# Kwo Lik (Lax) Chan

# PERSONAL INFORMATION

Date of birth: 07/07/1991

Address: Dipartimento di STUDI PER L'ECONOMIA E L'IMPRESA, Università del Piemonte Orientale, Novara.

## RESEARCH INTERESTS

- Functional data analysis
- Limit theorems of *U*-statistics
- Multiple systems estimation

## PRESENT POSITION

# Assistant professor (RTT) in Statistics DISEI, UNIVERSITÀ DEL PIEMONTE ORIENTALE "A. AVOGADRO", ITALY

Honorary assistant professor in Statistics

05/2025-present |

SCHOOL OF MATHEMATICS, UNIVERSITY OF BIRMINGHAM, UNITED KINGDOM

# PAST POSITIONS

# Assistant professor in Statistics 07/2024-05/2025

School of Mathematics, University of Birmingham, United Kingdom **Assistant professor (RTD-A)** 

02/2022-06/2024

DISEI, UNIVERSITÀ DEL PIEMONTE ORIENTALE "A. AVOGADRO", ITALY

Research theme: Small-Ball probability, Functional data analysis Scientific advisers: Prof. Enea Bongiorno, Professor Aldo Goia

Postdoctoral associate 09/2020-01/2022

DISEI, UNIVERSITÀ DEL PIEMONTE ORIENTALE "A. AVOGADRO", ITALY

Research theme: Small-Ball probability, Functional data analysis Scientific advisers: Prof. Enea Bongiorno, Professor Aldo Goia

Research Associate 09/2019-03/2020

KNOWLEDGE MEDIA INSTITUTE, THE OPEN UNIVERSITY, MILTON KEYNES, UNITED KINGDOM

Research theme: Time-series analysis, Factorial Hidden Markov Models, Combinatorial optimisation, Data analytics

Scientific adviser: Dr. Danica Greetham

**Research fellow** 08/2018-07/2019 |

RIGHTS LAB AT THE UNIVERSITY OF NOTTINGHAM, UNITED KINGDOM

Research theme: Multiple systems estimation, Capture–Recapture, heterogeneity, data analytics

Scientific adviser: Sir Bernard W. Silverman, Fellow of the Royal Society

Research assistant 08/2017-08/2018 |

HORIZON INSTITUTE AT THE UNIVERSITY OF NOTTINGHAM, UNITED KINGDOM

Research theme: Clustering, classification, stochastic processes, Bayesian inference

Scientific advisers: Dr. Iker Perez. Dr. Mercedes Torres Torres

# FDUCATION

#### **Doctor of Philosophy in Mathematics**

2014-2018

THE OPEN UNIVERSITY, MILTON KEYNES, UNITED KINGDOM

Thesis title: Continuous spectra for substitution-based sequences

Supervisors: Prof. Uwe Grimm and Dr. Ian Short

#### Master of Science in Mathematics

2013-2014

#### **Bachelor of Science in Mathematics with Honours**

THE UNIVERSITY OF LIVERPOOL, UNITED KINGDOM

# PUBLICATIONS IN REVIEWED JOURNALS

#### **DECOMPOSING COMPLEXITY MIXTURE PROCESSES ON METRIC SPACES**

Enea. G. Bongiorno, Lax Chan, Aldo Goia

Journal of Statistical Computation and Simulation (Accepted)

#### A LINK FUNCTION SPECIFICATION TEST IN THE SINGLE FUNCTIONAL INDEX MODEL

Lax Chan, Laurent Delsol, Aldo Goia

Advances in Data Analysis and Classification (Forthcoming)

#### BOOTSTRAPPING MULTIPLE SYSTEMS ESTIMATES TO ACCOUNT FOR MODEL SELECTION

Bernard W. Silverman, Lax Chan, Kyle Vincent

Statistics and Computing 34 (44) (2024)

#### **DETECTING THE COMPLEXITY OF A FUNCTIONAL TIME SERIES**

Enea G. Bongiorno, Lax Chan, Aldo Goia

Journal of Nonparametric Statistics 36(3) (2024), 600-622

# MULTIPLE SYSTEMS ESTIMATION FOR SPARSE CAPTURE DATA: INFERENTIAL CHALLENGES WHEN THERE ARE NON-OVERLAPPING LISTS

Lax Chan, Bernard W. Silverman, Kyle Vincent

Journal of American Statistical Association (Theory and methods) 116 (535) (2021), 1297-1306

