

Mr. Thierry Vallee

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EXPERIENCE

Consultant

Conseil Formation Amiante, Lyon France

Apr '11 - Present

Course Design in Mathematics, Statistics, Computing and Methodology.

I am currently developing courses in Mathematics, Statistics, Computing and Methodology on behalf of a continuing education center. The courses are intended for technical executives working in the building industry who want to specialize into asbestos removal management.

Research

Self-employed, France France

Aug '08 - Present

After one year as Assistant Professor at Georgia Southern University, I had to come back to Europe for personal reasons. This has been an opportunity for me to develop my research in the field of graph theory, research which led to several publications and submissions. A first theme of this research is the continuation of my previous work on the use of clique-coverings to prove hamiltonicity of graphs. On one hand several closure concepts preserving hamiltonicity were introduced in the literature in order to get round the hamiltonicity problem complexity. On the other hand it appeared that the search for a suitable clique-covering is easier for the closure than for the graph. These remarks led me to define recently several new closure concepts preserving hamiltonicity. Another research topic, developed in collaboration with two co-authors, concerns cartesian products of hypergraphs. Besides giving some properties of these products, we designed an algorithm able to decompose any conformal hypergraph into its prime factors. Notice that the decomposition in prime factors helps to reduce algorithm complexity and that hypergraphs have several applications, in particular in image analysis. Finally, I started to work on a new way to link groups and graphs, called G-graphs. The traditional way to represent a group with a graph is known as Cayley graphs. Although these graphs have highly-regular properties they have some limitations. In order to overcome these limitations, G-Graphs were recently introduced and developed as a generalization of Cayley graphs. Many of the properties and applications of these graphs have still to be explored.

Assistant Professor

Dept. of Mathematical Science, Georgia Southern University, Statesboro, GA

Aug '07 - Jul '08

I taught College Algebra and Statistics in the Mathematical Sciences department. The students were taking different majors and were at different stages of their degree. I was in charge of the students teaching, assessment and marking.

My research was an extension of my previous research in graph theory and graph algorithms developed in collaboration with researchers from the University of Caen (France). This collaboration led to several publications and pre-publications (see section Publications below). The main subject studied was hamiltonicity of graphs. A connected graph is hamiltonian if it contains a spanning cycle. Determining if a graph is hamiltonian is known as NP-complete problem and no satisfactory characterization exists. Nevertheless, many sufficient conditions for hamiltonicity were found, usually expressed in terms of degree connectivity, density, toughness, independent set, regularity and forbidden subgraphs. In 1974, Goodman and Hedetniemi gave two alternative sufficient conditions based on the existence of some type of clique-covering of the graph. We recently generalized one of these conditions using the notion of eulerian clique-covering. A polynomial algorithm to decide the existence of such a covering for every graph containing a simplicial vertex is also given. More general versions of the algorithm may be developed. It should also be possible to further generalize the new condition.

Postdoctoral Researcher

CEOL, Dept. Computer Science, University College Cork, Cork Ireland

May '03 - Apr '07

The Centre for Efficiency Oriented Language (CEOL) is a laboratory funded by Science Foundation Ireland. Its main goal was the development of a new programming language, named MOQA, which was especially designed to facilitate the average time analysis of its programs. In particular this language makes use of partial orders to control the multiplicities of the outputs on some type of sets of inputs said Random Structures. This control is a consequence of a property of MOQA operations said the Random Structure Preservation (RSP). My research in CEOL started with the improvements and comments on the seminal article introducing MOQA. I also proved a technical and useful result about what we call the Reconstruction Problem. I gave some generalizations of MOQA operations to every possible input. I also defined a general criterion to characterize the RSP property. Finally I worked on the average time of the basic operations of MOQA over some regular structures. I also developed a collaboration with researchers from the University of Caen in the domain of graph theory. This collaboration led to the publication of an article where we enriched the complexity class of the graph isomorphism problem (GI) by showing that GI is polynomially reducible to the homeomorphism problem between compatible topologies.

Postdoctoral Researcher

Dept. of Mathematics and Computer Science, University of Udine, Udine Italy **Aug '02 - Apr '03**

The position was a part-time postdoctoral researcher position at the department of Mathematics and Computer Science of the University of Udine (Italy). The research concerned a Non-Well-Founded Theory of Classes due to Ennio De Giorgi (who was professor of mathematics at the "Scuola Normale Superiore" of Pisa) and its embedding in MTA (a lambda-calcul theory developed in my Ph.D. thesis). After giving some generalizations of previous results from my thesis, I attempted to build a model of the theory plus a problematic axiom inside a model of MTA. The question of the existence of such a model is still open.

