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DaSCI^{news}



THE QUARTERLY NEWSLETTER OF THE
ANDALUSIAN RESEARCH INSTITUTE IN DATA SCIENCE AND COMPUTATIONAL INTELLIGENCE (DASCI)

Welcome to the DaSCI headquarters

6

BRIEF LECTURE

What's up
with
eXplainable AI (XAI)?

4

INTERVIEW

Victoriano Izquierdo
Graphext

9

AI on AIR

SintonIA -
A DaSCI podcast

16

SPOTLIGHTS
BOOK
PROJECT
PAPER

IN THIS VOLUME

Pedro González

Deputy Director of DaSCI at Univ. Jaén

Welcome to the third edition of the bulletin of the DaSCI Institute. First of all, we would like to highlight the success of the launching of this newsletter due to its dissemination among the members of the Institute. This makes us consider strengthening it to give visibility to the Institute and its activities among the research community and the rest of those interested in Artificial Intelligence in our environment.

In this number, we highlight that the Institute's headquarters in Granada have moved to the business centre of the PTS, in the Health and Technology Park of Granada. Having a physical space like this offers a great opportunity to promote the joint work of the Institute's members.

The brief lecture describes Natalia Díaz's work related to eXplainable AI, a very topical area of AI that bridges a gap among opaque AI models, to obtain models that minimise bias and are transparent, ethical and fair. Also included is an interview with Computer Scientist Victoriano Izquierdo, from Granada, CEO and co-founder of Graphext. The interview outlines his career and his vision for the future of AI, both in general and in Andalusia. This number also includes the usual sections, such as brief lectures, spotlight (books, papers and projects), PhD Theses and predoctoral experiences, Webinars, DaSCI in the media and the second season of Sintola.



But the work does not stop, and we are facing challenges such as the development of the Institute's strategic plan or the progress of the EDIH AIR Andalusia proposal.

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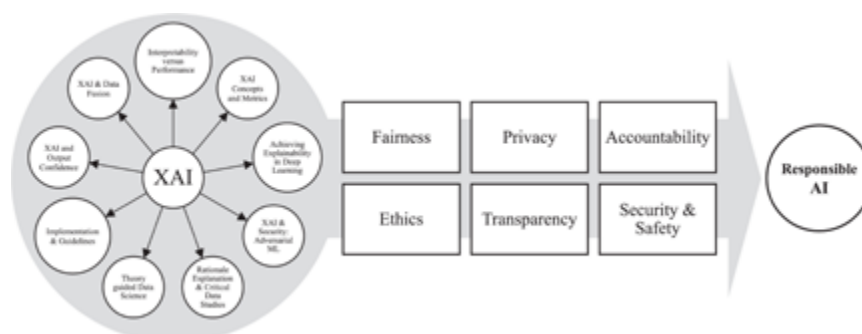
Sebastián Ventura · José María Luna

Pattern Mining with Evolutionary Algorithms

Springer

7 Pattern Mining with Evolutionary Algorithms

Book Spotlight



4 What's up with eXplainable AI?

Brief Lecture



Antonio R. Moya
Predoc Experiences

12

INTENSE Project Spotlight

13



What's up with eXplainable AI? **04**

Brief lecture

aiMPULSA is presented **05**

News

DaSCI headquarters **06**

News

Pattern Mining with Evolutionary Algorithms **07**

Book Spotlight

Improving the portability of predicting students' performance models by using ontologies **08**

Paper SpotLight

EXplainable Neural-Symbolic Learning (X-NeSyL) methodology to fuse deep learning representations with expert knowledge graphs: The MonuMAI cultural heritage use case **08**

Paper SpotLight

Reducing Data Complexity using Autoencoders with Class-informed Loss Functions **08**

Paper SpotLight

Latest PhD Theses **09**

Up to Date

Victoriano Izquierdo, CEO of Graphext **10**

Interview

Antonio Rafael Moya **12**

Predoc Experiences

INTENSE **13**

Project Spotlight

DaSCI in media **14**

DaSCI Webinars **15**

Up To Date

SintonIA: a podcast from DaSCI **16**

Up To Date

Brief Lecture

What's up with eXplainable AI?

