

SLING



Dnevi SLING

Kako spodbujati pismenosti na področju umetne inteligence
Mateja Baebler, Združenje za informatiko in telekomunikacije pri GZS

3.-5. december 2024

Kako spodbujati pismenosti na področju umetne inteligence

- Združenje za informatiko in telekomunikacije
- Zakaj spodbujati?
- Imamo problem?
- ARtificial Intelligence Skills Alliance (ARISA)
- Made in Slovenia UI
- European Software Skills Alliance (ESSA)

Združenje za informatiko in telekomunikacije

Gospodarska
zbornica
Slovenije



Združenje za
informatiko in
telekomunikacije

- **260 članov:** od "vendorji", sistemski integratorji, telekomunikacijska podjetja, razvijalci in implementatorji informacijskih rešitev, ponudniki opreme, do digitalnih podjetij, ki niso IKT podjetja in inštitucij znanja
- **Promocija panoge, digitalizacije in članov ZIT**
- **Podpora izvoznim aktivnostim**
- **Digitalna zakonodaja, poslovanje panoge, priprava stališč**
- **Soustvarjanje ekosistema za rast digitalne ekonomije v Sloveniji**
- **Storitve za povečanje konkurenčnosti članov**
- **9 sekcij**
- **SRIP GoDIGITAL**



Zakaj spodbujati?

- **Cilj (Digitalna strategija 2030):** do 2030 vsaj 75 % podjetij EU v skladu s svojimi poslovnimi dejavnostmi uporablja eno ali več od naslednjega: storitve računalništva v oblaku, velepodatke ali umetno inteligenco
- **Stanje (SURs):** v letu 2023 je storitve računalništva v oblaku najemalo 40 % podjetij z 10 ali več zaposlenimi in samozaposlenimi, 19 % jih izvaja podatkovno analitiko, 11 % jih uporablja tehnologije umetne inteligence (UI)
- Uspešna podjetja že sedaj namenijo 10 % sredstev algoritmom UI, 20 % tehnologiji in podatkom in **70 % v procese in usposabljanje zaposlenih!**

Imamo problem?

Kje vidite ključne ovire za intenzivnejše uvajanje UI v svojo organizacijo?

VOTE SUBMITTED

Odpor do sprememb med zaposlenimi 26%

Nezadostne kompetence vodstva 24%

Pomanjkanje kadrov za uvajanje 36%

Ni državnih spodbud za uvajanje umetne inteligence 9%

Dobro poslujemo tudi brez tega 5%

3.-5. december 2024



Ali ste v letošnjem letu izvedli šolanje svojih zaposlenih za področje umetne inteligence?

VOTE SUBMITTED

Ne 48%

Da, enkrat 24%

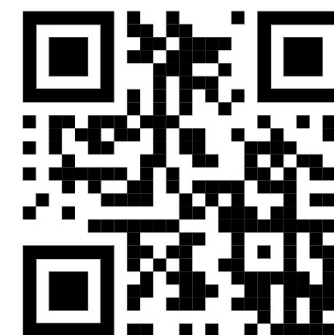
Da, več kot enkrat 28%

ARtificial Intelligence Skills Alliance (ARISA)

- Erasmus+ projekt, 4 leta, ZIT + FRI
- Ključni izročki do sedaj:
 1. Needs Analysis Report
 2. AI Skills Strategy for Europe
 3. Collection of Learning Outcomes (LO)
 4. Designing and developing training programmes for AI roles
 5. Work-Based Learning (WBL) components for ARISA AI training programmes
 6. **Educational Profiles and Specific Curricula for AI Roles**



