

## Curriculum Vitae: Karlo Babić

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CONTACT INFORMATION	University of Rijeka Faculty of Informatics and Digital Technologies Radmile Matejčić 2 HR-51000, Rijeka Croatia	<i>phone:</i> +385 51 584-718 <i>mail:</i> karlo.babic@uniri.hr <i>web:</i> www.inf.uniri.hr
	Researcher ID ORCID	E-5801-2019 <a href="https://orcid.org/0000-0001-6343-0938">https://orcid.org/0000-0001-6343-0938</a>

### EDUCATION

**PhD, Information Science**, University of Rijeka, Faculty of Informatics and Digital Technologies, 2019-2025.  
Thesis Topic: *The Pyramidal Recursive Neural Network for Multilevel Text Representation*.  
Supervisor: Ana Meštrović.

**M.Sc., Informatics**, University of Rijeka, Faculty of Informatics and Digital Technologies, 2016-2018.  
Thesis Topic: *Visualization of learning algorithms of neural networks*. Supervisor: Ana Meštrović.

**B.E., Informatics**, University of Rijeka, Faculty of Informatics and Digital Technologies, 2013-2016.  
Thesis Topic: *Implementing the Solar System model using OpenGL library and C++ language*. Supervisor: Ana Meštrović.

LIFELONG LEARNING AND PROFESSIONAL SPECIALIZATION	<b>4th International School on Deep Learning</b> Las Palmas de Gran Canaria, Spain <b>Workshop "Search tools for scientific sources"</b> University of Rijeka, Rijeka, Croatia <b>Early Career Training Event COSTNET</b> The Department of Statistics, Ludwig-Maximilians-University, Munich, Germany February 2019	26-30 July 2021 9 April 2019 11-13 February 2019
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PROFESSIONAL POSITIONS	<b>Assistant</b> Faculty of Informatics and Digital Technologies, University of Rijeka 2018 - present
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RESEARCH INTERESTS	Machine learning, neural networks, simulations, natural language processing, representation learning
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RESEARCH PROJECTS	<b>Researcher</b> <ul style="list-style-type: none"><li>Hybrid approaches of artificial intelligence in natural language processing and knowledge generation, uniri-iz-25-215 2025 - 2029</li><li>Artificial intelligence methods for media text analysis and research on information dissemination, uniri-iz-25-44 2025 - 2029</li><li>Multilayer Framework for the Information Spreading Characterization in Social Media during the COVID-19 Crisis (HRZZ InfoCoV) 2020 - 2022</li><li>Keyword Extraction and Summarization Based on Language Networks (LangNet), uniri-drustv-18-20 2019 - 2022</li><li>Methods for measuring semantic similarity of texts (SemTex), uniri-drustv-18-38 2019 - 2022</li></ul>
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**Journal publications**

Babić, Karlo, and Ana Meštrović. "Recursively Autoregressive Autoencoder for Pyramidal Text Representation." *IEEE Access* 12 (2024): 71361-71370.

Pitoski, Dino, Karlo Babić, and Ana Meštrović. "A new measure of node centrality on schedule-based space-time networks for the designation of spread potential." *Scientific reports* 13.1 (2023): 22561.

K. Babić, M. Petrović, S. Beliga, S. Martinčić-Ipšić, M. Matešić, A. Meštrović. "Characterisation of COVID-19-Related Tweets in the Croatian Language: Framework Based on the Cro-CoV-cseBERT Model." *Applied Sciences*, 2021, 11, 21.

K. Babić, F. Guerra, S. Martinčić-Ipšić, A. Meštrović. "A Comparison of Approaches for Measuring the Semantic Similarity of Short Texts Based on Word Embeddings." *JIOS*, 2020, 44, 2.

A. Vorkapić, K. Babić, R. Radonja, S. Martinčić-Ipšić. "Machine learning methods in monitoring operating behaviour of marine two-stroke diesel engine." *Transport*, 2020, 35, 5.

K. Babić, S. Martinčić-Ipšić, A. Meštrović. "Survey of Neural Text Representation Models." *Information*, 2020, 11, 511.

**Conference proceedings**

K. Babić. "Selection in the Meme Pool: Graph-Based Evolution of Textual Content." *ECAI*, 2025, Bologna, Italy, pp. 1825-1832.