Natalia Díaz Rodríguez

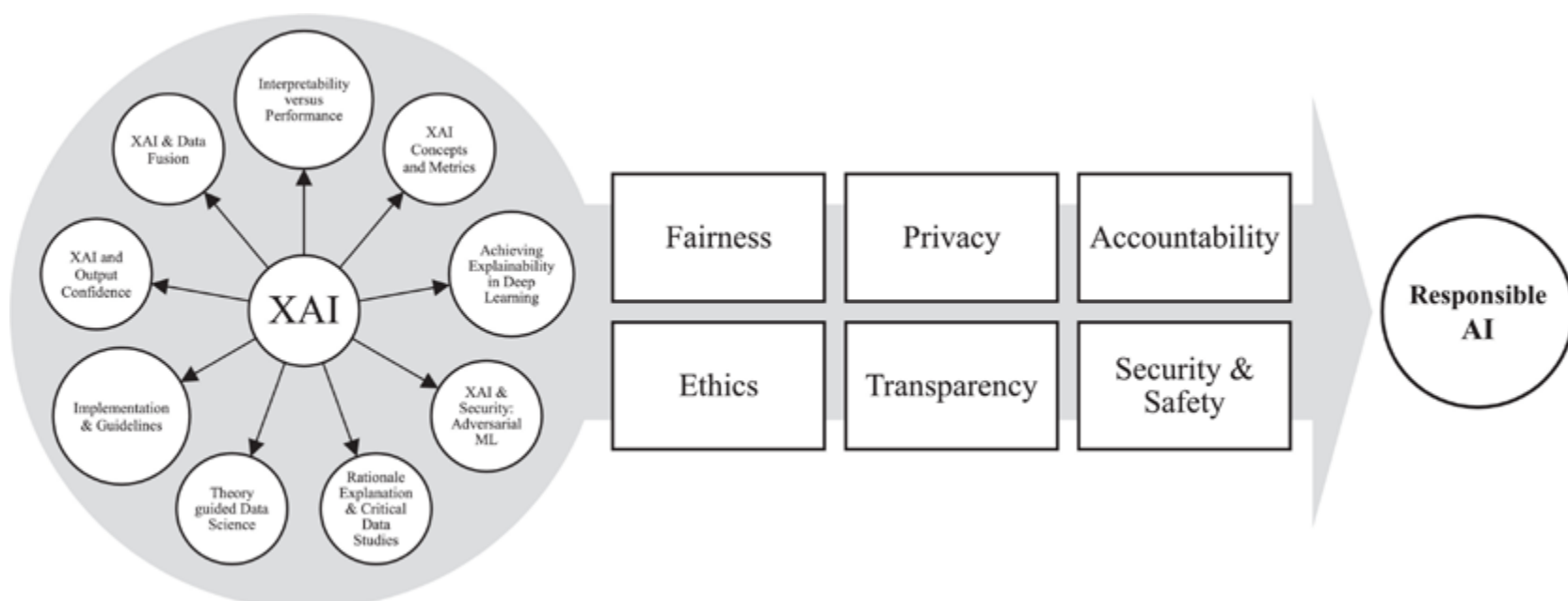


Fig. 1: Challenges in eXplainable Artificial Intelligence (XAI) and its impact on the principles for Responsible AI (RAI). [1].

The computer science area of Artificial Intelligence (AI) is experiencing incredible advances due to the power and cheaper availability of GPUs. This has made its use ubiquitous and the latest AI models are reaching performance levels that are comparable or beat those of human experts (e.g., radiologists diagnosing COVID [2], dermatologists diagnosing skin cancer [3] and melanoma [4], or ophthalmologists diagnosing diabetic retinopathy [5]). However, these models are considered black-box models because they have many layers of operations that make their decisions hard to trace, comprehend, communicate how they function and, most importantly, hard to fix when they are used in a slightly different domain to the one on which they were trained in the lab. This makes it very hard to explain why they fail when they do, and the causal rationale behind their functioning.

Likewise, you have probably heard about the negative impacts that AI can have on society, the future of (the digital transition at) work, human rights and/or minorities. For instance, from fake news and misinformation, to politics manipulation through AI-driven marketing campaigns or addictive social networks -based on maximizing the time users keep scrolling content.

While AI systems only can learn from real life data and therefore they inherit our own bias as humans, it is the responsibility of us all to understand the types of flaws that, as humans in society, systems can suffer from. Understanding the functioning of AI models can

allow us all to take action on them, and provide feedback to improve them. As a user, you can signal when, e.g., someone is misbehaving in a social network, or when a model is exhibiting discriminative behaviour.