# DISCUSSION OF MULTIPLE SYSTEMS ANALYSIS FOR THE QUANTIFICATION OF MODERN SLAVERY: CLASSICAL AND BAYESIAN APPROACHES BY SILVERMAN

Ian Dryden, James Goulding, Simon Preston, Lax Chan Journal of the Royal Statistical Society: Series A **183** (2020)

# SUBSTITUTION-BASED STRUCTURES WITH ABSOLUTELY CONTINUOUS SPECTRUM

Lax Chan. Uwe Grimm. Ian Short

Indagationaes Mathematicae 29(4) (2018), 1072-1086

#### SPECTRUM OF A RUDIN--SHAPIRO-LIKE SEQUENCE

Lax Chan, Uwe Grimm

Advances in Applied Mathematics 87 (2017), 16-23

### PROBLEMS IN STRONG UNIFORM DISTRIBUTION

Kwo Chan<sup>1</sup>, Radhakrishnan Nair

Tatra Mt. Math. Publ. 59 (2014). 51-64

## A REMARK ON THE DISTRIBUTION OF CHEBYSHEV POLYNOMIALS ON [-1, 1]

Kwo Chan, Radhakrishnan Nair

Uniform Distribution Theory 9 (2014), no.2, 125-134

# CONFERENCE PROCEEDINGS, ABSTRACT IN BOOKS AND CONFERENCES,

# **AND THESIS**

#### TESTING LINEARITY IN THE SINGLE FUNCTIONAL INDEX MODEL FOR DEPENDENT DATA

Lax Chan, Aldo Goia

Statistical Models and Learning Methods for Complex Data. CLADAG 2023. Studies in Classification, Data Analysis, and Knowledge Organization. Springer, Cham." (2025)

# IMPROVING FINITE SAMPLES PERFORMANCES IN NONPARAMETRIC FUNCTIONAL REGRESSION BY USING WEIGHTED PSEUDO-METRICS

Lax Chan, Laurent Delsol, Aldo Goia

<sup>&</sup>lt;sup>1</sup>This was my registered name when I was at the University of Liverpool.

In: Aneiros, G., Bongiorno, E.G., Goia, A., Hušková, M. (eds) New Trends in Functional Statistics and Related Fields. IWFOS 2025. Contributions to Statistics. Springer, Cham. (2025)

# ANALYSING THE COMPLEXITY MIXTURE STRUCTURE OF DAILY PROBABILITY DENSITIES OF BITCOIN RETURNS

Enea G. Bongiorno, Lax Chan, Aldo Goia

In: Aneiros, G., Bongiorno, E.G., Goia, A., Hušková, M. (eds) New Trends in Functional Statistics and Related Fields. IWFOS 2025. Contributions to Statistics. Springer, Cham. (2025)

# A BOOTSTRAP APPROACH TO ACCOUNT FOR MODEL SELECTION IN MULTIPLE SYSTEMS ESTIMATION

Lax Chan. Bernard W. Silverman

Book of Methodological and Applied Statistics and Demography IV, Volume of the Italian Statistical Society Series on Advances in Statistics series

## STUDYING A MIXTURE OF FUNCTIONAL DATA HAVING DIFFERENT COMPLEXITY

Enea G. Bongiorno, Lax Chan, Aldo Goia

Book of Methodological and Applied Statistics and Demography III, Volume of the Italian Statistical Society Series on Advances in Statistics series

#### CONFIDENCE INTERVAL FOR THE COMPLEXITY INDEX OF FUNCTIONAL DATA

Enea G. Bongiorno, Lax Chan, Aldo Goia

Book of Methodological and Applied Statistics and Demography III, Volume of the Italian Statistical Society Series on Advances in Statistics series

#### NON-PARAMETRIC DIMENSIONALITY DETECTION FOR FUNCTIONAL DATA

Enea G. Bongiorno, Lax Chan, Aldo Goia

In Book of Abstracts of the 25th International Conference on Computational Statistics (COMPSTAT) (2023)

#### ON SPECIFYING A LINK FUNCTION OF A SINGLE FUNCTIONAL INDEX MODEL

Lax Chan

In Book of Abstracts of the 25th International Conference on Computational Statistics (COMPSTAT) (2023)

#### GOODNESS-OF-FIT TEST FOR THE SINGLE FUNCTIONAL INDEX MODEL

Lax Chan, Aldo Goia

Book of Short Papers - CLADAG 2023 [in press]

