LAMBDA - Learning, Applying, Multiplying Big Data Analytics

Summer School 2020

Welcome & Opening

LEARNING, APPLYING, MULTIPLYING BIG DATA ANALYTICS

This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement No 809965.

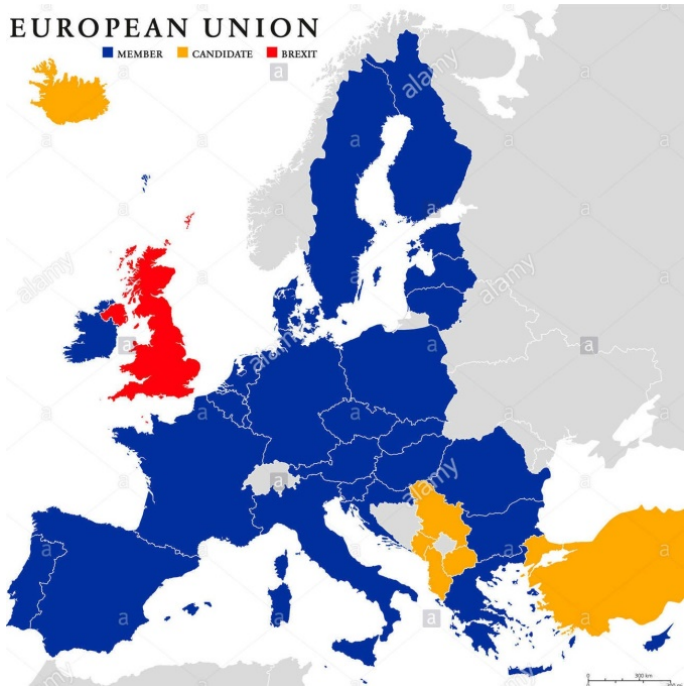
Project Funding

- This project has received funding from the European Union's Horizon 2020 research and innovation programme, GA No 809965

- Project Partners
  - Institute Mihajlo Pupin, Serbia (Coordinator)
  - Fraunhofer Institute for Intelligent Analysis and Information Systems, Germany
  - Institute for Computer Science - University of Bonn, Germany
  - Department of Computer Science - University of Oxford, UK

Vision and Primary Objectives

Strengthening the Human capital and Education, Research and Development capacities of "Mihajlo Pupin" Institute the leading Serbian R&D institution in information and communication technologies in order to serve as a **Big Data & Analytics HUB** that connects and integrates scientists and professionals from the West Balkans and the entire region into the European Research Area.



Decreasing the existing European regional R&I disparity by Fostering excellence in the Big Data Ecosystem areas unlocking and raising the scientific profile of academics institutions from Serbia and the region while contributing to European progress beyond the state-of-the-art of related research and technology, as well as establishing productive and fruitful long-term cooperation.

- Leading Serbian R&D institution in information and communication technologies (ICT)
- The biggest and the oldest (1946) R&D Institute in ICT area in the whole Southeastern Europe

- World Bank SEE Knowledge Economy report for 2004 and 2011: "Internationally competitive"
- EU Commissionaire – "Pupin as the best practice example for bridging academia and industry"
- 90% of turnover via TT

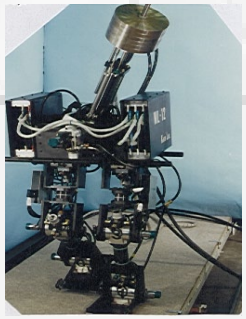
KEY RESEARCH AND DEVELOPMENT AREAS

Supervision and Control

IS, DMS, DSS , SW, LOD

Security Program

Defense Program



Robotics

Traffic Management

Telecomm. Program

JOINING FORCES WITH EU-BASED R&D PARTNERS

Fraunhofer – Pupin

Joint Project Office established 2003

93 International Research Projects, over 400 partners

18 H2020 (AI-PROFICIENT, HESTIA, SINERGY, TRAPEZE, BorderUAS, PLATOON, TRINITY, IDEAS, REACT, LAMBDA, FeeelAgain, RESPOND, InBETWEEN, SlideWIKI, FLIRT, EEN INNO, FS4SMIH, EENSerbia)