AI is a tool, and as such, its impact will depend on how responsible its use is. Because AI technologies exist to tackle unfairness issues and to mitigate model bias or lack of quality data, a paramount first step to deploy any AI system on a large scale is its ability to explain its decisions. EU regulation will not allow models to take decisions that are not explainable, ethical, responsible, nor accountable [6]. For instance, we need to explain why an AI based autonomous car may fail and kill a pedestrian. Explainability is thus a pre-requirement to deploy any AI system.

Democratizing the understanding of AI models allows debugging them if the AI model needs to provide an explanation to a technical audience (a data scientist, a developer, an engineer), to a

decision maker (credit granting bank employee, a politician deciding on budget allocation, the EU performing algorithms auditing), or to a non technical end-user (a mortgage applicant, a job applicant assessed through an AI-based screening tool, a patient).

Depending on the audience that demands the AI model explanation, the machine learning model being used, and the kind of data that it ingests to learn from examples, there are different levels of explainability to be provided, some examples are in Fig. 2.

However, it is important to clarify some notions. While Interpretability is defined as the ability to explain or to provide meaning in understandable terms to a human, Explainability goes a step beyond and is associated with the notion of explanation as an interface between humans and a decision maker that is, at the same time, both an accurate simplification of the decision maker and comprehensible to humans. Therefore,

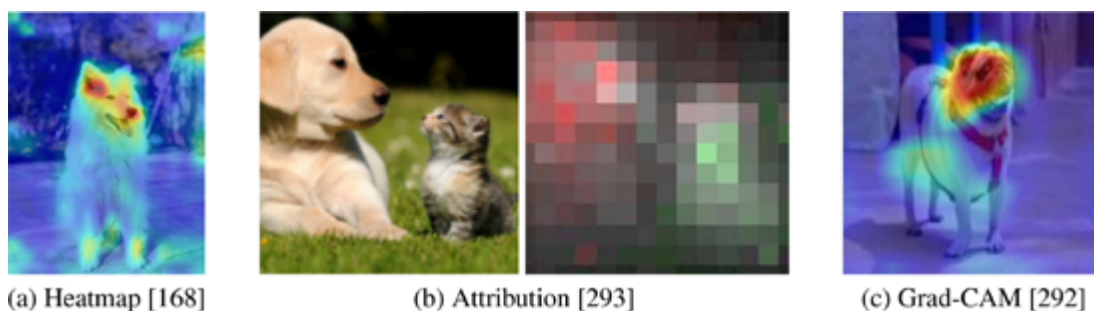


Fig. 2: Examples of rendering interfaces for different XAI visualization techniques on deep learning models that take images as input. Left: Heatmap. Middle: Attribution methods. Right: Grad-CAM.

given an audience, an explainable Artificial Intelligence (XAI) is one that produces details or reasons to make its functioning clear or easy to understand.

To conclude, XAI bridges a gap among opaque AI models, to attain models that do not discriminate, are accountable, transparent, ethical, fair and minimize bias. If you are interested in reading more about the concepts associated to XAI, its taxonomy of method families, Responsible AI and exciting research avenues to work on AI problems that matter to society today, you can learn more about the subject in Barredo Arrieta et al. 2020 [1].

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News

aiMPULSA is presented

An public-private initiative to set focus in Granada as a top ecosystem for Artificial Intelligence-based companies.



The University of Granada, the PTS Foundation, the Granada Chamber of Commerce and the Granada City Council have presented aiMPULSA, the Artificial Intelligence Ecosystem to connect Granada with the international AI sector. The project, which is also sponsored by the Junta de Andalucía and the Granada Provincial Council, aims to generate and attract talent, attract new and large companies thanks to this type of technology and thus influence the social and economic growth of the environment.

For its operation, aiMPULSA relies on the potential of the University of Granada, which has been providing training and research in AI for more than 30 years, as well as international prestige and relationships with large

companies. The university also facilitates the incorporation of talent and the technological updating of companies.

The project is part of the activity of AIRAndalusia, the Andalusian Digital Innovation Centre for Applied Artificial Intelligence and Robotics, in which the University of Granada participates and which is supported by the Ministry of Economic Transformation, Industry, Knowledge and Universities of the Andalusian Regional Government. This hub has been set up to become a support tool for small and medium-sized enterprises and Andalusian public administrations, with the aim of improving their efficiency and competitiveness.