Sofinancira program
Evropske unije
Erasmus+

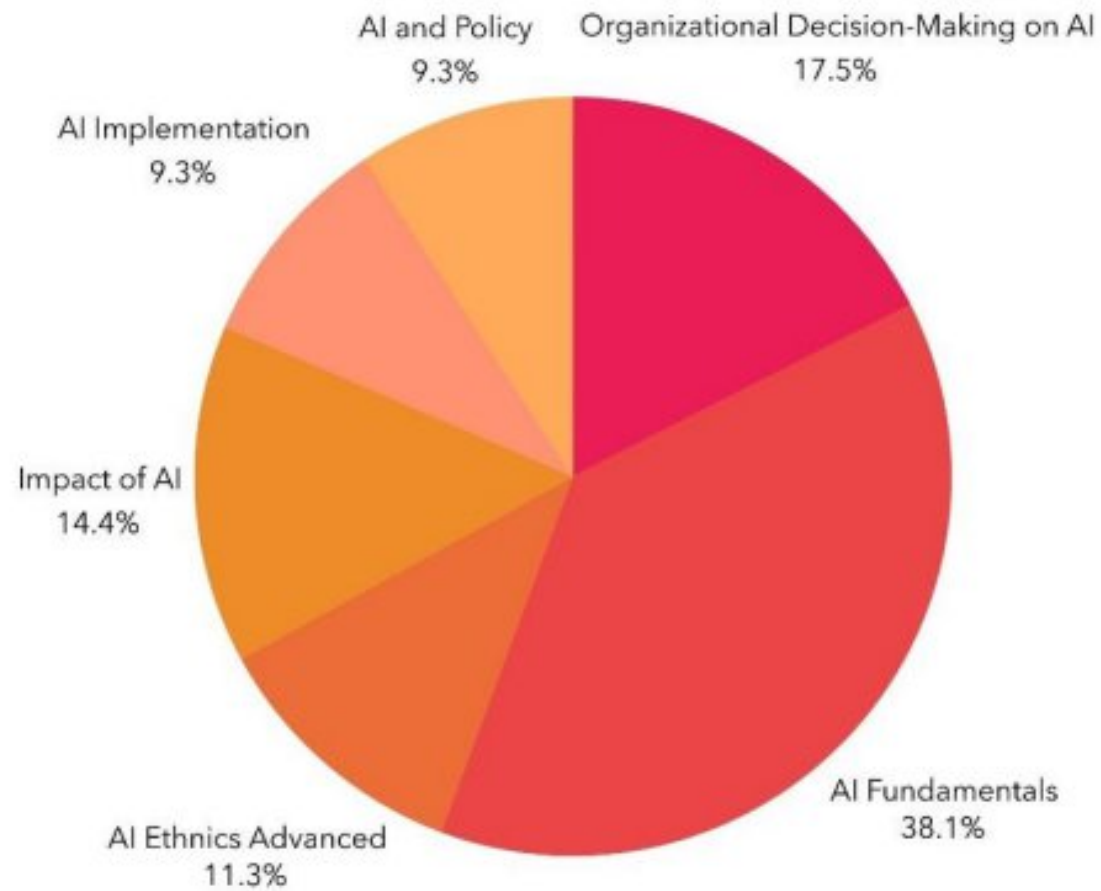


Spletna stran

AI managers izobraževalni program

	Policy makers/ Decision makers	Decisionmakers		AI advisor/ consultant	
PLOs	EQF 6	EQF 6/7	EQF 7	EQF 6	EQF 6/7
<i>AI fundamentals</i>	X	X			X
<i>AI and policy</i>					
<i>Organisational decision-making on AI</i>		X	X		
<i>AI Strategy</i>					X
<i>AI implementation</i>					X
<i>AI Ethics advanced</i>					X
<i>Impact of AI</i>					X

