

# Dr SIMONE PARISOTTO

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Born in Verona (Italy) on 23/12/1987, Married, DBS Checked

Google Scholar: [fkD9m-UAAAAJ](https://scholar.google.com/citations?user=fkD9m-UAAAAJ) - ORCID ID: [0000-0003-0865-0289](https://orcid.org/0000-0003-0865-0289) - ResearcherID: [AAF-9764-2019](https://www.researcherid.com/AAF-9764-2019) - GitHub: [www.git.io/simoneparisotto](https://www.git.io/simoneparisotto)

## WORK AND RESEARCH POSITIONS

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### 01/2022-07/2022: Image Processing Researcher, siHealth Photonics S.r.l. – Flyby S.r.l., Livorno, IT

- Development of AI digital solutions for imaging problems in healthcare
- R&D, Project and Product Manager of mobile imaging solutions for the diagnostic of Actinic Keratosis lesions on skin

### 01/2019-12/2021: Research Associate, DAMTP & Fitzwilliam Museum, University of Cambridge, UK

- **Unveiling the invisible: mathematics for conservation in Arts and Humanities** (Leverhulme Trust funded project)
- PI: Prof Carola-Bibiane Schönlieb; in collaboration with Hamilton Kerr Institute, Fitzwilliam Museum, Faculty of Classics
- Development of deep learning solutions for the virtual restoration, pattern recognition and clustering of heritage data

### 07/2014-09/2014: Research Scholarship, University of Verona, IT

- **Image processing using thermography techniques for non-invasive analysis of Cultural Heritage**
- Infrared Analysis and Image Processing for Cultural Heritage Conservation of “**Monocromo**”, **Leonardo Da Vinci**

### 03/2012-12/2012: Internship, Vision, Image Processing & Sound Laboratory, Verona, IT

- Study of the Laplace-Beltrami operator and Heat-Kernel-Signature for 3D shapes. Supervised learning of brain morphological deformations and features possibly correlated to “schizophrenia”. Attendance to ECCV2012 Conference.

## EDUCATION

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### 10/2014 – 04/2019: PhD Degree, Cambridge Centre for Analysis - Jesus College, University of Cambridge, UK

- Thesis title: **Anisotropic Variational Models and PDEs for Inverse Imaging Problems**. (DOI: [10.17863/CAM.38240](https://doi.org/10.17863/CAM.38240))
- Supervisor: Prof Carola-Bibiane Schönlieb - Co-supervisor: Prof Simon Masnou
- Examiners: Prof Arieh Iserles, Prof Jean-Michel Morel (Submitted: 12/2018, Approved: 04/2019, Awarded: 10/2019)

### 2014: Master’s Degree in Mathematics, University of Verona, IT (110/110 cum laude)

- Thesis title: **Variational Methods in Image Processing for Inpainting and Shadow Removal**.
- Supervisor: Prof Giandomenico Orlandi - Co-supervisor: Prof Simon Masnou

## RESEARCH INTERESTS

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Mathematical Image Processing, Inverse Problems, Deep Learning, Unsupervised Learning, Variational Methods, Anisotropic PDEs, Numerical Analysis, Optimisation, Inpainting, Denoising, Scattered Data Interpolation, Heritage Science, Digital Humanities.

## EDITORIAL ACTIVITIES

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|---|---|
| ○ SIAM J. on Imaging Sciences (SIIMS, 9)          | ○ J. of Mathematics and the Arts (2)            |
| ○ J. of Computational and Applied Mathematics (3) | ○ Heritage Science (1)                          |
| ○ Computers & Mathematics with Applications (2)   | ○ Sensors (1)                                   |
| ○ Int. J. of Geo-Information (ISPRS IJGI, 2)      | ○ Scale Space and Variational Methods (SSVM, 1) |
| ○ J. of Mathematical Imaging and Vision (JMIV, 2) |   |