Another pillar of aiMPULSA is AILab, the new Centre of Excellence specialising in AI, located in the PTS in Granada, which will bring together the capabilities of the UGR with those of Google and Indra, providing talent, technology and infrastructure as a lever for digital transformation.

At a strategic level, the participation of leading companies in artificial intelligence such as Google and Indra, as well as companies using this type of technology, including Covirán, Cosentino, Grupo Cuerva and Caixabank, is essential.

DaSCI becomes in a key player in this ecosystem, through its researchers and world leading knowledge.

News

DaSCI headquarters

From March 2022, DaSCI headquarters are in the third floor of the business centre of the PTS (Health and Technology Park of Granada).

In the first days of March, a quite large number of DaSCI Institute's members moved to the new offices of the Institute in the business centre of the Health Technology Park.

We are located in the third floor (sector A) of the PTSalud building (Av. Ilustracion 41).

DaSCI area is composed of:

- 2 offices for predoctoral researchers,
- 1 office for postdoctoral researchers,
- 2 laboratories
 - AI4HumanID
 - Signal & Biomed Lab
- 1 meeting room,
- 2 researchers' offices,
- 1 director's office
- 1 secretary's office.



Third floor of PTSalud building is the core of AI in Granada.

These days have been very exciting, because finally we are making a wish of many years come true: our own space.

They are also days to start to roll and get the facilities ready so that soon we can have an inauguration in style.

In the meantime we share with you some pictures of the new DaSCI offices.



Book Spotlight

Pattern Mining with Evolutionary Algorithms

The extraction of patterns of different types is a problem that has got the attention of many researchers all over the world. This complex problem, hard to be deterministically solved on large datasets, has been addressed with evolutionary algorithms obtaining really promising results.

This book is intended to provide a general and comprehensible overview of existing evolutionary-based approaches for mining patterns of different types. It includes formal definitions of patterns, types of patterns, pattern mining techniques, quality measures, and related tasks. This book also presents the main drawbacks of exhaustive search approaches, which suffer from both runtime and memory usage when high dimensional datasets are analyzed. The algorithms presented in this book aim to outperform existing pruning strategies specifically designed to face the runtime and memory consumption issues. Pseudocodes for all these algorithms are included in the book.

The first two chapters of the book provide the reader with some formal concepts about pattern mining and association rule mining. Additionally, many different quality measures are analyzed by grouping them into two main groups: objective quality measures and subjective quality measures. Some relationships between quality measures are presented so the reader can identify similarities and differences among any quality measure.

The third chapter introduces the concept of evolutionary computation, and it describes different methodologies including genetic algorithms, genetic programming, and many other bio-inspired algorithms. Right after that, the book contains two chapters that describe how genetic algorithms and genetic programming have been considered for mining patterns. The structure of these two chapters is the same: some general issues (encoding, operators, fitness functions), different algorithmic approaches, and some successful applications. The sixth chapter introduces some approaches for addressing the pattern mining problem as a multi-objective problem. This chapter describes the quality measures usually considered in the pareto front and some algorithmic approaches grouped into three groups: genetic algorithms, genetic programming, and others.

The last chapters of this book provide the reader with additional and useful information related to related tasks. It includes the concept of supervised local pattern mining, the definition of exceptional relationships between patterns as well as some scalability issues.

1. *Introduction to pattern mining*
2. *Quality measures in pattern mining*
3. *Introduction to evolutionary computation*
4. *Pattern mining with genetic algorithms*
5. *Genetic programming in pattern mining*
6. *Multiobjective approaches in pattern mining*
7. *Supervised local pattern mining*
8. *Mining exceptional relationship between patterns*
9. *Scalability in pattern mining*

Technical sheet



Title Pattern Mining with Evolutionary Algorithms

Authors Sebastián Ventura
José María Luna.

