Danilo Costarelli

Curriculum Vitae

▬▬▬ Personal Information

Danilo Costarelli, born in Perugia (Italy), on September 29, 1986.

▬▬▬ Education:

2010	Master degree in Mathematics, on July 16, 2010, at Univ. of Perugia (Italy), grade: 110 /110 cum laude, and participation to the Summer Course of Mathematics in Perugia 2010, of the "Scuola Matematica Interuniversitaria (SMI)"
From 2011	Fellow of GNAMPA, of the INDAM.
From 2012	Fellow of S.I.M.A.I. (Società Italiana di Mat. Applicata e Industriale), and of U.M.I. (Unione Mat. Italiana).
Feb. 26, 2014	Ph.D. in Mathematics, at "Roma Tre University", Rome (Italy) on February 26, 2014.
Nov., 2014	Winner of a grant reserved to the Ph.D. students of the region "Lazio" (Italy) of universities belonging to the CRUL and the CRUPR.
From 2014 to 2019	Post-doc at the Department of Mathematics and Computer Science of the University of Perugia, with different research grants.
Feb., 2015	Candidate of the Ph.D. in Math. at Roma Tre University, for the grant "INDAM-SIMAI-UMI 2014" for the best Italian Ph.D. thesis from Jan. 2012 to Feb. 2015.
July 25, 2016	Winner of a research grant of the INdAM, from Jan. 1, 2017 to Oct. 31, 2017.
Oct. 30, 2019	Winner of a three years Research position (Italian RTD-b) at the Department of Mathematics and Computer Science of the University of Perugia. Duration: Nov. 29, 2019 - Nov. 28, 2022.

▬▬▬ Current Position:

From November 29, 2022 to now.	Associate Professor of Mathematical Analysis (SSD MAT/05) at the Depart. of Mathematics and Computer Science, of the University of Perugia.

▬▬▬ Other Italian Scientific Abilitation (ASN):

April 05, 2018	National scientific qualification (ASN) for Associate Professor of Numerical Analysis. Deadline of the qualification: April 5, 2024.

▬▬▬ Research interests:

Functional Analysis, Fourier Analysis, Approximation Theory and their applications to imaging, and to real world bio-medicine and engineering problems.

▬▬▬ Professional Experiences and Teaching:

1. From Jan. 2013, Referee for the following journals: Journal of Mathematical Analysis and Applications, Mathematical Methods in Applied Sciences, Applied Mathematics and Computation, Mathematische Nachricten, Results in Mathematics, and many others.
2. From Jan. 2014, referee for "Mathematical Reviews", of the American Math. Society (AMS).

3. From Sept. 2018, member of the "Research ITalian network on Approximation" (RITA)".
4. From Sept. 2020, member of the working group TAA (Teoria dell'Approssimazione e Applicazioni) of UMI.
5. From 2021 to 2023, member of the World's Top 2% Scientists" of the Stanford University.
6. The list of all teaching courses of the last years is available in the personal web-page.

Member of PhD programs and teaching for PhD Courses:

1. From the A.A. 2021/2022, member of the board of the PhD program in Medicine at the Univ. of Perugia.
2. From the A.A. 2023/2024, PhD course entitled: "Neural network-type approximation methods: classical and recent results" for the PhD in Mathematics organized in consortium among the Univ. of Florence, the INdAM, and the Univ. of Perugia.

Editorial board's member of the following scientific journals:

1. From Nov. 18, 2016 to Dec. 2019, member of the Editorial Board (EB) of the "J. NeuroTechnology".
2. From Feb. 20, 2017, member of the EB of the "Asian Research Journal of Mathematics".
3. From Jan. 10, 2019, member of the EB of the section: Mathematics of Computation and Data Science, part of the journal Frontiers in Applied Mathematics and Statistics.
4. From Dec. 16, 2020, member of the EB of the journal "Mathematics (MDPI)".
5. From Jan. 5, 2021, Associate Editor of the: "Rev. de la Real Acad. de Cienc.Exactas, Fisicas y Naturales. Serie A. Mat.".
6. From August 14, 2023, member of the EB of the "Fundamental Journal of Mathematics and Applications."