#### A SPECIFICATION TEST FOR THE SINGLE FUNCTIONAL INDEX MODEL.

Lax Chan

In Book of Abstracts of the 15th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics)(2022)

#### **EVALUATING THE COMPLEXITY OF A FUNCTIONAL TIME SERIES**

Enea G. Bongiorno, Lax Chan, Aldo Goia

In Book of Abstracts of the 14th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics)(2021)

#### ABOUT THE COMPLEXITY OF A FUNCTIONAL TIME SERIES

Enea G. Bongiorno, Lax Chan, Aldo Goia, Philippe Vieu

In Book of Abstracts of the 5th International Workshop On Functional and Operatorial Statistics (2021)

### CONTINUOUS SPECTRA FOR SUBSTITUTION-BASED SEQUENCES

Lax Chan

PhD thesis (2018)

#### SUBSTITUTION-BASED SEQUENCES WITH ABSOLUTELY CONTINUOUS DIFFRACTION

Lax Chan, Uwe Grimm

Journal of Physics: conference series, 809 (2017) 012027

# TECHNICAL REPORT

# ON BAYESIAN INFERENTIAL TASKS WITH INFINITE-STATE JUMP PROCESSES: EFFICIENT DATA AUGMENTATION

Iker Perez, Lax Chan, Mercedes Torres Torres, James Goulding, Theodore Kypraios arXiv: 1806.02458

## R PACKAGES

#### SPARSEMSE 2.0.1

Lax Chan (maintainer and creator), Bernard W. Silverman, Kyle Vincent

## INVITED TALKS AND SEMINARS

#### A link function specification test in semi-parametric regression

07/09/2023

DATA SCIENCE AND COMPUTATIONAL STATISTICS SEMINAR, UNIVERSITY OF BIRMINGHAM, UK

### On specifying a link function of a single functional index model

22-25/08/2023

Invited talk at the 25th International Conference on Computational Statistics, London

## **Goodness-of-fit test for the Single Functional Index Model**

04/07/2023

SEMINARI DI MATEMATICA E STATISTICA, UNIVERSITÀ DEL PIEMONTE ORIENTALE, ITALY

### A specification test for the single functional index model

17-19/12/2022

INVITED TALK AT THE 15TH INTERNATIONAL CONFERENCE OF THE ERCIM WG ON COMPUTATIONAL AND METHODOLOGICAL STATISTICS (CMSTATISTICS). LONDON

#### On the complexity index of a functional time series

20-24/06/2022

Invited talk at the International Symposium of Nonparametric Statistics, Pathos, Cyprus

#### **Evaluating the complexity of a Functional Time Series**

18-20/12/2021

INVITED TALK AT THE 14TH INTERNATIONAL CONFERENCE OF THE ERCIM WG ON COMPUTATIONAL AND METHODOLOGICAL STATISTICS (CMSTATISTICS), ONLINE

### Substitution-based structures with absolutely continuous spectrum

29/03/2017

Invited talk at Open Statistical Physics, Milton Keynes, UK

#### Diffraction spectrum of a Rudin--Shapiro-like sequence

07/06/2016

PLENARY TALK, TRANSVERSAL ASPECTS OF TILINGS AT OLÉRON, FRANCE

# CONTRIBUTED TALKS AND POSTER PRESENTATIONS

#### Improving Finite Samples Performances in Nonparametric Functional Regression by Using Weighted **Pseudo-metrics**

25-27/06/2025

POSTER PRESENTATION AT THE INTERNATIONAL WORKSHOP ON FUNCTIONAL AND OPERATORIAL STATISTICS (IWFOS), Novara, Italy

#### **Complexity mixture processes**

25-27/06/2025

POSTER PRESENTATION AT THE INTERNATIONAL WORKSHOP ON FUNCTIONAL AND OPERATORIAL STATISTICS (IWFOS), Novara, Italy

#### A bootstrap approach to account for model selection in Multiple Systems Estimation 17-20/06/2024 CONTRIBUTED TALK AT THE 52ND SCIENTIFIC MEETING OF THE ITALIAN STATISTICAL SOCIETY (2024), BARI, ITALY