## GRANTS, AWARDS AND PRIZES

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- 2021: Pilot Project: **Hidden knowledge: the extraction of the fingerprint of medieval paper from digital images**
- 2021: **MSCA-IF 2020 Seal of Excellence** for the ESCHER project (ID: 101027102), CCHT @ Italian Institute of Technology
- 2020: Award of **two additional increments** in the payroll based on exceptional performances, Univ. Cambridge, UK
- 2018: **Best Paper Award**, International Conference on Image and Signal Processing, **ICISP 2018**, Cherbourg, FR
- 2018: **SIAM Imaging Science 2018 Student Travel Award** (\$700)
- 2014-2020: Travel grants: **Cambridge Philosophical Society** (+1.5K GBP), **DAMTP** (2K GBP) **Jesus College** (0.65K GBP)
- 2014: **Best Master Thesis Award**, Banca di Credito Cooperativo, Verona, IT

## MEMBERSHIP, FELLOWSHIP AND PARTICIPATION TO COMMITTEES

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- 11/2019-today: **Member** of the “**Veronesi tutti Math**”, the mathematical alumni association of University of Verona, IT
- 09/2020-12/2021: **External collaborator** to the project **ARCH-AI-STORY** (Atelier 2) @ CEPAM, CNRS, FR
- 04/2020-12/2021: **Member** of the “Unione Matematica Italiana” (**UMI**) and its imaging working group **UMI MIVA**
- 11/2019-11/2021: **Organiser** of the Alan Turing Institute **AI&ARTS** Group and **member** of its editing board newsletter
- 10/2016-12/2021: **Member** of the “Society for Industrial and Applied Mathematics” (**SIAM**)

- 02/2015-12/2021: **Fellow** of the **Cambridge Philosophical Society**, Cambridge, UK
- 2017: **Committee Member** and **Master Thesis Reviewer** for candidate Nicola Garibaldi, University of Genova, IT
- 2016: **Committee Member** of the **SIAM-IMA Cambridge Student Chapter**, University of Cambridge, UK

#### ORGANISATION OF EVENTS

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- 04/2021-12/2021 (monthly): **AI&ARTS Webinar Series** (Alan Turing Institute, online)
- 11/2019 - 11/2020: Maths for Applications in Cultural Heritage: Annual Meeting (**MACH20**), Cambridge, UK (online)
- 07/2020: Cultural Heritage Imaging Science, mini-symposium, **SIAM IS20**, Toronto, CA (online)
- 07/2019: Mathematical Imaging Models for Cultural Heritage Conservation, mini-symposium, **ICIAM19**, Valencia, ES
- 05/2016: **SIAM-IMA** Cambridge Annual Conference, University of Cambridge, UK
- 04/2015: 5<sup>TH</sup> Joint **DTC Student Conference** CCA-MASDOC-OxpDE, University of Cambridge, UK
- 2015 (Lent term): Cambridge Analysts' Knowledge Exchange (**C.A.K.E.**) Seminar Series, University of Cambridge, UK
- 10/2014: **Autumn School** in Image Processing 2014. University of Verona, IT

#### INVITED SPEAKER AT INTERNATIONAL CONFERENCES

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- 06/2021: **European Congress of Mathematics**, Portorož, SI (online)
- 07/2020: **SIAM Imaging Science (SIAM IS20)**, Toronto, CA (online)
- 07/2019: **International Congress on Industrial and Applied Mathematics (ICIAM19)**, Valencia, ES
- 06/2018: **Image Processing for Art Investigation (IP4AI 2018)**, Ghent, BE
- 06/2018: **SIAM Imaging Science (SIAM IS18)**, Bologna, IT
- 12/2017: **Variational methods and effective algorithms for imaging and vision**, Cambridge, UK
- 09/2016: **First Joint Meeting Brazil-Italy in Mathematics**, Rio de Janeiro, BR
- 03/2016: **British Applied Mathematics Colloquium (BAMC 2016)**, Oxford, UK