Editor of the following special issues:

1. 2021-2023. Editor of the special volume of the journal "Mathematical Foundations of Computing" (of the American Institute of Mathematical Science) of the title: "Approximation by linear and nonlinear operators with applications" (3 issues).

Participation to research projects:

1. 2012 - Project GNAMPA-INdAM 2012 : "Operator theory for approximation problems, for evolution equations and their applications". PI: Prof. Gianluca Vinti.
2. 2014 - Project GNAMPA-INdAM 2014: Approximation Theory and Fractional Calculus: applications to Signal Theory. PI: Prof. Carlo Bardaro.
3. 2015 - Project GNAMPA-INdAM 2015: Approximation methods with applications to Signal and Image Processing). PI: Prof. Laura Angeloni.
4. 2015 / 2016 - Project: Enhancement of thermographic images for the study of heat bridges in the energetic analysis of buildings, funded by the "Fondazione Cassa di Risparmio di Perugia" (FCRP).
5. 2016 - Project GNAMPA-INdAM 2016: ""Problemi di regularitá nel Calcolo delle Variazioni e di Approssimazione". PI: Prof. Menita Carozza.
6. 2018 - Project GNAMPA-INdAM 2018: "Dinamiche non autonome, analisi reale e applicazioni". PI: Prof. Luca Bisconti.
7. 2020 - Project GNAMPA-INdAM 2020: "Analisi reale, teoria della misura ed approssimazione per la ricostruzione di immagini". PU: Prof. Anna Rita Sambucini.
8. 2020 - 2023. Project: "Metodiche di Imaging non invasivo mediante angiografia OCT sequenziale per lo studio delle Retinopatie degenerative dell'Anziano", funded by "FCRP". PI: Prof. Gianluca Vinti.
9. 2022. Project GNAMPA-INdAM 2022: "Enhancement e segmentazione di immagini mediante operatori di tipo campionamento e metodi variazionali per lo studio di applicazioni biomediche". PI: Prof. G. Vinti.
10. From July 1, 2022 - to now. Project: "Vitality, Ecosistema dell'Innovazione, Spoke 9 e 10 in Umbria". PI: Prof. Luca Gammaitoni.
11. From Nov. 2022 - to now. Project: "Dissecting INFLAmmatory pathways in tumor cell and microenvironment for the identification of resistance biomarkers and drug discovery strategies in cancer: focus on the NOTCH signaling and its interactors (INFLANOTCH)." PI: Prof. Paolo Sportoletti.
12. From April 16, 2023 - to now. Project GNAMPA-INdAM 2023: "Approssimazione costruttiva e astratta mediante operatori di tipo sampling e loro applicazioni". PI: Dr. Marco Cantarini.
13. From January 12, 2024 - to now. Project GNAMPA-INdAM 2024: "Tecniche di approssimazione in spazi funzionali con applicazioni a problemi di diffusione". PI: Prof.ssa Mirella Cappelletti Montano.

Principal Investigator of the following research projects:

1. March 15, 2017 - June 30, 2018. Project GNAMPA-INdAM 2017: "Approximation by discrete operators and minimum's problems for the functionals of calculus of variation with applications to imaging".
2. March 11, 2019 - to September 30, 2020. Project GNAMPA-INdAM 2019: "Metodi di analisi reale per l'approssimazione attraverso operatori discreti e applicazioni" .
3. PRIN 2022, national CO-PI and local PI of the research unit at the Univ. of Perugia. Project title: "AI- and DIP-Enhanced DAta Augmentation for Remote Sensing of Soil Moisture and Forest Biomass (AIDA)". National PI: Dr. Davide Comite, University "Sapienza" of Rome.
4. PRIN 2022 PNRR, national PI. Project title: "RETINA: REmote sensing daTa INversion with multivariate functional modeling

for essential climAte variables characterization".