#### **Goodness-of-fit test for the Single Functional Index Model**

11-13/09/2023

CONTRIBUTED TALK AT THE 14TH SCIENTIFIC MEETING CLASSIFICATION AND DATA ANALYSIS GROUP, SALERNO, ITALY

### **About the complexity of a Functional Time Series**

23/06/2021

CONTRIBUTED TALK AT THE INTERNATIONAL WORKSHOP FOR FUNCTIONAL AND OPERATORIAL STATISTICS, ONLINE

### Inflation-based sequences with absolutely continuous spectrum

16-24/09/2016

Poster presentation at International Conference on Quasicrystals, Kathmandu, Nepal

# MFMBER OF INTERNATIONAL WORKING GROUP

# COST Action CA21163 "HiTEc", "Text, functional and other high-dimensional data in econometrics: New models,methods,applications" 2022-2026

GRANT FUNDED BY EUROPEAN UNION

## **Responsive Algorithmic Enterprise: Energy management system for SMEs**

09/2019-03/2020 |

Knowledge Media Institute, the Open University, Milton Keynes, United Kingdom

FUNDED EXTERNALLY BY AND TECHNOLOGY AND RESEARCH

Principal investigator: Dr. Danica Greetham

## **Data and Measurement Programme**

08/2018-07/2019

RIGHTS LAB AT THE UNIVERSITY OF NOTTINGHAM, UNITED KINGDOM

FUNDED BY THE UNIVERSITY OF NOTTINGHAM BEACON OF EXCELLENCE PROGRAMME

Principal investigators: Professor Doreen Boyd, Sir Bernard W. Silverman, Fellow of the Royal Society

# GRANTS AND AWARDS

### FSE REACT-EU, PON Ricerca e Innovazione 2014-2020

2022-2025

GRANT FUNDED BY EUROPEAN UNION

# Project title: Small-ball probabilities in Functional Statistics: theoretical aspects and applications to economic and financial data

COMPETITIVE GRANT FUNDED BY FONDAZIONE CRT

- Young scientist award to attend International conference on Quasicrystals 2016
- Partial funding to attend thematic month at Oléron, France 2016
- Fully funded studentship with stipend 2014-2017
- Liverpool affinity award 2013-2014
- Faculty of physical sciences and engineering postgraduate scholarship 2013-2014
- Departmental scholarship for M.Sc. students 2013-2014
- University of Liverpool regional award 2010-2013

# SUPERVISION

# **Bachelor and master theses co-supervisors**

2024-present

Universita del Piemonte Orientale. Italy

# Mentored German exchange student Marcus Voss on energy disaggregation project

2019

Knowledge Media Institute, The Open University

• I co-supervised Marcus with Dr. Danica Greetham on energy disaggregation. During his time here, he implemented deep learning algorithms on energy disaggregation. His results formed part of our report back to the industry partner.

# Mentored French exchange student Nicolas Laube on aperiodic tiling

2017

School of Mathematics and Statistics, The Open University

• Organized meeting and planned goals to be achieved during his stay. Discussed with him on his weekly reading. Assessed his progress made each week. He produced a report and Python code that generated aperiodic tilings.

# TEACHING EXPERIENCE

#### Course leader and lecturer

Universita del Piemonte Orientale, Italy

- 1. 2022-2023, 2023-2024, 2025-2026 Statistics for finance (Master level) (60 hours) 8 ECTS
  - Scientific sector: SECS-S/01
  - Duties: Preparation of lecture slides, homework sheets and solutions, R codes, exams and management of teaching website. Delivery of lectures and R tutorials and exam marking and oral evaluation
  - Number of students: around 30 students

- 2. 2023-2024, 2024-25, 2025-2026 Laboratorio di Statistica in(Statistics laboratory) (Bachelor level course in Italian) (20 hours) 2 ECTS
  - Scientific sector: SECS-S/01
  - Preparation of homework sheets and solutions and management of teaching website. Delivery of lectures.
  - Number of students: around 300 students

#### **Course leader and lecturer**

University of Birmingham, United Kingdom

- 1. 2024-2025 Nonparametric Statistics (Master level) (Lecture: 24 hours Guided independent study: 76 hours) 5 ECTS
  - Scientific sector: SECS-S/01
  - Duties: Creation of lecture slides, homework sheets and solutions, R codes, exams and management of teaching website. Delivery of lectures, problem classes, R tutorials and exam marking.
  - Number of students: around 20 students
- 2. 2024-2025 Statistics (Bachelor level) (Lecture: 24 hours) 5 ECTS
  - Scientific sector: SECS-S/01
  - Creation of lecture slides, homework sheets and solutions, R codes, exams and management of teaching website. Delivery of lectures, problem classes and exam marking.
  - Number of students: around 300 students

# Teaching assistant to Prof. Aldo Goia

2021-2022

Universita del Piemonte Orientale

• Statistics for finance (Master level) (60 hours).

