



Dr Rédina Berkachy

Senior Researcher

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Professional Path

Rédina Berkachy is a Senior Researcher at the Applied Statistics and Modelling (ASAM) group at the Faculty of Economics and Social Sciences at the University of Fribourg, and a Senior Lecturer at the Haute École d'Ingénierie et d'Architecture de Fribourg (HEIA-FR). Her teaching experience includes Mathematics and Statistics. Her main research field is applied statistics such as fuzzy statistics, as well as numerical analysis and mathematical modelling. She is an R developer, and the author of [FuzzySTs](#) package available on [CRAN](#) . She has published in numerous journals, and was invited speaker at many conferences.

Rédina Berkachy has a Masters degree in Numerical Analysis and Mathematical Modelling and a PhD in Applied Statistics. She is also certified in Machine Learning and Data Science. She has 8 years of experience in Research, Teaching, and programming. She collaborated on various projects in Applied Statistics and Mathematics, and is the author of many research articles and a book entitled "The signed distance measure in fuzzy statistical analysis. Theoretical, Empirical and Programming Advances". She gained the [Best Student Paper Award](#) for her paper entitled "Fuzzy Confidence Intervals by the Likelihood Ratio with Bootstrapped Distribution".

Personal Data

Date of birth	February 11, 1991
Nationality	Lebanese, Swiss B permit
Origine	Deir El Ahmar (LB)
Private adress	Boulevard de Pérolles 75, CH-1700 Fribourg (Switzerland)
Social networks	One can find me on: <ul style="list-style-type: none"> ○ ResearchGate ○ gitlab ○ Academia ○ Google Scholar ○ github ○ ORCID

Skills and Competences

Languages

Arabic	Mother tongue
French	Mother tongue
English	Oral: excellent; written: excellent
Italian	Passive understanding
German	Oral: beginner; written: beginner

Programming and software knowledges

Programming	<ul style="list-style-type: none"> ○ Visual Studio (C#), C++, C, MySql, Python, Visual Basic for Application (VBA), Hadoop and Spark, R. ○ \LaTeX, Microsoft Office, Adobe Reader etc. ○ Author of the FuzzySTs R package.
Software	<ul style="list-style-type: none"> ○ Specific statistical and mathematical softwares: R, SAS, STATA, SPSS, Statistica, Mathematica, Maple, Matlab/Simulink, Octave, Freefem++.
Platforms	<ul style="list-style-type: none"> ○ Internet sites and Learning platforms: Moodle, Jupyter Notebooks.

Education

College

09/1995 – 07/2008 **Baccalauréat (General Sciences)**, *Notre Dame de la Paix*, Dora, Lebanon, 80/100 points, Excellent.

University

09/2008 – 07/2011 **Bachelor (Mathematics)**, *Lebanese University*, Beirut, Lebanon, magna cum laude.

09/2011 – 07/2013 **Masters (Applied Mathematics)**, *Saint Joseph University of Beirut*, Beirut, Lebanon, summa cum laude.

- o Mathematics, Statistics, Operational Research, Data Science, Computer Science

01/2015 – 07/2020 **PhD (Statistics)**, *University of Fribourg*, Fribourg, Switzerland, summa cum laude.

- o Thesis entitled: "The signed distance measure in fuzzy statistics analysis : Some theoretical, empirical and programming advances" under the supervision of Prof. Dr. Laurent Donzé.

Varia

03/2015 – 03/2015 **Certificate in Project Management for researchers**, *Atelier REGARD, University of Fribourg*, Fribourg, Switzerland.

10/2016 – 10/2017 **Didactique universitaire**, *Centre de didactique universitaire, University of Fribourg*, Fribourg, Switzerland.

06/2018 – 06/2018 **Certificate in Hadoop Platform and Application Framework**, *University of California San Diego*, USA, 94.9/100.

07/2018 – 07/2018 **Certificate in Machine Learning**, *University of Stanford*, USA, 99.2/100.