K. Babić, A. Meštrović. "Pyramidal Recursive Composition of Multi-Word Units into Unified Representations." *CECIIS*, 2025, Varaždin, Croatia, pp. 363-380.

K. Babić, M. Petrović, S. Beliga, S. Martinčić-Ipšić, M. Pranjić, A. Meštrović. "Prediction of COVID-19 Related Information Spreading on Twitter." *MIPRO, DS-BE*, 2021, Opatija, Croatia, 2021, pp. 395-399.

K. Babić, M. Petrović, S. Beliga, S. Martinčić-Ipšić, A. Jarynowski, A. Meštrović. "COVID-19-Related Communication on Twitter: Analysis of the Croatian and Polish Attitudes." *ICICT*, London, England, 2021, pp. 379-390.

K. Babić, S. Martinčić-Ipšić, A. Meštrović, F. Guerra. "Short texts semantic similarity based on word embeddings." *CECIIS*, Varaždin, Croatia, 2019, pp. 27-33.

K. Babić, A. Meštrović. "Visualizations of the training process of neural networks." *MIPRO, SP*, 2019, Opatija, Croatia, 2019, pp. 1619-1623.

**Talks**

K. Babić, S. Martinčić-Ipšić. "The representation of text in a multilayer complex network for deep learning." 4th COSTNET Action conference, Bilbao, Spain, 9-11 September 2019. (Poster)

K. Babić. "The representation of text in a multilayer complex network for deep learning." Early Career Training Event COSTNET, the Department of Statistics, Ludwig-Maximilians-University, Munich, Germany, 11-13 February 2019.

K. Babić, A. Meštrović. "Neural networks visualizations." 10th International Conference on Information Technologies and Information Society, Novo Mesto, Slovenia, 24-26 October 2018.

TEACHING EXPERIENCE	<b>Undergraduate courses</b>	
	<ul style="list-style-type: none"> <li>• Introduction to software engineering, FIDIT<sup>1</sup>, University of Rijeka</li> <li>• Basics of game development, FIDIT, University of Rijeka</li> <li>• Programming Paradigms and Languages, FIDIT, University of Rijeka</li> <li>• Formal Languages and Compilers 2, FIDIT, University of Rijeka</li> <li>• Declarative programming languages, FIDIT, University of Rijeka</li> <li>• Formal Languages and Compilers 1, FIDIT, University of Rijeka</li> <li>• Programming 1, Department of Polytechnics, University of Rijeka</li> </ul>	2023 2022-2023 2021- 2019-2020 2019-2022 2018-2021 2018-2019
	<b>Graduate courses</b>	
	<ul style="list-style-type: none"> <li>• 3D game development, FIDIT, University of Rijeka</li> <li>• Data intelligence, FIDIT, University of Rijeka</li> <li>• Big data analytics, FIDIT, University of Rijeka</li> <li>• Programming for artificial intelligence, FIDIT, University of Rijeka</li> <li>• Object-Oriented Languages, FIDIT, University of Rijeka</li> <li>• Natural Language Processing, FIDIT, University of Rijeka</li> <li>• Decision Support Systems, FIDIT, University of Rijeka</li> <li>• Management of IT Projects, FIDIT, University of Rijeka</li> </ul>	2024- 2023- 2023- 2023- 2021 2019- 2019-2022 2018-2021
TECHNICAL SKILLS	<b>Operating Systems</b>	
	GNU/Linux, MS Windows	
	<b>Programming Languages</b>	
	Advanced: Python, JavaScript	
	Intermediate: C++, C#, Java, Bash	
	Beginner: Haskell, PHP	
	<b>Tools</b>	
	L <sup>A</sup> T <sub>E</sub> X, TensorFlow/Keras, Godot, Unity	
HOBBY PROJECTS	<b>Simulations</b>	
	Abstracted fluid, fluid flow on terrain, dynamics of falling flat object through air, pendulums, evolution tree generation, animated mathematics of chaos	
	<b>Cellular automata</b>	
	Game of life and modified versions, liquid automaton	
	<b>Web scraping</b>	
	Celestial events information, weather information, website crawler with audio and video scraping	
	<b>Web</b>	
	Simulations and games using JavaScript	
	<b>Video games</b>	
	For Web with JavaScript, and for mobile phones with Godot (Paperfall is on Google Play)	
LANGUAGES	<i>Fluent:</i> Croatian, English	

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<sup>1</sup>FIDIT - "Faculty of Informatics and Digital Technologies"