## Teaching assistant to Prof. Uwe Grimm

2014-2015

LONDON TAUGHT COURSE CENTRE'S PHD COURSE

• Aperiodic order: Marking assignments (10 hours) and assisting in tutorials (2.5 hours).

# Teaching assistant to the following undergraduate/postgraduate courses

2013-2014

THE UNIVERSITY OF LIVERPOOL

- Calculus I (first year): Teaching in tutorials (10 hours) and marking assignments (25 hours)
- Calculus II (first year): Teaching in tutorials (10 hours) and marking assignments(20 hours)
- Introduction to Statistics (first year): Teaching in tutorials (5 hours)
- Complex functions (Second year): Teaching in tutorials (10 hours) and marking assignments (20 hours)
- Geometry of curves (third year): Teaching in tutorials (5 hours) and marking assignments (15 hours)
- Group theory (third year): Teaching in tutorials (5 hours) and marking assignments (10 hours)
- Analysis and number theory (third year): Teaching in tutorials (10 hours)

# COURSE MATERIAL DESIGN ASSISTANCE

# Professor Uwe Grimm's course: Aperiodic order

2014-2015

LONDON TAUGHT COURSE CENTRE

• I proof-read his online slides and homework. Further, I proof-read and gave suggestion to a condensed version of his course material which later became a chapter in the book *Dynamical and Complex Systems*, *LTCC Advanced Mathematics Series volume* 5.

#### Online course material (textbooks)

2014-2015

SCHOOL OF MATHEMATICS AND STATISTICS, THE OPEN UNIVERSITY

• I proof-read, went through textbooks material and provided feedback for M337 Complex analysis and MST124 Essential Mathematics I. The latest version of the textbook materials are now in print.

## GRANTS REVIEW EXPERIENCE

• UK research and innovation future leaders fellowships (2023)

## REFEREE FOR JOURNALS

- Computational Statistics
- Statistics and Computing
- Computational statistics and Data analysis

## ORGANISATION OF SESSIONS IN CONFERENCES

# International workshop on Functional and Operatorial Statistics, Novara, Italy

25-27/06/2025

MEMBER OF ORGANISING COMMMITEE

## Advances in functional data analysis, Joint with Prof. Enea Bongiorno

27-30/08/2024

Organised session at the 26th International Conferences on Computational Statistics, Giessen, Germany

Advances in functional data: Theory and applications, Joint with Prof. Enea Bongiorno 22-25/08/2023 | ORGANISED SESSION AT THE 25TH INTERNATIONAL CONFERENCES ON COMPUTATIONAL STATISTICS, LONDON, UNITED KINGDOM

### DEPARTMENTAL ADMINISTRATION

### Committee for evaluation of applications of contracted professors or teachers

2022-present

DISEI. Università del Piemonte Orientale "A. Avogadro"

#### Committee for evaluation of English capability for entry to master level courses

2022-present |

DISEI, UNIVERSITÀ DEL PIEMONTE ORIENTALE "A. AVOGADRO"

## Founder and coordinator of postgraduate students seminar

2014-2017

SCHOOL OF MATHEMATICS AND STATISTICS. THE OPEN UNIVERSITY

#### Student chair of modules and teaching review committee

2010-2013

THE UNIVERSITY OF LIVERPOOL

• Led a team of seven to process students reviews of all the courses the department offered. Wrote summary reports and delivered them to lecturers. Presented findings to the student-staff committee and lead to better teaching qualities.

### MEMBERSHIP IN SOCIETIES

- Member of Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni, InDAM
- Member of the Società Italiana di Statistica
- Fellow of the Royal Statistical Society

### COMPUTER SKILLS

- R (with experience of writing CRAN approved package)
- Python (Implemented Factorial Hidden Markov Models and Combinatorial optimisation on energy data set)
- Matlab (Implemented state of the art classification algorithms)
- ATEX(Articles and report writing)

# LANGUAGE SKILLS

- Mother tongue: Cantonese
- Other languages: English, Italian.