

Oya Deniz BEYAN

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Head of Institute for Medical Informatics,
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FAIR Data and Distributed Analytics,
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COMMUNICATION:

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| E-MAIL | oya.beyan@uni-koeln.de |
| PERSONEL WEBSITE | http://oyabeyan.info <i>(On this website, you can access my complete and up-to-date CV content with documents and links)</i> |
| POSTAL ADDRESS | Kerpener Str. 62, 50937, Cologne, Germany |
| VISITING ADDRESS | Zülpicher Str. 56, 50674, Cologne, Germany |
| LANGUAGES | English (Fluent), German (Intermediate) Turkish (Native) |

EDUCATION:

| Year | Degree | University |
|-------------|--|---|
| 2010 | Doctor of Philosophy (in Medical Informatics) | Middle East Technical University, Informatics Institute, Department of Health Informatics |
| 2010 | Master of Science (in Sociology) | Middle East Technical University, Faculty of Arts and Sciences, Department of Sociology |
| 2003 | Master of Science (in Information Systems) | Middle East Technical University, Informatics Institute, Department of Health Informatics |

ACADEMIC EXPERIENCES

| Date | Position-University |
|--------------------------------|--|
| May 2021- Today | <p>University of Cologne</p> <ul style="list-style-type: none"> • Head of the Institute for Biomedical Informatics (BI-K), Faculty of Medicine • Co-leader of the Medical Data Integration Center (MeDIC), Faculty of Medicine • Core Scientist in Center for Data and Simulation Science (CDSS), Faculty of Medicine (since January 2024) • Affiliated with the Faculty of Mathematics and Natural Sciences, Computer Science Department (since November 2022) |
| August 2016- Today | <p>Fraunhofer Institute for Applied Information Technology (FIT), Germany</p> <ul style="list-style-type: none"> • FAIR Data and Distributed Analytics |
| October 2015-April 2020 | <p>Informatik 5, RWTH Aachen University, Germany.</p> <ul style="list-style-type: none"> • Postdoctoral Researcher • Lecturer |
| 2012-2015 | <p>INSIGHT Centre for Data Analytics, NUI Galway, Ireland</p> <ul style="list-style-type: none"> • Postdoctoral Researcher • Visiting Researcher • Adjunct Lecturer |
| 2011-2012 | <p>Faculty of Engineering, Department of Computer Engineering, Atılım University, Ankara, Turkey</p> <ul style="list-style-type: none"> • Assistant Professor |
| 2000-2011 | <p>Informatics Institute, Department of Health Informatics, Middle East Technical University (METU), Ankara, Turkey.</p> <ul style="list-style-type: none"> • Research Assistant |

SELECTED JOURNAL PUBLICATIONS

Waltemath D, **Beyan O**, Crameri K, Dedié A, Gierend K, Gröber P, Inau ET, Michaelis L, Reinecke I, Sedlmayr M, Thun S, Krefting D. FAIRe Gesundheitsdaten im nationalen und internationalen Datenraum. Bundesgesundheitsbl. (2024). doi: 10.1007/s00103-024-03884-8.

Christoforaki M, **Beyan O**. Towards an ELSA Curriculum for Data Scientists. AI. (2024). Special Issue Standards and Ethics in AI. 5(2):504-515. doi:10.3390/ai5020025.

Li F, Wang Y, **Beyan O**, Schöneck M, Lourenco Caldeira L. Voxel-wise Medical Images Generalization for Eliminating Distribution Shift. ACM Transactions on Knowledge Discovery from Data. (2024). Online AM: 25 January 2024. doi:10.1145/3643034

Karim MdR, Islam T, Shajalal Md, **Beyan O**, Lange C, Cochez M, Rebholz-Schuhmann D, Decker S. Explainable AI for Bioinformatics: Methods, Tools and Applications. Briefings in Bioinformatics. (2023). Published in: 21 July 2023. doi: 10.1093/bib/bbad236.

Gehrmann J, Herczog E, Decker S, **Beyan O**. What prevents us from reusing medical real-world data in research. Sci Data 10, 459. (2023). doi:10.1038/s41597-023-02361-2.

Welten S, Mou Y, Neumann L, Jaberansary M, Ucer Yediel Y, Kirsten T, Decker S, **Beyan O**. A Privacy-Preserving Distributed Analytics Platform for Health Care Data. Methods of Information in Medicine. (2022). doi: 10.1055/s-0041-1740564.

Christoforaki M, **Beyan O**. AI Ethics—A Bird’s Eye View. Applied Science. (2022). 2022, 12, 4130. doi: 10.3390/app12094130

Karim MdR, Cochez M, Zappa A, Sahay R, Rebholz-Schuhmann D, **Beyan O**, Decker S. Convolutional Embedded Networks for Population Scale Clustering and Bio-ancestry Inferencing. IEEE/ACM Transactions on Computational Biology and Bioinformatics. (2022). 2022 Jan;19 (1):369-382. doi: 10.1109/tcbb.2020.2994649.