Publisher Springer

Year 2016

Pages 190

ISBN 978-3-319-33857-6

URL <https://link.springer.com/book/10.1007/978-3-319-33858-3>

Paper Spotlight

Improving the portability of predicting students' performance models by using ontologies

J. López-Zambrano, J.A. Lara, C. Romero,

Journal of Computing in Higher Education (2021)

DOI:

[10.1007/s12528-021-09273-3](https://doi.org/10.1007/s12528-021-09273-3)

One of the main current challenges in Educational Data Mining and Learning Analytics is the portability or transferability of predictive models obtained for a particular course so that they can be applied to other different courses. To handle this challenge, one of the foremost problems is the models' excessive dependence on the low-level attributes used to train them, which reduces the models' portability. To solve

this issue, the use of high-level attributes with more semantic meaning, such as ontologies, may be very useful. Along this line, we propose the utilization of an ontology that uses a taxonomy of actions that summarises students' interactions with the Moodle learning management system. We compare the results of this proposed approach against our previous results when we used low-level raw attributes obtained directly from Moodle

logs. The results indicate that the use of the proposed ontology improves the portability of the models in terms of predictive accuracy. The main contribution of this paper is to show that the ontological models obtained in one source course can be applied to other different target courses with similar usage levels without losing prediction accuracy.

EXplainable Neural-Symbolic Learning (X-NeSyL) methodology to fuse deep learning representations with expert knowledge graphs: The MonuMAI cultural heritage use case

F. Herrera, N. Díaz-Rodríguez, A. Lamas, J. Sanchez, G. Franchi, I. Donadello, S. Tabik, D. Filliat, P. Cruz, R. Montes

Information Fusion (2022)

DOI:

[10.1016/j.inffus.2021.09.022](https://doi.org/10.1016/j.inffus.2021.09.022)

The latest Deep Learning (DL) models for detection and classification have achieved an unprecedented performance over classical machine learning algorithms. However, DL models are black-box methods hard to debug, interpret, and certify. DL alone cannot provide explanations that can be validated by a non technical audience such as end-users or domain experts. In contrast, symbolic AI systems that convert concepts into rules or symbols – such as knowledge graphs – are easier to explain. However, they present lower generalization and scaling capabilities. A very important

challenge is to fuse DL representations with expert knowledge. One way to address this challenge, as well as the performance-explainability trade-off is by leveraging the best of both streams without obviating domain expert knowledge. In this paper, we tackle such problem by considering the symbolic knowledge is expressed in form of a domain expert knowledge graph. We present the eXplainable Neural-symbolic learning (X-NeSyL) methodology, designed to learn both symbolic and deep representations, together with an explainability metric to assess the level of alignment of machine and human expert explanations. The ultimate objective is to fuse DL representations with expert domain knowledge during the learning process so it serves as a sound basis for explainability. In

particular, X-NeSyL methodology involves the concrete use of two notions of explanation, both at inference and training time respectively: (1) EXPLANet: Expert-aligned eXplainable Part-based cLAssifier NETwork Architecture, a compositional convolutional neural network that makes use of symbolic representations, and (2) SHAP-Backprop, an explainable AI-informed training procedure that corrects and guides the DL process to align with such symbolic representations in form of knowledge graphs. We showcase X-NeSyL methodology using MonuMAI dataset for monument facade image classification, and demonstrate that with our approach, it is possible to improve explainability at the same time as performance.

Reducing Data Complexity using Autoencoders with Class-informed Loss Functions

D. Charte, F. Charte, F. Herrera

IEEE Transactions on Pattern Analysis and Machine Intelligence (2022)

DOI:

[10.1016/j.inffus.2021.09.022](https://doi.org/10.1016/j.inffus.2021.09.022)

The latest Deep Learning (DL) models for Available data in machine learning applications is becoming increasingly complex, due to higher dimensionality and difficult classes. There exists a wide variety of approaches to measuring complexity of labeled data, according to class overlap, separability or boundary shapes, as well as group morphology. Many techniques can transform the data in order to find better features, but few focus on specifically reducing

data complexity. Most data transformation methods mainly treat the dimensionality aspect, leaving aside the available information within class labels which can be useful when classes are somehow complex. This paper proposes an autoencoder-based approach to complexity reduction, using class labels in order to inform the loss function about the adequacy of the generated variables. This leads to three different new feature learners, Scorer, Skaler and Slicer. They are based on Fisher's discriminant

ratio, the Kullback-Leibler divergence and least-squares support vector machines, respectively. They can be applied as a preprocessing stage for a binary classification problem. A thorough experimentation across a collection of 27 datasets and a range of complexity and classification metrics shows that class-informed autoencoders perform better than 4 other popular unsupervised feature extraction techniques, especially when the final objective is using the data for a classification task.