#### INVITED RESEARCH VISITS

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- 06-08/02/2020: Dr Cristina Maria Barrocas Dias, **Hercules Lab**, Evora, PT (part of the ARCHMAT EMJMD program)
- 22-28/09/2019: Prof Aurélie Bugeau, **LaBRI**, University of Bordeaux, FR
- 25/09-15/12/2017: VMV Programme, **Isaac Newton Institute**, University of Cambridge, UK
- 18-22/06/2013, 19-31/03/2017, 07-19/10/2017: Prof Simon Masnou, **University Lyon 1**, FR

#### STUDENT SUPERVISION AND TEACHING ACTIVITIES

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- 04/2021-08/2021: Co-tutor pre-doctoral PhD student for **ARCH-AI-STORY**, Univ. Côte d'Azur (FR) and Univ. of Bologna, IT
- 2017: Teaching Supervisor for **Linear Analysis** (Part II, 12 students), University of Cambridge, UK
- 2015-2016-2017: Teaching Supervisor for **Optimization & Control** (Part II, 17 students), University of Cambridge, UK
- 2016: Co-supervisor in the **Summer Undergraduate Research Program**, University of Cambridge, UK  
Project title: "Classification of Ancient Pottery by Machine Learning and Geometric Analysis". Student: V. Vankov
- 12/2010: **High school teacher** (temporary cover). Liceo Scientifico San Giuseppe, Verona, IT

#### COMMUNICATION ACTIVITIES

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- 2019-2022: webmaster of [Mathematics for Applications in Cultural Heritage](#) (MACH)
- 2019: Science on YouTube: "[Making stuff disappear using applied maths](#)" with **Prof S. Siltanen** and **Prof C.-B. Schönlieb**
- 2016: webmaster of [SIAM-IMA Cambridge Student Chapter](#)
- 2017: Member in Panel Discussion "Art, Architecture, AI", Emmanuel College, Cambridge, UK

#### ACADEMIC RELATED ACTIVITIES

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- 2018: **Submission helper**, Computer-Aided Teaching of All Mathematics (CATAM) course, University of Cambridge, UK
- 2015: **Mark Checker** and **Script Sorter** for Prof Richard Weber, University of Cambridge, UK

#### IT, CODING SKILLS AND RELEVANT TRAINING

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- **MATLAB, Python 3, C, Git/GitHub/Azure DevOps, TeX, MS Office, MS SharePoint**
- **University of Cambridge training:** Python 3, Jupyter, PHP, Unix, MySQL, HPC with Open ACC
- **CINECA training:** scientific computing in HPC (MPI, OpenACC, CUDA)
- **Other Expertises:** HTML, CSS, MyPHP, Joomla, Wordpress, Adobe Lightroom/Photoshop, Film/Digital Photography

#### LANGUAGES

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- **Italian** (Mother tongue)
- **English** (7.0 IELTS)