ATER (temporary lectureship for Ph.D students)

IUT, University Clermont 1, Clermont-Ferrand France **Sep '97 - Aug '99**

During my PhD, I held a two years position as an A.T.E.R. (a temporary teaching position for Ph.D. students) in Mathematics and Computer Science of Clermont 1 University. My lectures took place in the Management departments of the I.U.T. (Institute of Technology) and I.U.P. (Professional University Institute). During this period, I was responsible for the course content, teaching, organization of the examinations and grading. At the I.U.P., I taught mathematics to first year students. At the I.U.T., I was in charge of degree courses for first year and second year students. I taught Word, Excel, Access to the first year students. I was also responsible for the conception and teaching of a second year course. I taught SQL (the universal request language for relational data bases) and Visual Basic (an object-oriented programming language).

Miscellaneous

Miscellaneous, Paris, Lyon France **Jan '82 - Nov '96**

Before I resumed my studies and while studying, I worked full-time in different jobs both in industry and in education (unskilled worker, monitor, furniture delivery, order control etc).

EDUCATION

Doctorate (Logic and Foundation of Computer Science)

Dept. of Mathematics, University Paris VII, Paris France **Dec '01**

The thesis is published as ENTCS Vol.79 and is about a foundational theory of lambda-calculus due to Klaus Grue and called Map Theory. Lambda-calculus is the consistent part of an original system designed by Church as a common foundation for both computability and mathematics. Coming back to the original aim of Church, Grue introduced Map Theory (MT). MT allows a thorough interpretation of predicate calculus and of ZFC+FA, where FA is the usual well-foundation axiom. All primitive notions in logic and set theory are translated into terms of an untyped lambda-calculus enriched with few constants. Nevertheless, MT does not take into account the possibility of non well-founded objects like looping processes, transition systems and paradox in natural languages. Other objects are potentially infinite, only accessible to a partial and progressive knowledge, like strings, real numbers and formal series. Semantics of such objects are given in a more natural and straightforward way inside a universe which includes non well-founded sets. Moreover, the traditional induction principles are not suited to those types of objects. That led computer scientists to develop a dual approach based on co-induction principles. Following that trend, I designed a non well-founded version of MT named MTA which takes into account the existence of non well-founded objects. In the first part of the thesis, I showed MTA to be at least as powerful as ZFC+AFA, where AFA is the anti foundation axiom of P. Aczel. In the second part, I also showed the relative consistency of this new version in the framework of the kappa-continuous semantics of lambda-calculus, which is a generalization of the (omega-) continuous semantics of Scott to any regular cardinal kappa. My system includes a co-induction principle to reason about non well-founded maps and also a way to define those maps.

Training course completion Certificate (Unix Analyst, Data Bases and Networks)

IGS Group (IBIA-Paris), Paris France

Sep '97

This training course included Unix and Oracle (database) administration, C++ programming, analysis methods (Merise), operational research, and some basics about networks and protocols.

DEA (Mathematical Logic and Foundation of Computer Science)

Dept. of Mathematics, University Paris VII, Paris France

Oct '95

The DEA is a 5th year french degree corresponding to a Master of Sciences which completion is compulsory in order to be allowed to start a doctorate.

Maitrise (Logic)

Philosophy Dept., University Paris 1, Paris France

Sep '94

The Maitrise is a 4th year degree corresponding to a Bachelor of Science degree.

Licence (Philosophy)

Philosophy Dept., University Paris 1, Paris France

Sep '92

The Licence is a 3 years degree essentially corresponding to a Bachelor of Arts.

Licence (Logic)

University Paris 1-La Sorbonne, Paris France

Sep '92

JOURNAL PUBLICATIONS

- A new closure concept preserving graph Hamiltonicity and based on neighborhood-equivalence, Discrete Mathematics 311 (2011), pp. 336-341.
- Normal Eulerian clique-covering and Hamiltonicity, Information Processing Letters 110, Issue 16 (2010), pp. 697-701.
- TEPAWSN: A Formal Analysis Tool for Wireless Sensor Network, (with T. Krilavicius, K.L. Man, H.L. Leung), International Journal of Research and Reviews in Computer Science (IJRRCS), Vol. 1, No. 1 (2010), pp. 24-26.
- A clique-covering sufficient condition for Hamiltonicity of graphs, (with A. Bretto, University of Caen, France), Information Processing Letters Vol. 109, Issue 20(2009), pp. 1156-1160.
- Compatible topologies on graphs: An application to graph isomorphism problem complexity, (with A. Bretto and A. Faisant), Theoretical Computer Science, Vol. 362 (1-3), (2006), pp. 255-272.