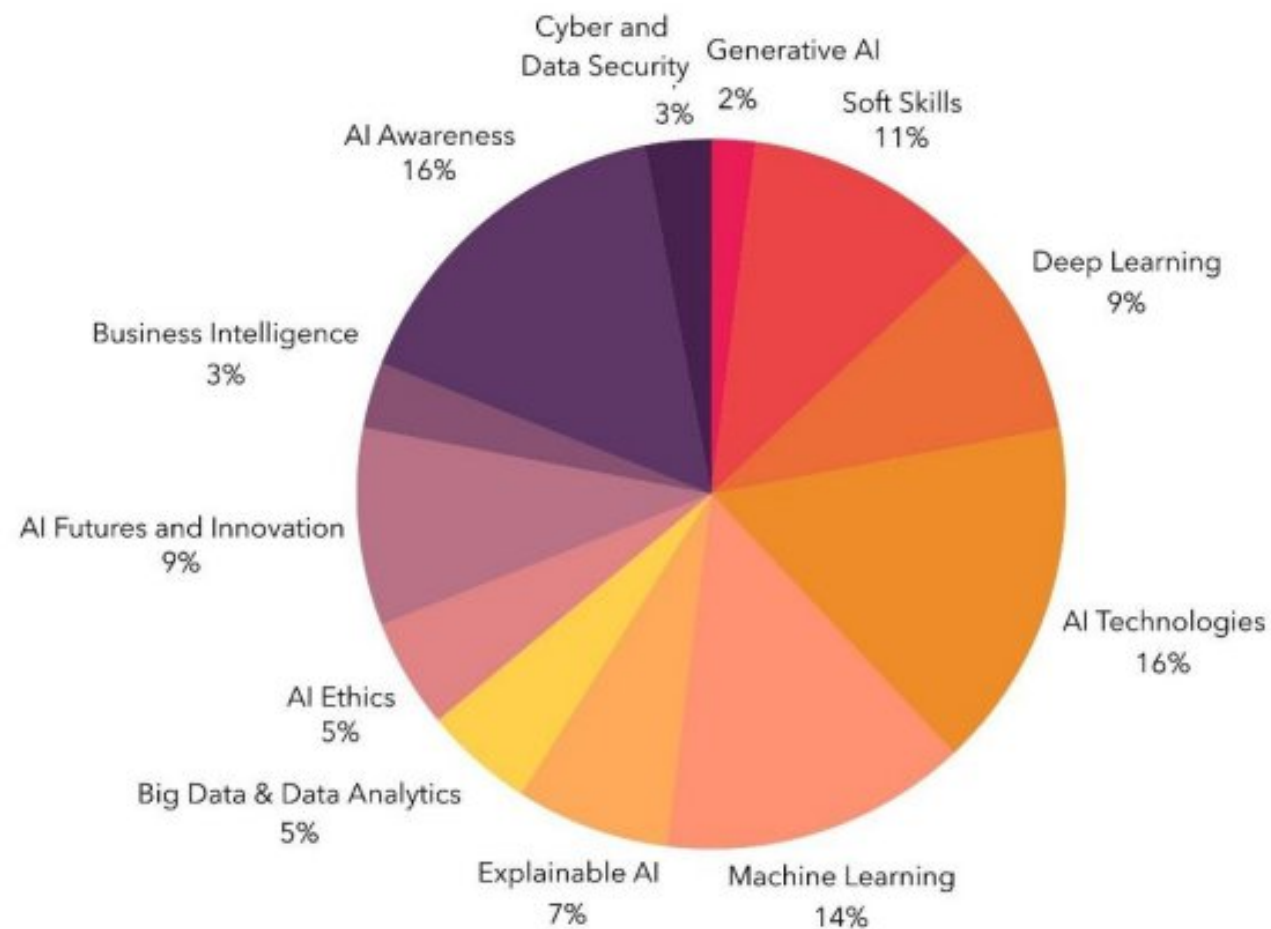
AI managers – učni izidi



AI professionals izobraževalni program

PLOs	Data Analyst		Data Scientist		Machine learning engineer		NLP engineer	
	EQF 4/5	EQF 6	EQF 6	EQF 7	EQF 6	EQF 7	EQF 6	EQF 7
<i>Deep Learning</i>		X	X	X	X	X	X	X
<i>AI Technologies</i>	X	X	X	X	X	X	X	X
<i>MLOps</i>		X		X	X	X		X
<i>HPC and Cloud services</i>						X		X
<i>Machine Learning</i>	X	X	X	X	X	X	X	X
<i>Explainable AI</i>	X	X	X	X	X	X		X
<i>Big Data & Data Analytics</i>	X	X	X	X		X		
<i>Human-Centred AI</i>		X	X	X		X	X	X
<i>AI Ethics</i>	X	X	X	X	X	X	X	X
<i>AI Futures and Innovation</i>		X		X			X	X
<i>Business Intelligence</i>	X	X	X	X				
<i>AI Awareness</i>	X	X	X	X	X	X	X	X
<i>AI for Robotics</i>								
<i>Cyber and Data Security</i>		X	X	X	X	X	X	
<i>NLP</i>							X	X
<i>Generative AI</i>		X	X	X	X	X	X	X
<i>Change Management</i>			X	X		X	X	X
<i>Soft Skills</i>	X	X	X	X	X	X	X	X

AI professionals – učni izidi



ARISA ključni izobraževalni programi

AI professionals:

- [Data Analyst EQF 4-5](#)
- Data Analyst EQF 6: [example 1](#) & [example 2](#)
- Data Scientist EQF 6: [example 1](#) & [example 2](#)
- [Data Scientist EQF 7](#)
- [Machine Learning Engineer EQF 6](#)
- [Machine Learning Engineer EQF 7](#)
- [NLP engineer EQF 6](#)
- [NLP Engineer EQF 7](#)

AI managers:

- AI advisor EQF 6-7: [example 1](#) & [example 2](#)
- [Decision-maker EQF 6-7](#)
- [Decision-maker EQF 7](#)
- [Decision- and policymaker EQF 6](#)



1. General information

Name	Data Analyst
EQF level	EQF 6 for all units with exception on neural networks units where EQF level is 7 and 8
Goals	<ol style="list-style-type: none"> Master Machine Learning Techniques: Equip learners with essential skills in supervised and unsupervised learning, including clustering, classification, and regression. Develop Data Analysis Skills: Enable proficient exploratory data analysis, visualization, and implementation of data analytic workflows. Design and Build Advanced Neural Networks: Foster comprehensive knowledge in constructing, optimizing, and implementing neural networks and deep learning models from scratch. Apply Practical Machine Learning Tools: Train learners to effectively use machine learning tools, recognize opportunities for their application, and implement solutions in various real-world scenarios. Ensure Ethical AI Deployment: Instill understanding of ethical considerations, explainability, and best practices for responsible AI implementation.