Jobs

02/2013 – 07/2013 **Research trainee - Master Project**, *Collaboration between the Université Saint Joseph de Beyrouth and the Ecole d'Ingénieurs et d'Architectes de Fribourg*, Fribourg, Switzerland.

10/2013 – 05/2014 **Researcher**, *Social and Public Innovation Institute under the direction of Prof. Dr. Mathias Rossi, School of Business Management of Fribourg (HEG-FR)*, University of Applied Sciences and Arts, Western Switzerland (HES-SO), Fribourg, Switzerland.

06/2014 – 09/2014 **Researcher**, *CRM Department, Murex Systems*, Beirut, Lebanon.

06/2015 – 06/2015 **Researcher**, *Career Women, School of Business Management of Fribourg (HEG-FR)*, University of Applied Sciences and Arts, Western Switzerland (HES-SO), Fribourg, Switzerland.

- 09/2015 – 12/2016 **Data Analysis Consultant**, *Laboratory of Nutritional Energetics and Body Composition Regulation under the direction of Prof. Dr. Abdul G. Dulloo, Department of Medicine/Physiology, University of Fribourg*, Fribourg, Switzerland.
- 08/2016 – 12/2020 **Assistant, PhD Student**, *attached to Prof. Dr. Laurent Donzé, professor at the University of Fribourg, Applied Statistics And Modelling group (ASAM), University of Fribourg*, Fribourg, Switzerland.
Field: Fuzzy Statistics.
- 09/2020 – today **Senior Lecturer**, *School of Engineering and Architecture of Fribourg (HEIA-FR), University of Applied Sciences of Western Switzerland (HES-SO)*, Fribourg, Switzerland.
Responsible of the following courses : Linear Algebra I (3.5 ECTS) and Linear Algebra II (3.5 ECTS) for the Bachelor degrees in Chemistry and in Civil Engineering.
- 01/2021 – today **Senior researcher**, *University of Fribourg, Applied Statistics And Modelling group (ASAM), University of Fribourg*, Fribourg, Switzerland.
Field: Fuzzy Statistics.

Projects and Mandates

Projects

- 02/2013 – 07/2013 **Species persistence in niche-overlap graphs**, *School of Engineering and Architecture of Fribourg (HEIA-FR), University of Applied Sciences of Western Switzerland (HES-SO)*, Fribourg, Switzerland.
Study on the persistence of species in niche-overlap graphs.
- 11/2013 – 05/2014 **Health conditions of Swiss entrepreneurs**, *School of Business Management of Fribourg (HEG-FR)*, University of Applied Sciences and Arts, Western Switzerland (HES-SO), Fribourg, Switzerland.
Study on understanding the health situation of entrepreneurs in Switzerland using different national databases.
- 06/2014 – 09/2014 **Staffing management model based on predictive statistical methods**, *CRM Department, Murex Systems*, Beirut, Lebanon.
Study on design, implementation and validation of a staffing management model based on predictive statistical methods using CRM department's databases.
- 06/2015 – 06/2015 **Comparison between female and male entrepreneurial activities**, *Career Women, School of Business Management of Fribourg (HEG-FR)*, University of Applied Sciences and Arts, Western Switzerland (HES-SO), Fribourg, Switzerland.
Study on behalf of Career Women for the comparison between female and male entrepreneurial activities.
- 01/2012 – 01/2016 **University Databank for Massive Weight Loss Patients**, *University of Fribourg*, Fribourg, Switzerland.
Study on behalf of the Hôpitaux Universitaires Suisses. Design and setup of a database.

Mandates

01/2021 – today **Probability of collapse on historical casing. Application of API 5C3 Annex F/H Methodology**, *S & L Consulting*, Fribourg, Switzerland.
Mandate.

Professional affiliations

01/2015 – today **Swiss Statistical Society SSS** .
Member.

01/2015 – today **International Statistical Institute ISI** .
Member.