Abroad Visiting Professor activities:

1. May 15-18, 2023, Oradea (Romania). "Research Visiting Professor" at the Dep. of Mathematics and Informatics of the University of Oradea (Romania). During the above period he gives the following talk: "Estimates of the approximation error for families of neural network operators".

Plenary speaker at conferences:

1. Konya (Turkey), July 6-8, 2023: 2nd INTERNATIONAL WORKSHOP: CONSTRUCTIVE MATHEMATICAL ANALYSIS (IWCMA). Planary talk: "Estimates of the approximation error for families of neural network operators".
2. Roma (Italia), 8 Novembre 2023, AIDA Kick Off Meeting, at the "Roma International University". Plenary talk: "Approssimazione con operatori di tipo sampling e loro applicazioni".

Speaker at conferences:

1. Bologna (Italy), Sept. 12-15, 2011: XIX Conference of the Italian Mathematical Society (XIX Congresso dell'Unione Matematica Italiana - U.M.I.). Presentation of the talk: Multivariate Sampling-Kantorovich operators and applications to Image Processing.
2. Torino (Italy), June 25-28, 2012: National Conference of the Italian Society of the Industrial and Applied Mathematics (Convegno Nazionale SIMAI - Società Italiana Matematica Applicata e Industriale). Presentation of the talk: "Approximation by sigmoidal functions and applications".
3. Ubéda (Spain), July 15-20, 2012: III Jaen Conference on Approximation Theory. Presentation of the talk: "Multivariate Sampling Kantorovich Operators: approximation results".
4. Brema (Germany), July 1-5, 2013: SampTA 2013. 10th International Conference on Sampling Theory and Applications, July 1st - July 5th, 2013, Jacobs University, Bremen. Poster presentation: "Multivariate Sampling Kantorovich Operators: approximation and applications to civil engineering".
5. Lecce (Italy), March 23-27, 2015: GAMM 2015, 86th Annual Meeting of the International Association of Applied Mathematics and Mechanics. Presentation of the talk: "Multivariate sampling Kantorovich operators: from the theory to the Digital Image Processing algorithm".
6. Siena (Italy), Sept. 07-12, 2015: XX Conference of the Italian Mathematical Society (XX Congresso dell'Unione Matematica Italiana - U.M.I.). Presentation of the talk: Approximation by neural network operators of the max-product type activated by sigmoidal functions.
7. Milano (Italy), Sept. 13-16, 2016: National Conference of the Italian Society of the Industrial and Applied Mathematics (Convegno Nazionale SIMAI - Società Italiana Matematica Applicata e Industriale). Presentation of the talk: "Approximation by neural network operators of the max-product type activated by sigmoidal functions".
8. Konya (Turkey), Feb. 11-13, 2019: The first International Workshop on Constructive Mathematical Analysis, partecipation as invited speaker with the talk: "Neural Network Operators: approximation results".
9. Roma (Italy), Sept. 14-17, 2021, International Conference on Optimization and Decision Sciences, Optimization in Artificial Intelligence and Data Sciences (ODS 2021), invited speaker with the talk: "Neural Network Operators: approximation results".
10. Reggio Calabria (Italy), Nov. 10-12, 2021, Approximation: theory, methods, and applications (ATMA 2021), talk: "Approximation properties of the sampling Kantorovich operators: regularization, saturation, inverse results and Favard classes in Lp-spaces".
11. Istanbul (Turkey), May 11-14, 2022, 5th International ONLINE Conference on Mathematical Advances and Applications (ICOMAA 2022), invited speaker: "Approximation properties of the sampling Kantorovich operators: regularization, saturation, inverse results and Favard classes in Lp-spaces".
12. Matera (Italy), July 5-8, 2022, Functional Analysis, Approximation Theory and Numerical Analysis (FAATNA20¿22), talk: "Approximation properties of the sampling Kantorovich operators: regularization, saturation, inverse results and Favard classes in Lp-spaces".
13. Cetraro (Italy), June 18-22, 2023, International Conference on Approximation Theory and Applications, talk: "Estimates of the approximation error for families of neural network operators".

