

# Dimitris Gkoumas

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## RESEARCH INTERESTS

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My research has drawn on topics of Generative AI, Multimodal Representation Learning, Computational Linguistics (NLP), and Quantum Information Theory, particularly for representation learning. My research interests lie in the fields of human-centric, geometric, and evolutionary representation learning, human-preference LLM-judge evaluation ecosystems, as well as unaligned multimodal representation learning.

## EDUCATION

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### The Open University, UK

Milton Keynes, UK

*Ph.D. in Artificial Intelligence*

2017 – 2021

- Thesis: Quantum Cognitively Motivated Context-Aware Multimodal Representation Learning for Human Language Analysis

### Aristotle University of Thessaloniki

Thessaloniki, Greece

*M.Sc. in Information Technology, Grade 9.34/10*

2012 – 2014

### Technical University of Crete

Crete, Greece

*B.Sc. in Computer Science, Grade 8.5/10*

2001 – 2005

## PROFESSIONAL APPOINTMENTS

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### Queen Mary University of London

Jan 2021 – Current

*School of Electronic Engineering and Computer Science*

*Postdoc*

- Worked on centred around representation alignment, leveraging human preference data algorithms for aligning Large Language Models (LLMs) with human preferences and values, LLMs functioning as self-judge ecosystems for evaluation purposes, and evolutionary dynamics within longitudinal linguistics, with a particular focus on applications in mental health and life sciences.

### Huawei

Jun 2021 – Nov 2023

*Ireland Research Centre*

*AI consultant*

- Worked on semantic programming language representation utilizing computational models and learning-based techniques to capture the meaning of code in an explicit and structured manner with applications in program analysis and compiler design.

### Corvinno Technology Transfer Centre

Jan 2016 – Sep 2017

*Hungary*

*Early stage researcher*

- Engaged in ontology development to improve language adaptation and evolution by creating structured representations of semantic changes and capturing semantic relationships with applications in domains such as education and policy making.

### My glass studio (industry)

Sep 2013 – Dec 2015

*Department of IT*

*Senior software developer*

- Developed a bespoke web-based ERP-CRM system from scratch.

## RESEARCH PROJECTS

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### Creating time sensitive sensors from language & heterogeneous user generated content

*Awarded by UKRI/EPSCRC Turing AI Fellowship (Grant: EP/V030302/1)*

2021-

- Role: Postdoc

### Memory Safe Trustworthy Programming Languages

*Awarded by Huawei, Ireland Research Centre*

2021-2023

- Role: AI Consultant

### Quantum Information Access and Retrieval Theory (QUARTZ)

*Awarded by EXCELLENT SCIENCE - Marie Curie Actions. (No: 721321)*

2017-2020

- Role: Early stage researcher

## EDUWORKS: An EU-wide investigation of labour market matching processes.

Awarded by European Commission - Marie Curie ITN - FP7-PEOPLE- 2012-ITN (No. 608311)

2016-2017

- Role: Early stage researcher

## INTERNATIONAL RESEARCH VISITS

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### University of Montreal, Canada

Jan 2020 - Apr 2020

Advisor: Prof. Jian-yun Nie

- Worked on quantum-inspired models for conversational emotion recognition

### University of Copenhagen, Denmark

Aug 2019 - Dec 2020

Advisor: Prof. Christina Lioma

- Worked on multimodal models for sentiment analysis

### University of Padua, Italy

Jan 2019 - Mar 2019

Advisor: Prof. Massimo Melucci

- Worked on tensor-based fusion representation learning

### Tianjin University, China

Oct 2017 - Dec 2019

Advisor: Prof. Dawei Song

- Worked on information retrieval

## SELECTED PUBLICATIONS

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- \* **Gkoumas, D.** (2024). Aligning LLMs with Preference Data Algorithms for Cross Language-Molecule Translation. ACL2024 (forthcoming).
- \* **Gkoumas, D.**, Wang, B., Tsakalidis, A., Wolters, M., Zubiaga, A., Purver, M., and Liakata, M. (2024). A longitudinal multi-modal dataset for dementia monitoring and diagnosis. Journal of Language Resources and Evaluation (LRE). [\[Read\]](#)
- \* **Gkoumas, D.**, Purver, M. & Liakata, M. (2023). Reformulating NLP tasks to Capture Longitudinal Manifestation of Language Disorders in People with Dementia. EMNLP2023. [\[Read\]](#)
- \* **Gkoumas, D.**, Tsakalidis, A. & Liakata, M. (2023). A Digital Language Coherence Marker for Monitoring Dementia. EMNLP2023. [\[Read\]](#)
- \* **Gkoumas, D.**, Li, Q., Yu, Y., & Song, D. (2021). An Entanglement-driven Fusion Neural Network for Video Sentiment Analysis. IJCAI 2021. [\[Read\]](#)
- \* **Gkoumas, D.**, Li, Q., Dehdashti, S., Melucci, M., & Song, D. A Quantum Cognitively Motivated Decision Fusion Framework for Video Sentiment Analysis. In AAAI 2021. [\[Read\]](#)
- \* Li, Q., **Gkoumas, D.**, Sordoni, A., Nie, J.Y. & Melucci M. Quantum-inspired Network for Conversational Emotion Recognition. In AAAI 2021. [\[Read\]](#)
- \* **Gkoumas, D.**, Li, Q., Lioma, C., Yu, Y., & Song, D. (2020). What makes the difference? An empirical comparison of fusion strategies for multimodal language analysis. Information Fusion. [\[Read\]](#)
- \* Li, Q., **Gkoumas, D.**, Lioma, C., & Melucci, M. (2020). Quantum-inspired multimodal fusion for video sentiment analysis. Information Fusion. [\[Read\]](#)
- \* Vas, R., Weber, C., & **Gkoumas, D.** (2018). Implementing connectivism by semantic technologies for self-directed learning. International Journal of Manpower. [\[Read\]](#)

## SKILLS

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- Large scale deep learning, generative models, graph neural networks, deep learning for life sciences, deep learning with reinforcement learning, deep learning for multi modalities.
- Experience using ML frameworks such as PyTorch, scientific software such as NumPy, SciPy, and Pandas, and ML on accelerators.
- Strong knowledge of linear algebra, calculus and statistics and experience working in a scientific environment across disciplines (particularly maths, biology, and physics).

## PRIZES AND AWARDS

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◇Marie-Curie Early Stage Researcher Scholarship (2017-2020), ◇Marie-Curie Early Stage Researcher Scholarship (2016-2017), ◇Awarded university-sponsored scholarship for excellent academic performance, leading to waived tuition fees in final semester (2013), ◇Awarded the Greek State Scholarships Foundation (IKY) Scholarship for Academic Excellence during Bachelor's studies(2004-2005)