01/2015 – today **Programme doctoral en statistique de la Conférence Universitaire de Suisse Occidentale CUSO** .
Member.

01/2015 – today **Fribourg - Statistics and Applied Mathematics FRI-SAM** .
Member.

01/2015 – today **Bernoulli Society** .
Member.

01/2016 – today **Institute for Systems and Technologies of Information, Control and Communication INSTICC** .
Member.

11/2018 – today **European Society for Fuzzy Logic and Technology EUSFLAT** .
Member.

Events

September 24, 2016 **Explora 2016** , *Journée portes ouvertes*, University of Fribourg.
Talk.

October 6, 2017 **Pitch your Research in Statistics 2017** , *FRI-SAM event in collaboration with SSS* , University of Fribourg.
Organisation Committee's Member.

September 22, 2018 **Explora 2018** , *Open House Day*, University of Fribourg.
Stand.

Teaching

Teaching Assistant for the following courses:

08/2015 – 12/2020 **Bachelor level:**
Introduction à la Statistique, 1st Year, Fall semester;
Statistique: Approfondissement, 2nd Year, Spring semester.

08/2015 – 12/2020

Master level:

Statistique Bayésienne;
Thèmes choisis de statistiques multivariées;
Méthodes de classification;
Inférence, évaluation et sélection de modèles.

09/2020 – today

Bachelor level:

Linear Algebra I, 1st Year Engineering, Fall semester;
Linear Algebra II, 1st Year Engineering, Spring semester.

Supervision of written theses

Seminars, Bachelor and Master theses

10/2016 – today

Several written theses.

Written theses in Applied Statistics and Econometrics, which describe a theoretical or empirical student's research.

Publications, conferences, etc.

Books and Books' Chapters

Berkachy, Rédina (2020). "The Signed Distance Measure in Fuzzy Statistical Analysis. Some theoretical, empirical and programming advances". PhD thesis.

Berkachy, Rédina and Laurent Donzé (2017c). "Statistical Characteristics of Distributions Obtained Using the Signed Distance Defuzzification Method Compared to Other Methods". In: *The Application of Fuzzy Logic for Managerial Decision Making Processes: Latest Research and Case Studies*. Ed. by Andreas Meier et al. Cham: Springer International Publishing, pp. 35–45. ISBN: 978-3-319-54048-1. DOI: [10.1007/978-3-319-54048-1_4](https://doi.org/10.1007/978-3-319-54048-1_4). URL: https://doi.org/10.1007/978-3-319-54048-1_4.

— (Nov. 8, 2018d). "Fuzzy one-way ANOVA using the signed distance method to approximate the fuzzy product". In: *Rencontres Francophones sur la Logique Floue et ses Applications 2018*. Ed. by Collectif LFA. LFA 2018. LFA. Arras, France: CÉPADUËS-ÉDITIONS, pp. 253–264. ISBN: 978-2-36493-677-5.

— (2019a). "Central Moments of a Fuzzy Random Variable Using the Signed Distance: A Look Towards the Variance". In: *Uncertainty Modelling in Data Science*. Ed. by Sébastien Destercke et al. Uncertainty Modelling in Data Science. Vol. 832. Advances in Intelligent Systems and Computing. Springer International Publishing, pp. 17–24. ISBN: 978-3-319-97546-7. URL: <https://doi.org/10.1007/978-3-319-97547-4>.

— (2019b). "Defuzzification of the fuzzy p-value by the signed distance: Application on real data". In: *Computational Intelligence. 9th International Joint Conference, IJCCI 2017 Funchal-Madeira, Portugal, November 1–3, 2017 Revised Selected Papers*. Ed. by Christophe Sabourin et al. Studies in Computational Intelligence 829. Springer Nature Switzerland AG 2019, pp. 77–97. ISBN: 978-3-030-16468-3. DOI: <https://doi.org/10.1007/978-3-030-16469-0>.