PH.D. THESIS PUBLICATION

"Map Theory" et Antifondation, ENTCS Vol.79 (2003), pp. 1-260.

CONFERENCE PUBLICATIONS

- Cartesian product of hypergraphs: properties and algorithms, (with A. Bretto and Y. Sylvestre), Proceedings of ACAC'09, EPTCS 4 (2009), pp. 22-28.
- Hamiltonicity of simplicial-connected graphs: an algorithm based on clique decomposition, Proceedings of ITNG'08, IEEE Computer Society Order Number P3099, ISBN 978-0-7695-3099-4 (2008), p. 904-909.
- Reconstruction problem and Equivalence Order-labellings, (with J. Manning), Proceedings of MFCSIT'06, ref:17307, ENTCS (2009), pp. 441-456.
- Functionally-Generalised MOQA Operations, Proceedings of MFCSIT'06, ref:ENTCS17306, ENTCS (2009), pp. 421-439.
- Map Theory : from Foundation to Antifoundation, Proceedings of the 6th Workshop on Domains (WD6), ENTCS Vol.73 (2004), pp. 217-245.
- Une introduction a "Map Theory", Actes du LLAIC (Laboratoire de Logique Algorithmique et Informatique de Clermont 1), Universite d'Auvergne-Clermont 1, Vol VI, Ed. F. Gaillard et D. Richard (1997), pp. 214-227.

PRE-PUBLICATIONS

- A theory of hyperflows on directed hypergraphs - (with Alain Bretto and Y. Sylvestre) submitted to STOC 2012, 26 pp.
- Factorization of hypergraphs - (with Alain Bretto and Y. Sylvestre) submitted to Theoretical Computer Science (2011), 23 pp.
- Another closure concept preserving graph Hamiltonicity and based on neighborhood-equivalence - submitted to Discussiones Mathematicae Graph Theory (2012), 13 pp.
- N2-chain closure of graphs and Hamiltonicity - to be submitted (2011), 37 pp.

- De Giorgi's theory into Map Theory, Final report, postdoc project July 2002-24 April 2003, Dept. of Mathematics and Computer Science, University of Udine (2003), 48 pp.
- Sur l'interpretation de ZFC dans "Map Theory", Prepublications de l'Equipe de Logique, CNRS-Paris VII, N°62, Juin 97.

SCIENTIFIC TALKS

- Hamiltonicity of simplicial-connected graphs: an algorithm based on clique decomposition, ITNG'08, University of Nevada, April 6-9, 2008.
- Functionally-Generalised MOQA Operations, MFCSIT'06, University College Cork, August 1-5, 2006.
- Reconstruction of Partial Orders, joint talk with Dr. Joseph Manning, MFCSIT'06, University College Cork, August 1-5, 2006.
- Compatible Topologies on Graphs: an application to Complexity Theory via the Graph Isomorphism Problem, 21st Summer Conference on Topology and its Applications, Georgia Southern University, July 6-9, 2006
- Compatible topologies on graphs: an application to Graph Isomorphism problem Complexity}, Computer Science Colloquium, Graduate Center, City University New-York, May 2006.
- Reconstruction of partial orders and models of ACETT, Contributed talk, ISDT'04, Xi'An, China, May 2004.
- Map Theory and Antifoundation, Contributed Talk for the 6th Workshop on Domains (WD6), Birmingham 16-19 Sept., 2002.

RESEARCH VISITS

- Invitation at the DIKU (Klaus Grue), Dept. of Computer Science, University of Copenhagen, one week, 2003.
- Invitation at the DIKU, University of Copenhagen, Dept. of Computer Science, one week, July 1997.

PROGRAM COMMITTEES

- DATICS'10, Special Session in the IAENG IMECS 2010 conference, Hong Kong, 17-19 March, 2010.
- DATICS'09, Special Session in the IAENG IMECS 2009 Conference which will take place in Hong Kong, 18-20 March, 2009.
- DATICS'08, part of the 12th WSEAS International Conference on CIRCUITS, Heraklion, Crete Island, Greece, July 22-24, 2008.
- MFCSIT'06 (Mathematical Foundation of Computer Science and Information Technology 2006), University College Cork, Ireland, 1-5 August, 2006.

REVIEWING

I have reviewed articles for several journals and conferences: Theoretical Computer Science, Journal of Computers, Journal of Discrete Mathematics, Information Sciences, DATICS'08-09-10, MFSCIT'06.

REFERENCES

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