Up To Date

Latest PhD Theses

April 30, 2021

Complex Linguistic Information Modelling in Decision Making Problems under Uncertainty

Álvaro Labella Romero

The modelling of linguistic information in Group Decision Making (GDM) problems with uncertainty and its Consensus Reaching Processes (CRPs) has become a very important research line in the field of decision making. Most of the proposals focused on linguistic modelling are based on the fuzzy linguistic approach and use linguistic expressions close to the way human beings' thinking to model the uncertainty inherent in decision problems. However, many of these proposals have limitations in terms of interpretation and/or accuracy. In this doctoral thesis, a new methodological framework has been proposed for the modelling and treatment of uncertainty for GDM and CRPs problems by means of complex linguistic expressions that allow modelling the experts' opinions in this type of problems.

Directors: Dr. **Luis Martínez** and Dr. **Rosa Mª Rodríguez**

Qualification: *Outstanding Cum Laude*

November 19, 2021

New methodologies for postural change recognition through sensors

Edna Rocío Bernal Monroy

This thesis offers a system for real-time monitoring of body position, in a human-friendly way, that achieves easy configuration in favor of personalization, including some data of the patient under study. Three classifiers were evaluated in the research: KNN, SVM and C4.5. The main contribution of this proposal consists in the use of inertial microsenors, attached to the patients' clothing in a non-invasive way, to detect the different bed postures. Among its many advantages, it is worth highlighting that the algorithm performs lightweight and optimized processing so it can easily be integrated into low-cost devices, since the implementation does not require deep learning models. In addition, three flexible heterogeneous postural change protocols were implemented..

Directors: Dr. **Macarena Espinilla** and Dr. **Javier Medina**

Qualification: *Outstanding Cum Laude*

December 10, 2021

Time Series Analysis In Big Data Environment

Fco. Javier Baldán Lozano

This thesis is focused on time series analysis, specifically in supervised classification tasks. Although the time series classification field has a large number of approaches to deal with this problem, the proposals made in this field can be classified into three main groups: distance-based, feature-based, and deep learning.

Director: Dr. **José Manuel Benítez**

Qualification: *Outstanding Cum Laude*

December 20, 2021

New Approaches To Improve The Performance Of Machine Learning And Deep Learning Algorithms In Solving Real-World Problems: Companies' Financial Failure Forecasting

Huthaifa Jawazneh

This thesis explore into performance of Machine Learning and Deep Learning algorithms in real financial datasets which are extremely imbalanced. This case creates a major problem during training: the tendency to predict the majority class instances and ignore the minority ones. In order to solve this problem, new simple resampling approaches have been proposed. A comprehensive analysis of the impact of using several different advanced balancing methods on the performance of classical classification algorithms in predicting companies' financial failure has been done. Furthermore, in order to improve the performance of several classical classifiers in predicting companies' bankruptcy, cascading technique have been used to create hybrid classifiers, showing better performance than using stand-alone ones. Finally, a novel data balancing technique named Distance Based Border Instances SMOTE (DBBI-SMOTE) has been developed to solve the inconsistent distribution of the financial data. This avoids some drawbacks in the existing advanced balancing methods procedures, such as generating the new minority instances in the majority region. It outperforms many other balancing methods addressed in the literature.

Directors: Dr. **Pedro A. Castillo** and Dr. **Antonio M. Mora**

Qualification: *Outstanding Cum Laude*

December 21, 2021

Learning expressive numerical planning domains by integrating machine learning techniques

José Ángel Segura Muros

This doctoral thesis proposes a novel methodology for learning Action Models for Automatic Planning. This methodology is framed within the field of Knowledge Engineering, specifically in the area of Knowledge Acquisition. Particularly, this doctoral thesis presents a learning process that hierarchically combines different Machine Learning techniques, with a special focus on the use of Explainable Artificial Intelligence techniques. Contributions presented have been evaluated using reference planning domains taken from the Automatic Planning community and, also, from the VGAI videogame working environment.

Directors: Dr. **Juan Fernández Olivares** and Dr. **F. Raúl Pérez**

Qualification: *Outstanding Cum Laude*

Interview

“The combination of Computer Science, Data and Journalism was exciting enough for me to dedicate myself fully to it”

Victoriano Izquierdo is one of those young people from Granada who have succeeded far from the city of the Alhambra and surely dreams of soon returning to its streets on a daily basis, coordinating his team of workers from here and turning his hometown into a reference in Artificial Intelligence. From DaSCI we wanted him to tell us a little about his career and his vision for the future of AI in general, and in Andalusia in particular.