Member of the organizing committee of the following conferences:

1. "Multivariate Approximation: Theory and Applications (MATA 2020)" , January 16-18, 2020, at the Department of Mathematics and Computer Science of the University of Perugia.
2. "Workshop on Analysis and Applications", online workshop, May 29, 2021.

Member of the scientific committee of the following conferences:

1. "International E-Conference On Mathematical and Statistical Sciences: A Selcuk Meeting", Oct. 20-22, 2022 (Turkey).
2. "7th International Conference on Engineering of Modern Electric Systems (ICEMES 2023)", June 9-10, 2023, Oradea (Romania).

Patents:

- Nov. 3, 2017. "Utility Model Patent", entitled: *DEVICE FOR OBTAINING INFORMATION ON BLOOD VESSELS AND OTHER BODY PARTS*. Protocol Number: 202017000125290. Owners and inventors: Danilo Costarelli, Marco Seracini, Gianluca Vinti.
- Sept. 11, 2020. "Utility Model Patent", entitled: DISPOSITIVO PER L'IDENTIFICAZIONE DI VASI SANGUIGNI CAPILLARI E PER LA VALUTAZIONE DEL LORO GRADO DI PERFUSIONE TISSUTALE. Protocol number: 202020000005164. Owners and inventors: Danilo Costarelli, Marco Seracini, Gianluca Vinti, Marco Lupidi, Carlo Cagini.

Main bibliometric indexes:

Data-bases - citations - h-index:

- SCOPUS: Citations: 1971   -   h-index: 30
- WOS: Citations: 1605   -   h-index: 28
- Google Scholar: Citations: 2830   -   h-index: 35

Top ten of the publications from 2014 to now:

1. D. Costarelli, R. Spigler, *Approximation by series of sigmoidal functions with applications to neural networks*, Annali di Matematica Pura ed Applicata, 194 (1) (2015), 289-306.
2. D. Costarelli, *Neural network operators: constructive interpolation of multivariate functions*, Neural Networks, 67 (2015) 28-36.
3. D. Costarelli, A.M. Minotti, G. Vinti, *Approximation of discontinuous signals by sampling Kantorovich series*, Journal of Mathematical Analysis and Applications, 450 (2) (2017) 1083-1103.
4. F. Asdrubali, G. Baldinelli, F. Bianchi, D. Costarelli, A. Rotili, M. Seracini, G. Vinti, *Detection of thermal bridges from thermographic images by means of image processing approximation algorithms*, Applied Mathematics and Computation, 317 (2018) 160-171.
5. D. Costarelli, G. Vinti, *Saturation by the Fourier transform method for the sampling Kantorovich series based on bandlimited kernels*, Analysis and Mathematical Physics, 9 (2019) 2263-2280.
6. D. Costarelli, M. Seracini, G. Vinti, *A segmentation procedure of the pervious area of the aorta artery from CT images without contrast medium*, Mathematical Methods in the Applied Sciences, 43 (2020) 114-133.
7. D. Costarelli, G. Vinti, *Approximation properties of the sampling Kantorovich operators: regularization, saturation, inverse results and Favard classes in L^p-spaces*, Journal of Fourier Analysis and Applications, 28 (2022) Art. numb. 49.
8. D. Costarelli, M. Piconi, G. Vinti, *On the convergence properties of Durrmeyer-Sampling type operators in Orlicz spaces*, Mathematische Nachrichten, 296 (2023) 588-609.
9. D. Costarelli, *Approximation error for neural network operators by an averaged modulus of smoothness*, Journal of Approximation Theory, 294 (2023) 105944.
10. M. Cantarini, D. Costarelli, G. Vinti, *Approximation results in Sobolev and fractional Sobolev spaces by sampling Kantorovich operators*, Fractional Calculus and Applied Analysis, 6 (2023) 2493-2521.

The full list of publications is available in the personal web-page.

Date

13/01/2024

Signature