Welten S, Neumann L, Ucer Yediel Y, da Silva Santos LOB, Decker S, **Beyan O**. DAMS: A Distributed Analytics Metadata Schema. Data Intelligence 1–17. (2021). May 12 2021. doi: 10.1162/dint_a_00100.

Gleim LC, Karim MdR, Zimmermann L, Kohlbacher O, Stenzhorn H, Decker S, **Beyan O**. Enabling Ad-hoc Reuse of Private Data Repositories through Schema Extraction. Journal of Biomedical Semantics. 11, 6 (2020). doi: 10.1186/s13326-020-00223-z.

Bukowski M, Farkas R, **Beyan O**, Moll L, Hahn H, Kiessling F, Schmitz-Rode T. Implementation of eHealth and AI integrated diagnostics with multidisciplinary digitized data: are we ready from an international perspective? European Radiology (2020). doi: 10.1007/s00330-020-06874-x.

Beyan O, Choudhury A, van Soest J, Kohlbacher O, Zimmermann L, Stenzhorn H, Karim MdR, Dumontier M, Decker S, Bonino da Silva Santos LO, Dekker A. Distributed Analytics on Sensitive Medical Data: The Personal Health Train. Data Intelligence. 2 (2020), 96–107. doi: 10.1162/dint_a_00032.

Karim MdR, Rahman MdA, Jares JB, Decker S, **Beyan O**. A Snapshot Neural Ensemble Method for Cancer Type Prediction Based on Copy Number Variations. Neural Computing and Applications. (2019). First Online: 30 November 2019. doi: 10.1007/s00521-019-04616-9.

Karim MdR, Wicaksono G, Costa IG, Decker S, **Beyan O**. Prognostically Relevant Subtypes and Survival Prediction for Breast Cancer Based on Multimodal Genomics Data. IEEE Access. Vol. 7, pp. 133850 – 133864 (2019). doi: 10.1109/access.2019.2941796.

Porter E, La Gioia A, Salahuddin S, Decker S, Shahzad A, Elahi MA, O'Halloran M, **Beyan O**. Minimum information for dielectric measurements of biological tissues (MINDER): A framework for repeatable and reusable data. International Journal of RF and Microwave Computer-Aided Engineering. 28, no. 3 (2018): e21201.

Felzmann H, Beyan T, Ryan M, **Beyan O**. Implementing an ethical approach to big data analytics in assistive robotics for elderly with dementia. ACM SIGCAS Computers and Society. 45, no. 3 (2016): 280-286.

COURSES GIVEN AT THE UNIVERSITY OF COLOGNE

I. COURSES ON MEDICAL DATA SCIENCE

Data-Driven Medicine: Seminars in the form of Wahlblocks in four sessions.

- ◆ Introduction to medical data science (DDM 1)
- ◆ Teaching machines how to make a decision: Supervised Machine Learning (DDM 2)
- ◆ How machines can self-learn: Unsupervised Machine Learning (DDM 3)
- ◆ Diagnosing AI algorithms: Visualisation and Evaluation (DDM4)

Hands-on Data Science: Six sessions offered as a semester-wide Studium Integrale course.

II. COURSES ON AI ETHICS IN MEDICINE

Ethical aspects of Medical AI Applications: Seminars in the form of Wahlblocks in two sessions

AI Ethics: Eight sessions offered as a semester-wide Studium Integrale course

Paradigm Shifts in Medical Reasoning: Seminars in three sessions.

- ◆ Human vs Machine thinking
- ◆ Revisiting basics of the Scientific Methodology in Clinical Medicine
- ◆ Reproducibility

III. COURSES ON MEDICAL INFORMATICS TECHNOLOGIES

Deep Learning Basics: Seminar in the form of Wahlblock in one session

Medical Image Processing: Seminar in the form of Wahlblock in 2 sessions

Machine Learning and Trust in Medical Applications: Determining the tradeoffs, seminar in the form of Wahlblock in one session

Data Analytics with Python for Medical Doctors: Seminar in the form of Wahlblock in one session.

Coding Basics in Python for Medical Students: seminars in the form of Wahlblocks in four sessions.

Semantic Interoperability in Health: Seminars in the form of Wahlblocks in four sessions

- ◆ Data management and Interoperability (Part 1)
- ◆ Data stewardship (Part 2)
- ◆ Experience session - Medical interoperability (Part 3)
- ◆ Experience session - Visualisation (Part 4)

IV. INNOVATION AND ENTREPRENEURSHIP

MedTechs: Medical Technology-based Entrepreneurship and Innovation: Seminars in variable format (8, 4 or 2 sessions)

Innovation Ecosystems in Health and Medical Technologies: Seminars in 2 sessions

V. SCIENTIFIC PROJECT (WISSPRO)

Wissenschaftliches Projekt im Rahmen einer Literaturrecherche mit begleitendem: Seminar, seminar in seven weekly sessions

Wissenschaftliches Projekt im Rahmen eines Programmierpraktikums mit begleitendem: Seminar (Coding Lab), seminar in seven weekly sessions

VI. OTHERS

Advances in Biomedical Informatics Research: Graduate Students Colloquium, recurring semester-wide seminars (16 with internal Institute participants)

Medical Data Science Colloquium: Recurring semester-wide seminars (Eight with external participants)

RUNNING RESEARCH PROJECTS

BETTER: Better rEal-world healTh-daTa distributEd analytics Research platform. **EU Project** (HORIZON-HLTH-2023-TOOL-05). 2024-2028.