22 FP7 projects (REFLECT, AgroSENSE, META-NET, WBC-INCO-NET, HydroWEEE, ICT-WEB-PROMS, HELENA, EMILI, ENERGY WARDEN, PROCEED, LOD2, CASCADE, H-WEEE-DEMO, EPIC-HUB, SPARTACUS, GenderTIME, ResearchersNight, GeoKNOW, Danube INCO.NET, NoSQL-NET, Trafoon)

7 CIP/EIP (CESAR, EIIRC, GREEN, WEEEN, ICIP, IMAGEEN, Share PSI 2.0)

1 IPA Adriatic (PACCINO)

1 ERASMUS+ (BEST)

4 SEE (Intervalue, FORSEE, WBINNO, TV-Web)

3 TEMPUS (CARE, HUTON, INCOMING)

6 COST Actions (IC1004, IC1304, CA16116, CA15104, NexusLinguarum, Distributed Knowledge Graphs)

1 RSEDP2 (EMC)

3 6FP projects (SARIB, PROMETEA, Web4WeB)

2 EC Interreg/CADSES projects (I2E, STRIM)

5 IPA (EPS, Tax, Justice, Agro, POM)

3 Interreg DANUBE (MOVECO, NewGenerationSkills, EDU-LAB)

17 Bilateral projects (2 Switz.,2 France, 5 Germany, 1 Cyprus,1 Greece, 1 Norway, 1 Portugal, 1 Slovenia, 3 China)

LAMBDA Key Pillars

Component	Description
Learning **&** **Open Education**	Knowledge repository as part of the **LAMBDA Learning and Consulting Platform** will be established to facilitate spreading learning materials, as well as exchange of best practice between research institutions from South-Eastern Europe and leading EU partners: • https://project-lambda.org/Learning • https://project-lambda.org/Knowledge-repository/Lectures
Applying **Knowledge** **&** **Cooperation**	**LAMBDA Experts Exchange Program** for teachers, researchers and developers) will open possibilities for collaborative research on open issues in Big Data related areas: • Industry 4.0 • ICT for Energy
Multiplying **Dissemination and outreach**	Raising awareness about **future trends in Big Data, Emerging Tools and Technologies**, and standards by organization of events at international (e.g. DEXA, ESWC, SEMANTiCS) and regional (e.g. ICIST, ICT Innovations) conferences, organization of the Belgrade Big Data Analytics Summer/Winter School, https://project-lambda.org/Announcement-1

LAMBDA Consortium

BDA School 2019

> 15 Speakers (Germany, Bulgaria, UK, Italy, Austria, Romania, Serbia)

> 60 participants, > 20 different organizations

Learning, Applying, Multiplying Big Data Analytics

BDA School 2020

	Day 1	Day 2
09:00	Establishing connections (see instructions below)	
09:45	Opening	
	Using Big Heterogeneous Health Data or Personalized Medicine	Knowledge Graphs Creation
	Q & A Session	Scalable KG Processing (SANSA)
	Semantic information infrastructures from business information delivery to water management (Keynote)	Q & A Session
	Soft computing for Transparent synthesis of Geo Big Data (Keynote)	Federated Query Processing
	Q & A Session	Q & A Session
12:30	Lunch Break	
13.00	Data for AI: The EC's Horizon Europe/Digital Europe Programs and BDVA's standpoint	Plenary Talk: AI and Knowledge Graphs
	Reasoning on Financial Knowledge Graphs: The Case of Company Networks	Knowledge Graph Embeddings
	Chronorobotics: Spatio-temporal models for social and service robots	Context-Based Entity Matching for Big Data
	Q & A Session	Q & A Session
	Panel – Big Data Foresight	Big Data Applications
16:00	Closing	