#### JOURNAL PUBLICATIONS (PEER-REVIEWED)

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1. S. Parisotto, N. Leone, C.-B. Schönlieb and A. Launaro. **Unsupervised Clustering of Roman Potsherds via Variational Autoencoders**. Journal of Archaeological Science. Vol. 142, 105598, 2022, DOI: [10.1016/j.jas.2022.105598](https://doi.org/10.1016/j.jas.2022.105598)
2. C. Daffara, S. Parisotto, P.I. Mariotti and D. Ambrosini. **Dual mode imaging in mid infrared with thermal signal reconstruction for innovative diagnostics of the “Monocromo” by Leonardo da Vinci**. Nature Scientific Reports. Vol. 11 22482, 2021, DOI: [10.1038/s41598-021-01837-8](https://doi.org/10.1038/s41598-021-01837-8)
3. S. Parisotto, S. Masnou, C.B. Schönlieb and J. Lellmann. **Higher-order Total Directional Variation: Imaging Application**. SIAM Journal of Imaging Science, Vol. 13, Pages 2063–2104, 2020, DOI: [10.1137/19M1239209](https://doi.org/10.1137/19M1239209)  
Companion code: <https://github.com/simoneparisotto/TDV-for-image-denoising>
4. S. Parisotto, L. Calatroni, A. Bugeau, N. Papadakis and C.B. Schönlieb. **Variational Osmosis for Non-Linear Image Fusion**. IEEE Transaction on Image Processing, 2020, DOI: [10.1109/TIP.2020.2983537](https://doi.org/10.1109/TIP.2020.2983537)  
Companion code: <https://github.com/simoneparisotto/Variational-Osmosis-for-Non-Linear-Image-Fusion>
5. S. Parisotto, S. Masnou and C.B. Schönlieb. **Higher-order Total Directional Variation: Analysis**. SIAM Journal of Imaging Science, Vol. 13, Pages 474-496, 2020, DOI: [10.1137/19M1239210](https://doi.org/10.1137/19M1239210)
6. S. Parisotto, L. Calatroni, M. Caliari, C.B. Schönlieb and J. Weickert. **Anisotropic osmosis filtering for shadow removal in images**. Inverse Problems, Volume 35(5), IOP Publishing, 2019, DOI: [10.1088/1361-6420/ab08d2](https://doi.org/10.1088/1361-6420/ab08d2)  
Companion code: <https://github.com/simoneparisotto/anisotropic-osmosis-filter>
7. L. Calatroni, M. d’Autume, R. Hocking, S. Panayotova, S. Parisotto, P. Ricciardi and C.B. Schönlieb. **Unveiling the invisible - mathematical methods for restoring and interpreting illuminated manuscripts**. Heritage Science, Volume 6 (54), Springer, 2018, DOI: [10.1186/s40494-018-0216-z](https://doi.org/10.1186/s40494-018-0216-z) Code: <https://github.com/simoneparisotto/Manuscripts-restoration>
8. C. Daffara, S. Parisotto and D. Ambrosini. **Multipurpose, dual-mode imaging in the 3–5  $\mu\text{m}$  range (MWIR) for artwork diagnostics: A systematic approach**. Optics and Lasers in Engineering, Vol. 104, Pages 266-273, 2018, DOI: [10.1016/j.optlaseng.2017.10.006](https://doi.org/10.1016/j.optlaseng.2017.10.006)

#### CONFERENCE PROCEEDINGS (PEER-REVIEWED)

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1. C. Daffara, S. Parisotto S. Mazzocato, P.I. Mariotti, D. Ambrosini. **Thermal imaging in the 3-5 micron range for precise localization of defects: application on frescoes at the Sforza Castle**. OA3A VIII, SPIE, 2021, DOI: [10.1117/12.2593993](https://doi.org/10.1117/12.2593993)
2. N. Leone, S. Parisotto, K. Targonska-Hadzibabic, S. Bucklow, A. Launaro, S. Reynolds, C.-B. Schönlieb. **Art Speaks Maths, Maths Speaks Art**. Bridges 2020 Conference Proceedings, Pages 481-484, Tessellations Publishing, 2020.
3. S. Parisotto, S. Masnou, C.B. Schönlieb. **Total directional variation for video denoising**. Lecture notes in Computer Science, 11603, Pages 1-14. DOI: [10.1007/978-3-030-22368-7\\_41](https://doi.org/10.1007/978-3-030-22368-7_41) **\*Oral Presentation\*** Supplementary material: [YouTube](https://www.youtube.com/watch?v=...)
4. S. Parisotto, L. Calatroni and C. Daffara. **Mathematical osmosis imaging for multi-modal and multi-spectral applications in Cultural Heritage conservation**. In: Image Processing for Art Investigation, Ghent, 2018.
5. S. Parisotto, L. Calatroni and C. Daffara. **Digital Cultural Heritage imaging via osmosis filtering**. ICISP 2018: Image and Signal Processing, 2018, DOI: [10.1007/978-3-319-94211-7\\_44](https://doi.org/10.1007/978-3-319-94211-7_44) **\*Best paper award\***
6. L. Calatroni, C. Estatico, N. Garibaldi and S. Parisotto. **Alternating direction implicit (ADI) schemes for a PDE-based image osmosis model**. JOP: Conference Series, 904(1):012014, 2017, DOI: [10.1088/1742-6596/904/1/012014](https://doi.org/10.1088/1742-6596/904/1/012014)
7. C. Daffara, S. Parisotto and P.I. Mariotti. **Mid-infrared thermal imaging for an effective mapping of surface materials and sub-surface detachments in mural paintings: integration of thermography and thermal quasi-reflectography**. OA3A V: Proc. of SPIE Vol. 9527, 95270I, 2015, DOI: [10.1117/12.2184836](https://doi.org/10.1117/12.2184836)