DaSCI: Victoriano, in Computer Engineering there is hardly any content on visualisation and even less on big data, much less ten years ago when you were in the classroom. How did Graphext come about? What was the process that led you to enter this world?

Victoriano Izquierdo: While I was studying at university, a Spanish startup called Vizzuality emerged and came out with a product for analysing geospatial data called Carto. A lot of data journalists started using it and came up with super interesting analyses. When I was a teenager I had a blog about my high school, Padre Manjón, and I started collaborating with Ideal de Granada. So the combination of computer science, the world of data and journalism seemed exciting enough for me to dedicate myself fully to it.

When I finished my degree we started Contexto.io, with my partner Miguel Cantón (also an IT student at the UGR), which was a tool to analyse data emerging from social networks and from there we ended up making a product like Graphext to be able to analyse any type of data in a very visual way, without having to write code.

Innovation can be seen as an optimization function of understanding a problem and understanding what new technologies are capable of doing

In this world of entrepreneurship there is a lot of hype and fads, and start-ups talk about technologies simply because they sound good, but not because they use them or because they are necessary. How can we, from the academic environment, contribute to the creation of technological start-ups that are truly disruptive?

Innovation is undoubtedly an optimisation function that consists of understanding very well an important problem that is either not solved or is solved inefficiently and at the same time understanding very well what new technologies are capable of doing. The problem is that technologists often do not have the opportunity to gain a deep understanding of problems that are not purely technological. And those who do know about such problems often don't know enough about technology. So naturally it is a very difficult problem to solve.

What works best, I would say, is for technologists to meet and be closer to people who are not computer scientists. This happens for example in colleges of higher education where multidisciplinary relationships are forged. Also by offering more flexibility to students to be trained in subjects that are not purely in their field, as happens more in Anglo-Saxon systems where even more advanced courses are offered.

Finally, I would say that master's degrees that mix disciplines, such as biology and computer science, also tend to give rise to this type of disruptive start-ups.



Victoriano Izquierdo

Computer Scientist
CEO and co-founder of Graphext

He was born in 1990 in Granada. From 0 to 17 he grew up in Granada. After graduating from High School he spent a year in NY. Then I decided to move back to Spain and study Computer Science in Madrid. He lived as an exchange student in Melbourne - Australia - and Rome - Italy -, as an undergrad. He has collaborated with media outlets as a freelancer and worked with agencies like Getty Images, The Wideangle or Bilderberg. In 2015 he co-founded Graphext, an innovative analysis tool that has revolutionized the world of statistics, allowing people to analyze data, and use machine learning and artificial intelligence techniques to see the information hidden in the data.

Data visualisation is traditionally the “ugly duckling” of academic curricula in Data Science, and it is difficult to find subjects on the subject in postgraduate curricula. Why is this, and how are data visualisation professionals trained?

I don't know why there is a lack of training in data visualisation, perhaps because it is a discipline that requires concerns that go more towards design, visual perception, psychology, communication? Luckily, I think that nowadays you can learn a lot by searching on Twitter or other social networks for experts on the subject, such as Alberto Cairo (who is also Spanish), reading books, watching conferences on the subject or following tutorials with open source libraries or software such as ours, Graphext. We are going to release a series of courses soon and we have many videos on our Youtube channel.

Data Visualisation requires design, visual perception, psychology and communication abilities

From your experience, how aware is the public administration of the need to open data and its analysis by third parties, as you do with Graphext? And the business world?

Increasingly so, without a doubt. Data portals and transparency laws are beginning to proliferate. Foundations such as Civio have undoubtedly helped a lot to promote this in recent years, but we are still a long way off. One only has to look at the fact that it is impossible to obtain standardised and

disaggregated data on who has had COVID and has been in hospital in order to make good calculations of the probability of dying or becoming seriously ill using variables such as age, weight, sex or pre-existing conditions. And it's not just a Spanish thing, the situation is not much better outside our borders either.

What tools are essential for a graduate who wants to contribute to Data Science? What do you find missing in the CVs you receive?

To begin with, more CVs are needed! There is a lack of communication skills when it comes to explaining the results of an analysis as well as the methodology to be followed. Also more familiarity with real data that you find in companies. Let's say that data in real life is dirtier and you have to develop skills to clean it and transform it into usable features.

