimensions, Information and Inference, 2018, 7:2, 183-249.

PREPRINTS  
(SUBMITTED)

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

M. Cucuringu and H. Tyagi, Provably robust estimation of modulo 1 samples of a smooth function with applications to phase unwrapping, 2018.

A. Eftekhari, J. Tanner, A. Thompson, B. Toader and H. Tyagi, Sparse non-negative super-resolution - simplified and stabilised, 2018.

S. Chretien and H. Tyagi, Multi-kernel unmixing and super-resolution using the Modified Matrix Pencil method, 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.

Provably robust estimation of modulo 1 samples of a smooth function. July, 2018, ISMP, Bordeaux

## PROFESSIONAL EXPERIENCE

Senior Engineer, **ITTIAM Systems**, Bangalore, India.

**July, 2006 - July, 2008**

Worked in the Video Technology Solutions Team. Involved in the development of ITTIAM's 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.