#### CHAPTERS IN BOOK

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1. C. Daffara, S. Parisotto and P.I. Mariotti. **Infrared Analysis and Thermal Quasi-Reflectography**. In: “Leonardo Da Vinci, The Sala delle Asse of the Sforza Castle, Diagnostic Testing and Restoration of the Monochrome”, Silvana Ed., 2017

#### THESIS

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1. **Anisotropic Variational Models and PDEs for Inverse Imaging Problems**. PhD Thesis, Univ. of Cambridge, UK, DOI: [10.17863/CAM.38240](https://doi.org/10.17863/CAM.38240)
2. **Variational methods in Image Processing for Inpainting and Shadow Removal**. MSc Thesis, Univ. of Verona, IT
3. **Nonequispaced Fast Fourier Transform and Applications**. BSc Thesis, University of Verona, IT

#### PREPRINTS / SUBMITTED / UNDER REVIEW

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1. C. Ballester, A. Bugeau, S. Hurault, S. Parisotto, P. Vitoria. **An Analysis of Generative Methods for Multiple Image Inpainting**. ArXiv: 2205.02146 (chapter in book, submitted and under review)
2. S. Parisotto, P. Vitoria, C. Ballester, A. Bugeau, S. Reynolds and C.B. Schönlieb. **The Art of Inpainting: A monograph on Mathematical Methods for the Virtual Restoration of Illuminated Manuscripts**. (book, submitted and under review)

3. L. Calatroni, S. Morigi, S. Parisotto, G.A. Recupero. **Fast and stable schemes for non-linear osmosis filtering**. ArXiv:2203.15570 (research article, submitted and under review)
4. M. Burger, Y. Korolev, S. Parisotto and C.-B. Schönlieb. **Total Variation Regularisation with Spatially Variable Lipschitz Constraints**. ArXiv: 1912.02768 (preprint). Companion code: <https://github.com/simoneparisotto/TVpwL>
5. S. Parisotto, L. Calatroni and C. Daffara. **Efficient Osmosis Filtering of Thermal-Quasi Reflectography Images for Cultural Heritage**. ArXiv: 1704.04052 (preprint)

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#### ARTICLES IN PREPARATION

1. J. Budd, J. Latz, S. Parisotto, Y. v. Gennip and C.-B Schönlieb. **Joint reconstruction-segmentation on graphs**

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#### SOFTWARE (IN ADDITION TO THE COMPANION SOFTWARE OF THE PUBLISHED PAPERS)

1. **POTTERY (Clustering of Roman Potsherds)**. Zenodo, 2022, DOI: [10.5281/zenodo.5552265](https://doi.org/10.5281/zenodo.5552265)
2. **INLUMINA (Inpainting of iLUminated MINIatures App)**. Zenodo, 2021 DOI: [10.5281/zenodo.4320604](https://doi.org/10.5281/zenodo.4320604)
3. **MATLAB/Python Codes for the Image Inpainting Problem**. Zenodo, 2020 DOI: [10.5281/zenodo.4315173](https://doi.org/10.5281/zenodo.4315173)