BullNet: A cutting edge integrated approach to sperm biology and associated reproductive biotechnologies to assist the dairy and beef industries meet growing societal, environmental and economic demands. **EU Project** (HORIZON.1.2 - Marie Skłodowska-Curie Actions). 2024-2028.

CRC 1218: Mitochondrial regulation of cellular function (Third Funding Period). **DFG Project.** 2024-2027.

GNAO1-EU: European Natural History Study and search for novel biomarkers in GNAO1-associated disorders. **EU Project** (European Joint Programme on Rare Diseases, EJP RD). 2024-2027.

CRC, 1607: Towards immunomodulatory and anti(lymph)angiogenic therapies for age-related blinding eye diseases. **DFG Project.** 2024-2027.

RESTLESS: empoweRing univErsity Students Through heaLth EntrepreneurShIP trainingS. **EU Project** (European Education and Culture Executive Agency, EACEA). 2024-2026.

RESTORE VISION: Novel advanced and repurposed therapeutics for vision restoration in a group of severe rare ocular surface diseases: from validation to first clinical investigations. **EU Project** (HORIZON-HLTH-2022-DISEASE-06-two-stage). 2024-2025.

PrivateAIM: Privacy-Preserving Analytics In Medicine. **BMBF Project.** 2023-2028.

PM4ONCO: Personalized Medicine for Oncology. **BMBF Project.** 2023-2027.

SHIFT-HUB: Smart Health Innovation & Future Technologies Hub. **EU Project** (HORIZON-HLTH-2022-IND-13). 2023-2025.

FAIR Data Spaces. **DFG Project.** 2021-2024.

NFDI4DS: Nationale Forschungsdateninfrastruktur for Data Science and Artificial Intelligence. **DFG Project.** 2021-2024.

NFDI4Health: Nationale Forschungsdateninfrastruktur für personenbezogene Gesundheitsdaten. **DFG Project.** 2020-2025.

THESES SUPERVISION (RUNNING)

Exploring the full cycle for data driven innovation in the clinical domain based on integrative research and real-world use-cases. (Oliver Diekmeier; Supervisor: Prof. Dr. Oya Deniz Beyan, Co-supervisor: Prof. Dr.-Ing. Stefan Wesner) (Doctoral Student of the Math.-Nat. Fakultät, Abteilung für Informatik)

Leveraging data integration architectures for patient care: case of multimodal sensor data. (Mayra Elwes; Supervisor: Prof. Dr. Oya Deniz Beyan, Advisor: Ekaterina Kutafina) (Doctoral Student of the Math.-Nat. Fakultät, Abteilung für Informatik)

LLM driven robotic application. (Yuanbin Wang , Supervisor: Prof. Dr. Oya Deniz Beyan, Advisor: Ekaterina Kutafina) (Doctoral Student of the Math.-Nat. Fakultät, Abteilung für Informatik)

Optimizing integration of sparse multi-modal data vectors: An algorithmic approach for maximizing the usability of medical real-world data for AI-based decision-making. (Julia Gehrmann; Supervisor: Prof. Dr. Oya Deniz Beyan, Co-supervisor: Prof. Tatiana von Landesberger) (Doctoral Student of the Math.-Nat. Fakultät, Abteilung für Informatik)

Generative Deep Learning Modeling for Medical Image Transformation Application in Federated Learning Framework. (Feifei Li; Supervisor: Prof. Dr. Oya Deniz Beyan) (PhD in Health Sciences)

Cyber Security Threats in Medical Research Data Integration Centers: Proposal for an Overview and Mitigation Framework in University Hospital Cologne. (Muhammad Adnan; Supervisor: Prof. Dr. Oya Deniz Beyan) (PhD in Health Sciences)

Real-time Visualization and Analysis Architecture for Data Integration Processes at Cologne University Hospital's Medical Data Integration Center. (Md. Mostafa Kamal; Supervisor: Prof. Dr. Oya Deniz Beyan, Advisor: Ekaterina Kutafina) (PhD in Health Sciences)

Improving Quality and Reusability of Health Care Data for Secondary Use. (Samer Alkarkoukly, Supervisor: Prof. Dr. Oya Deniz Beyan) (Doctoral Studies for Medicine)

IN TAIM for Clinical Healthcare: A digitalized task and information management system for professionals in clinical healthcare. (Maria Beyer; Supervisor: Prof. Dr. Oya Deniz Beyan) (Doctoral Studies for Medicine)

Minimal Data Model for Rare Diseases to align HL7 FHIR and the GA4GH Phenopackets Schema. (Adam Graefe; Supervisor: Prof. Dr. Oya Deniz Beyan) (Doctoral Studies for Medicine)