Berkachy, Rédina and Laurent Donzé (2019e). "Testing Hypotheses by Fuzzy Methods: A Comparison with the Classical Approach". In: *Applying Fuzzy Logic for the Digital Economy and Society*. Ed. by Andreas Meier, Edy Portmann, and Luis Terán. Fuzzy Management Methods. Springer Nature Switzerland AG 2019. Chap. 1, pp. 1–22. DOI: https://doi.org/10.1007/978-3-030-03368-2_1. URL: https://doi.org/10.1007/978-3-030-03368-2_1.

Proceedings and articles

Berkachy, R. and L. Donzé (2020b). "Fuzzy Confidence Intervals by the Likelihood Ratio with Bootstrapped Distribution". In: *Best Student Paper Award. Proceedings of the IJCCI 2020 12th International Joint Conference on Computational Intelligence*. IJCCI 2020 12th International Conference on Fuzzy Computation Theory and Applications (FCTA 2020) (Nov. 2–4, 2020).

Berkachy, Rédina and Laurent Donzé (2015b). "Linguistic questionnaire evaluation: global and individual assessment with the signed distance defuzzification method". In: *Advances in Computational Intelligence, Proceedings of the 16th International Conference on Fuzzy Systems FS'15, Rome, Italy*. The 16th International Conference on Fuzzy Systems FS'15. Vol. 34. Rome, Italy: WSEAS, pp. 13–20.

— (2016a). "Individual and Global Assessments with Signed Distance Defuzzification, and Characteristics of the Output Distributions Based on an Empirical Analysis". In: *Proceedings of the 8th International Joint Conference on Computational Intelligence (IJCCI 2016) – Volume 2: FCTA*. IJCCI 2016, pp. 75–82. ISBN: 978-989-758-201-1. DOI: [10.5220/0006036500750082](https://doi.org/10.5220/0006036500750082).

— (2016c). "Linguistic Questionnaire Evaluation: an Application of the Signed Distance Defuzzification Method on Different Fuzzy Numbers. The Impact on the Skewness of the Output Distributions". In: *International Journal of Fuzzy Systems and Advanced Applications* 3, pp. 12–19. ISSN: 2313-0512.

— (Sept. 2016e). "Linguistic questionnaire evaluations using the signed distance defuzzification method: individual and global assessments in the case of missing values". In: *Proceedings of the 13th International Conference on Applied Statistics, Ribno (Bled), Slovenia*. 13th International Conference on Applied Statistics, Ribno (Bled), Slovenia. Ribno, Slovenia.

— (2016g). "Statistical characteristics of distributions obtained using the signed distance defuzzification method compared to other methods". In: *Proceedings of the International Conference on Fuzzy Management Methods ICFMSquare, Fribourg, Switzerland*. International Conference on Fuzzy Management Methods ICFMSquare, Fribourg, Switzerland (Sept. 29–Nov. 30, 2016). Fribourg, Switzerland, pp. 48–58.

— (2017a). "Defuzzification of a Fuzzy Hypothesis Decision by the Signed Distance Method". In: *Proceedings of the 61st World Statistics Congress, Marrakech, Morocco*. 61st World Statistics Congress, Marrakech, Morocco. International Statistical Institute ISI.

Berkachy, Rédina and Laurent Donzé (2017d). "Testing Fuzzy Hypotheses with Fuzzy Data and Defuzzification of the Fuzzy p-value by the Signed Distance Method". In: *Proceedings of the 9th International Joint Conference on Computational Intelligence, Funchal, Madeira, Portugal – Volume 1: (IJCCI 2017)*. IJCCI 2017, Funchal, Madeira, Portugal. INSTICC. SciTePress, pp. 255–264. ISBN: 978-989-758-274-5. DOI: [10.5220/0006500602550264](https://doi.org/10.5220/0006500602550264).

— (2018b). "Estimation of the fuzzy variance by different approximations of the fuzzy product". In: *Proceedings of the 23rd International Conference on Computational Statistics COMPSTAT, Iasi, Romania*. 23rd International Conference on Computational Statistics COMPSTAT 2018. Iasi, Romania.