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#### DATASETS

1. S. Parisotto, A. Launaro, N. Leone and C.-B. Schönlieb, **ROCOPOT (Roman COMmonware POTtery) Dataset**. Zenodo, 2022, DOI: [10.5281/zenodo.4311296](https://doi.org/10.5281/zenodo.4311296)
2. S. Parisotto, S. Panayotova, S. Reynolds and C.-B. Schönlieb, **INLUMINA (Inpainting of iLUminated MINIatures App) Dataset**. Zenodo, 2021 DOI: [10.5281/zenodo.4320633](https://doi.org/10.5281/zenodo.4320633)

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#### POSTERS AT INTERNATIONAL CONFERENCES

1. 2018 **Anisotropic image osmosis filtering for visual computing**. SIAM IS 18, Bologna, IT
2. 2017 **ADI splitting schemes for image osmosis problems**. NCMIP, Cachan, FR

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#### PRESENTATIONS AT INTERNATIONAL CONFERENCES

- 23.06.2021 **Higher-Order Total Directional Variation**. European Congress of Mathematics, Portorož, SI (online)
- 18.11.2020 **From Inpainting to Shape Matching: Maths for Cultural Heritage Challenges**. MACH20, Cambridge, UK (online)
- 14.07.2020 **Variational Osmosis for image fusion in Cultural Heritage**. SIAM IS20, Toronto, CA (online)
- 17.07.2019 **Anisotropic osmosis filter for shadow removal in images**. ICIAM 2019, Valencia, ES
- 01.07.2019 **Total Directional Variation for Video Denoising**. SSVM 2019, Hofgeismar, DE
- 03.06.2019 **Unveiling the invisible: a mathematical touch to challenges in CH**. Do Not Touch? 3D in Museums, Cambridge, UK
- 22.09.2018 **Mathematical osmosis imaging for multi-modal, multi-spectral applications in Cultural Heritage**. IP4AI, Ghent, BE
- 06.06.2018 (Higher order) **Total directional variation with imaging applications**. SIAM IS 18, Bologna, IT
- 06.06.2018 **Generalized Image Osmosis Filtering with shadow removal imaging applications**. SIAM IS 18, Bologna, IT
- 06.12.2017 **Common-ware Roman Pottery from excavation to digital features classification**. VMV - INI, Cambridge, UK
- 01.09.2016 **Anisotropic Surface Inpainting**. First Joint Meeting Brazil-Italy in Mathematics. Rio de Janeiro, BR
- 08.04.2016 **Anisotropic Surface Inpainting**. British Applied Mathematics Colloquium (BAMC), Oxford, UK

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#### INVITED ACADEMIC SEMINARS

- 14.04.2021 **Inverse Problems in Cultural Heritage**. University of Verona (for the Alumni Association Veronesi Tutti Math, online)
- 18.03.2021 **MACH: Mathematics for Applications in Cultural Heritage**. Research Coffee Fitzwilliam Museum, UK (online)
- 23.10.2020 **Mathematical Challenges in Cultural Heritage**. Université Côte d'Azur, FR (online)
- 07.02.2020 **Unveiling the invisible: from thermal analysis on frescoes to virtual restoration of manuscripts**. Hercules Lab, PT
- 01.06.2018 **Generalized Image Osmosis Filtering with shadow removal imaging applications**. Università degli Studi di Verona, IT
- 01.03.2017 **Panel Discussion - Gesamtkunstwerk: ART, ARCHITECTURE & AI**. Emmanuel College, Cambridge, UK
- 16.12.2014 **Variational Methods in Image Processing**. Università degli Studi di Verona, IT
- 24.04.2013 **Parallel Calculus**. Università degli Studi di Verona, IT

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#### OUTREACH NEWS

<https://uk.mathworks.com/company/mathworks-stories/ai-for-digital-preservation-of-ancient-artifacts.html>