Scope	<p>Scope of the Curriculum: The curriculum provides a comprehensive and practical education in machine learning, data science, and AI, covering a broad range of topics from foundational concepts to advanced techniques. It encompasses unsupervised and supervised learning methods, neural network construction, text and image analytics, and ethical AI deployment. The training is designed to be accessible, requiring no prior knowledge of math or statistics for most learning units, and leverages advanced training techniques and modern visual analytics software to facilitate rapid and effective learning.</p> <p>Target Groups: The curriculum is tailored for employees in the industry and public sector who aim to delve deeply into machine learning, data science, and AI. It is ideal for professionals seeking to enhance their skills and apply cutting-edge technologies in their work. The pedagogical approach ensures that learners can quickly grasp complex concepts using advanced training techniques and state-of-the-art visual analytics tools, enabling them to achieve competency efficiently and effectively.</p>
Entry requirements	No prior knowledge of mathematics, statistics, computer science, or programming is required. Exceptions are "Neural Networks from Ground-Up", which requires basic knowledge of Python and its programming environment (editing code, basic debugging, running Python applications),

	and "Generative AI - Large Language Model from Ground-Up", which requires solid Python programming skills.
Programme learning outcomes (PLOs)	1 - Deep Learning (EQF 6)
	2 - PLO AI Technologies (EQF 6)
	3 - ML Ops (EQF 6)
	4 - Machine Learning (EQF 6)
	5 - Explainable AI (EQF 6)
	6 - Big Data & Data Analytics (EQF 6)
	7 - Human-Centered AI (EQF 6)
	8 - AI Ethics (EQF 6)
	9 - AI Futures and Innovation (EQF 6)
	10 - Business Intelligence (EQF 6)
	11 - AI Awareness (EQF 6)
	13 - Generative AI (EQF 6)
	14 - Soft Skills (EQF 6)