— (2019d). "Fuzzy Confidence Interval Estimation by Likelihood Ratio". In: *Proceedings of the 2019 Conference of the International Fuzzy Systems Association and the European Society for Fuzzy Logic and Technology (EUSFLAT 2019)*. 11th Conference of the European Society for Fuzzy Logic and Technology, Prague, September 9-13, 2019 (EUSFLAT 2019) (Sept. 9–13, 2019). P.

Donzé, L. and R. Berkachy (2019b). "Fuzzy Poverty Measurement. Modelling and Empirical Analysis Based on the Swiss SILC Surveys". In: *Proceedings of the ZUFE 2019, Hangzhou, China, December 8-10, 2019*. ZUFE 2019, Hangzhou, China, December 8-10, 2019 (Dec. 8–10, 2019).

Donzé, Laurent and Rédina Berkachy (2019b). "Fuzzy individual and global assessments, and FANOVA. Application: Fuzzy measure of poverty with Swiss data". In: *Proceedings. 62nd ISI World Statistics Congress 2019 - Kuala Lumpur, Malaysia*. Kuala Lumpur.

— (2019c). "Fuzzy individual and global assessments, and FANOVA. Application: Fuzzy measure of poverty with Swiss data". In: *Proceedings of the 62nd ISI World Statistics Congress (WSC), Kuala Lumpur, 2019*. 62nd ISI World Statistics Congress (WSC), Kuala Lumpur, 2019 (Aug. 18–23, 2019).

Fares, E-J. et al. (2016). "Standing economy : Does heterogeneity in the energy cost of posture maintenance reside in differential patterns of "weight- shifting" ?" In: *Proceedings of the 13th International Congress on Obesity, May 2016, Vancouver, Canada*.

Miles-Chan, J. et al. (2017). "Standing economy : Does the heterogeneity in the energy cost of posture maintenance reside in differential patterns of spontaneous weight-shifting?" In: *European Journal of Applied Physiology* 1.117, pp. 1–13.

Rossi, Mathias and Rédina Berkachy (2014). "Conditions de travail des entrepreneurs et facteurs de risques pour la santé, situation en suisse. Analyse secondaire des données d'une enquête représentative à l'échelle nationale". In: *12ème Congrès International Francophone en Entrepreneuriat et PME, Agadir, Morocco*.

— (2015). "Conditions de travail des entrepreneurs et facteurs de risques pour la santé, l'impact sur la gestion du personnel, situation en Suisse. Analyse secondaire des données d'une enquête représentative à l'échelle

nationale". In: 9ème Congrès de l'Académie de l'Entrepreneuriat et de l'innovation, Audencia, Nantes.

Projects and Mandates

Berkachy, R. and L. Donzé (2021). *Probability of collapse on historical casing. Application of API 5C3 Annex F/H Methodology*. Fribourg: Mandate of S & L Consulting, 1752 Villars-sur-Glânes, Switzerland.

Berkachy, Rédina and Laurent Donzé (2018f). *Fuzzy Multivariate Analysis of Variance using the Signed Distance. Application on Nestlé's data set. Collaborative project with a team of Nestlé's Statisticians*. Fribourg: Nestlé.

Reports and working papers

Berkachy, Rédina (2017). *Nouvelle méthode d'auto-apprentissage du langage de programmation R en utilisant le Notebook JUPYTER : Un manuel interactif complet; Thesis of the Diploma of Advanced Studies in Didactics, Fribourg, Switzerland*. Tech. rep.

— (2018a). *Fuzzy Multivariate Analysis of Variance using the Signed Distance ; Application on a data set, Report for Nestlé beverages*. Tech. rep.

— (2018b). *Introduction to Fuzzy Statistics; Modelling with Fuzzy Logic, Nestlé beverages Statisticians meeting; Orbe, Switzerland*. Tech. rep.