1 2 3 4 5 6

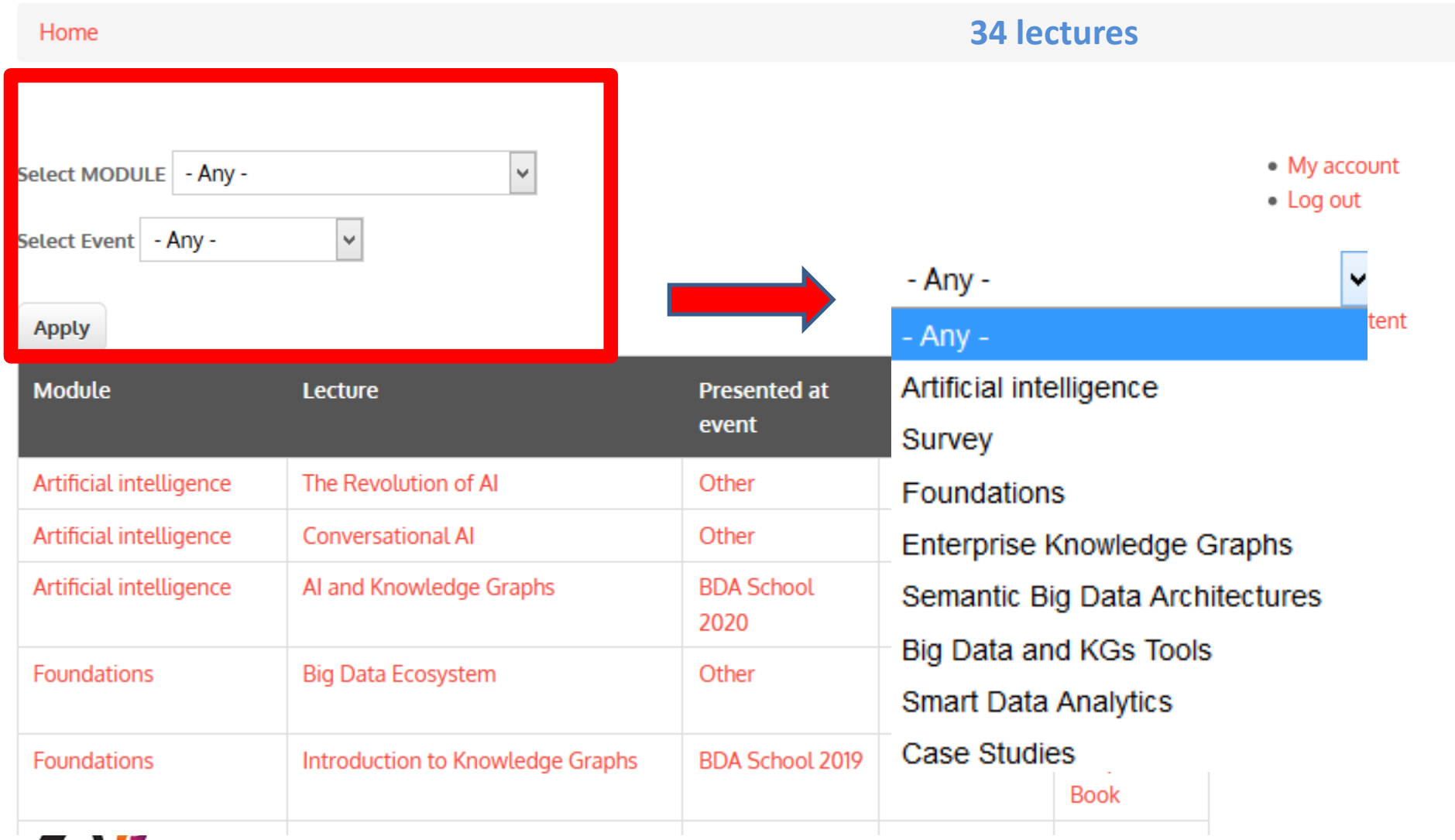
Open Education (June 2019)

- Enterprise Knowledge Graphs (University of Oxford)
  - Introduction to Knowledge Graphs
  - Extraction for Knowledge Graphs
  - Reasoning in Knowledge Graphs

- Semantic Big Data Architectures (Fraunhofer Institute)
  - Introduction to Big Data Architecture
  - Big Data Solutions in Practical Use-cases
  - Distributed Big Data Frameworks