2. Description of the structure

The curriculum is structured into distinct yet interconnected learning units, each focusing on a specific aspect of data science, machine learning, and AI, emphasizing a modular approach for a comprehensive understanding. The "Unsupervised Learning" unit lays a foundation in data exploration and clustering techniques, essential for understanding data patterns without labeled outcomes. This is complemented by the two "Supervised Learning" units, which train the classification and regression techniques, providing a detailed study of predictive modeling, accuracy assessment, overfitting prevention, and model explanation and understanding. The unit on "Mining of Unstructured Data" extends the knowledge to text and image analytics, introducing practical applications in unstructured data through deep neural network embedding and combining the data analysis techniques from the previous learning units. Again, this unit emphasizes pattern discovery, interpretation, and data understanding.

While these introductory machine learning units emphasize an intuitive understanding of machine learning techniques and utility in practical cases, the "Neural Networks from Ground-Up" offers an in-depth mathematical and practical understanding of neural network construction and optimization, paving the way for the "Generative AI - Large Language Model from Grounds-Up," where students replicate GPT-2, enhancing their skills in implementing and optimizing large-scale AI models. These two units were designed for those who want to gain a deep understanding of AI and state-of-the-art methods and require prior knowledge of Python programming.

The curriculum concludes with "Data Science, AI, and Society," which integrates ethical considerations, explainability, and industry practices, ensuring a holistic education that prepares

3. Overview of Learning Units

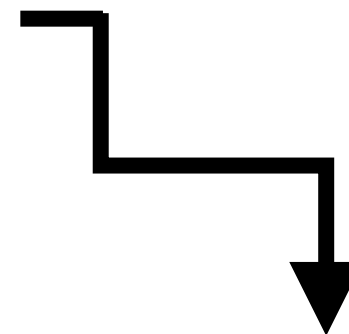
Learning unit title	Hours/ECTS	EQF level	Assessment
Unsupervised Learning	50 / 2	6	Quizzes, Project Report
Supervised Learning - Classification	50 / 2	6	Quizzes, Project Report
Supervised Learning - Regression	50 / 2	6	Quizzes, Project Report
Mining of Unstructured Data: Text and Image Analytics	50 / 2	6	Quizzes, Project Report
Neural Networks from Ground-Up	50 / 2	6	Quizzes, Project Report
Generative AI - Large Language Model from Grounds-Up	50 / 2	7	Quizzes, Project Report
Data Science, AI and Society	50 / 2	8	Quizzes, Project Report

Made in Slovenia UI

- Nominiranci nagrade GoDigital 2024 za najboljši digitalni projekt so bili projekti, ki temeljijo na različnih konceptih UI:
 - strojno učenje,
 - globoko učenje,
 - računalniški vid,
 - obdelava naravnega jezika,
 - avtonomni sistemi,
 - digitalni dvojčki,
 - generativni UI.

European Software Skills Alliance (ESSA)

- [Junior developer EQF4/5](#)
- [Developer EQF6](#)
- [Developer EQF7](#)
- [Junior DevOps expert EQF6](#)
- [DevOps expert EQF7](#)
- [Junior solution designer EQF6](#)
- [Solution designer EQF7](#)
- [Technical software specialist EQF4/5](#)
- [Test specialist EQF4/5](#)



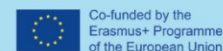
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EuroHPC
Joint Undertaking



REPUBLIKA SLOVENIJA
**MINISTRSTVO ZA VISOKO ŠOLSTVO,
ZNANOST IN INOVACIJE**

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