Conferences

Berkachy, R. and L. Donzé (2020a). *Fuzzy Confidence Intervals by the Likelihood Ratio with Bootstrapped Distribution*. In: IJCCI 2020 12th International Joint Conference on Computational Intelligence (Nov. 2–4, 2020).

Berkachy, Rédina and Laurent Donzé (2015a). *Linguistic questionnaire evaluation: global and individual assessment with the signed distance defuzzification method*. In: The 16th International Conference on Fuzzy Systems FS'15, Rome, Italy (Nov. 7–9, 2015). Rome, Italy.

— (2016b). *Individual and Global Assessments with Signed Distance Defuzzification, and Characteristics of the Output Distributions Based on an Empirical Analysis*. In: 8th International Conference on Fuzzy Computation Theory and Applications, Porto, Portugal (FCTA 2016) (Nov. 9–11, 2016). Porto, Portugal.

— (2016d). *Linguistic questionnaire evaluations using the signed distance defuzzification method: individual and global assessments in the case of missing values*. In: 13th International Conference on Applied Statistics, Ribno (Bled), Slovenia (Sept. 24–27, 2016). Ribno, Slovenia.

— (2016f). *Statistical characteristics of distributions obtained using the signed distance defuzzification method compared to other methods*. In: International Conference on Fuzzy Management Methods ICFM-Square, Fribourg, Switzerland (Sept. 29–Nov. 30, 2016). Fribourg, Switzerland.

Berkachy, Rédina and Laurent Donzé (2017b). *Defuzzification of a fuzzy hypothesis decision by the signed distance method*. In: 61st World Statistics Congress, Marrakech, Morocco, 2017 (July 16–21, 2017). Marrakech, Morocco.

— (2017e). *Testing Fuzzy Hypotheses with Fuzzy Data and Defuzzification of the Fuzzy p-value by the Signed Distance Method*. In: 9th International Joint Conference on Computational Intelligence (IJCCI 2017) (Nov. 1–3, 2017). Madeira, Portugal.

— (2018a). *Central Moments of a Fuzzy Random Variable Using the Signed Distance: A Look Towards the Variance*. In: 9th International Conference on Soft Methods in Probability and Statistics (SMPS 2018), Compiègne, France (Sept. 17–21, 2018). Ed. by Sébastien Destercke et al. Uncertainty Modelling in Data Science. Advances in Intelligent Systems and Computing.

— (2018c). *Estimation of the fuzzy variance by different approximations of the fuzzy product*. In: 23rd International Conference on Computational Statistics COMPSTAT 2018, Iasi, Romania (Aug. 28–31, 2018). Iasi, Romania.

— (2018e). *Fuzzy one-way ANOVA using the signed distance method to approximate the fuzzy product*. In: LFA 2018 Rencontres Francophones sur la Logique Floue et ses Applications 2018, Arras, France (Nov. 8–9, 2018). LFA 2018. Arras, France.

— (2019c). *Fuzzy Confidence Interval Estimation by Likelihood Ratio*. In: 11th Conference of the European Society for Fuzzy Logic and Technology, Prague, September 9–13, 2019 (EUSFLAT 2019) (Sept. 9–13, 2019). P.

Donzé, L. and R. Berkachy (2019a). *Fuzzy Poverty Measurement. Modelling and Empirical Analysis Based on the Swiss SILC Surveys*. In: ZUFE 2019, Hangzhou, China, December 8–10, 2019 (Dec. 8–10, 2019).

Donzé, Laurent and Rédina Berkachy (2019a). *Fuzzy individual and global assessments, and FANOVA. Application: Fuzzy measure of poverty with Swiss data*. In: 62nd ISI World Statistics Congress (WSC), Kuala Lumpur, 2019 (Aug. 18–23, 2019).

Varia

Berkachy, R. and L. Donzé (Oct. 25, 2019). *Fuzzy Confidence Intervals*. Poster. Bern: Swiss Statistical Seminars, SSS-ER.