- Smart Data Analytics (University of Bonn)
  - Distributed Big Data Libraries
  - Distributed Semantic Analytics I
  - Distributed Semantic Analytics II

Open Education (June 2020)



Knowledge Graphs and Big Data Processing

Springer

Table of Contents

Foundations

Chapter 1 Ecosystem of Big Data 1
Valentina Janev

Chapter 2 Knowledge Graphs: The Layered Perspective 19
Luigi Bellomarini, Emanuel Sallinger, and Sahar Vahdati

Chapter 3 Big Data Outlook, Tools, and Architectures 34
Hajira Jabeen

Architecture

Chapter 4 Creation of Knowledge Graphs 55
Anastasia Dimou

Chapter 5 Federated Query Processing 69
Kemele M. Endris, Maria-Esther Vidal, and Damien Graux

Chapter 6 Reasoning in Knowledge Graphs: An Embeddings Spotlight ... 82
Luigi Bellomarini, Emanuel Sallinger, and Sahar Vahdati

Methods and Solutions

Chapter 7 Scalable Knowledge Graph Processing using SANSA 97
Hajira Jabeen, Damien Graux, and Gezim Sejdiu

Chapter 8 Context-Based Entity Matching for Big Data 114
Mayesha Tasnim, Diego Collarana, Damien Graux, and Maria-Esther Vidal

Applications

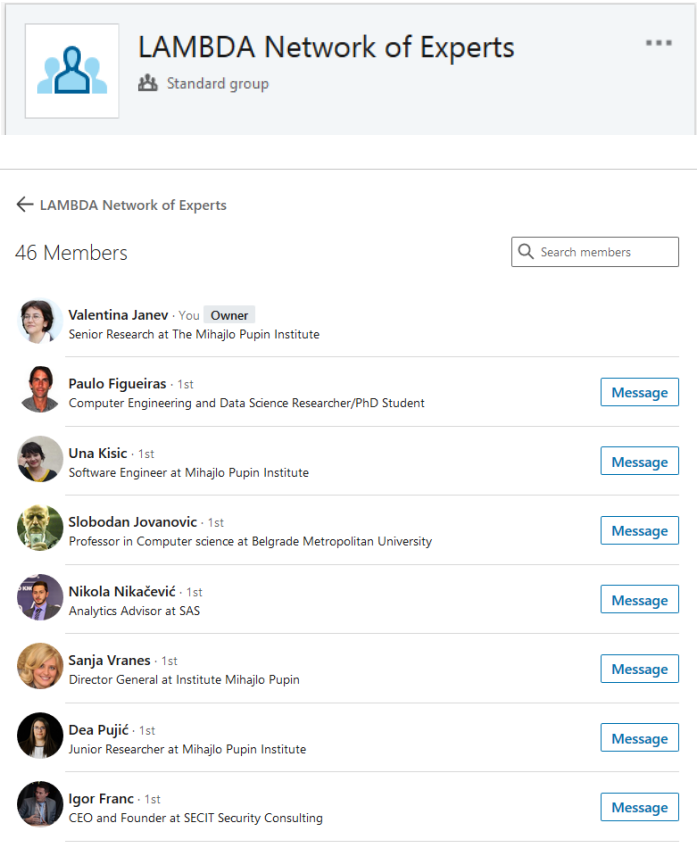
Chapter 9 Survey on Big Data Applications 139
Valentina Janev, Dea Pujić, Marko Jelić, and Maria-Esther Vidal

Chapter 10 Case Study from the Energy Domain 155
Dea Pujić, Marko Jelić, Nikola Tomašević, and Marko Batić

Bibliography 171

Join Us

LinkedIn



Keynote Session

Georgios Paliouras, NCSR "Demokritos"

Using Big Heterogeneous Health Data for Personalised Medicine

Mariana Damova, Mozaika, The Humanizing Technologies Lab

Semantic information infrastructures from business information delivery to water management

Gloria Bordogna, Italian National Research Council IREA

Soft computing for Transparent synthesis of Geo Big Data

WELCOME