If you were to visualise Graphext's development on a map, the location of its headquarters and its “satellite” headquarters... where would you see those “pins”? Why?

Well, Miguel and I started in the cafeteria of the Botanic Gardens next to the Law School. Then we spent a few months in Valencia in a startup accelerator and finally in Madrid where we arrived through the Google Campus and for years now we have had our own offices. Now we have more and more people working remotely from Granada, Scotland or the Canary Islands. I myself usually spend one week a month in Granada and the rest in Madrid.

I think that COVID has brought remote to stay in the technology teams, but at the same time I think that to create a good company culture it is necessary for people to see each other and

meet physically on a regular basis. What we don't know yet is how often. At the moment we have an office in Madrid where I think the idea is to go once or twice a week and we bring everyone to Madrid once a quarter.

COVID has brought remote to stay in the technology teams

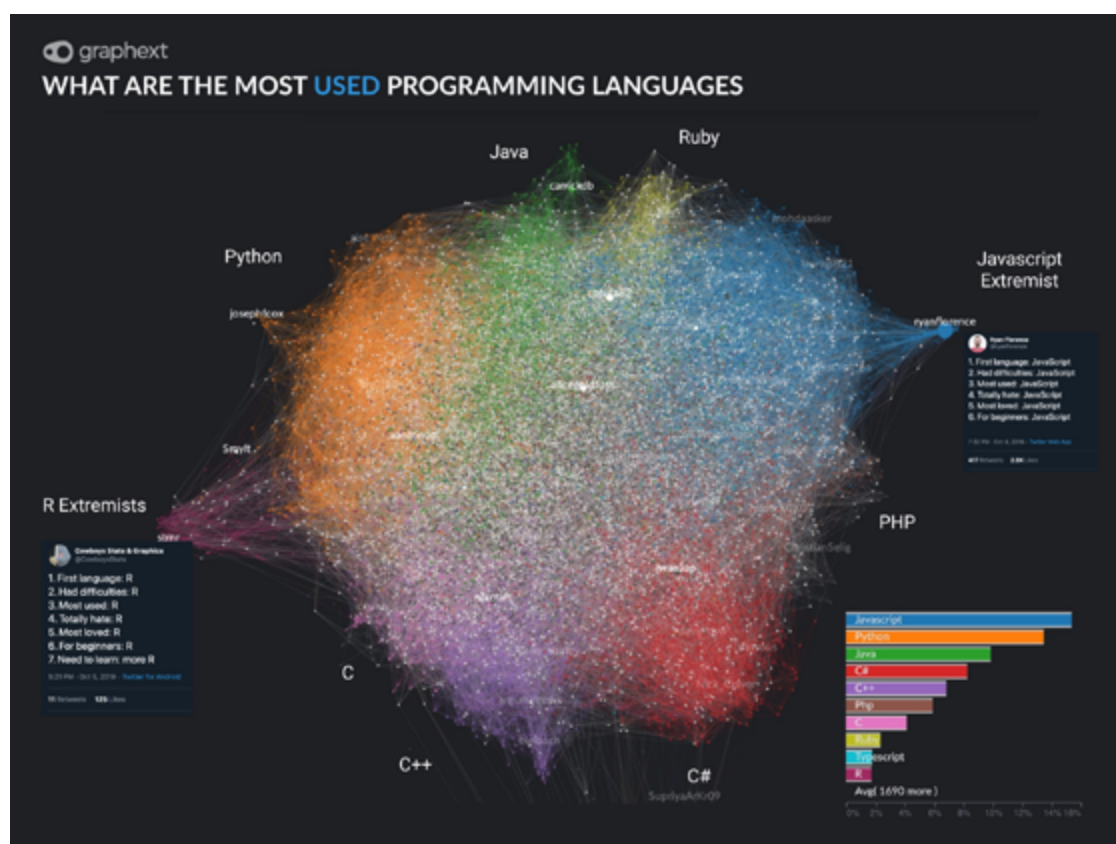
How does a person from Granada in Madrid see initiatives such as AI Lab Granada, aiMPULSA, or AIRAndalusia, all coordinated by DaSCI?

It is clear that Granada, with its excellent university and being so close to Malaga, has many great things to join the new technological ecosystems that are emerging beyond Madrid and Barcelona. Hopefully all these initiatives will come to fruition and manage to create a fundamental quarry to be a city that generates high quality jobs and where companies based on data and AI are born, which will be fundamental in this new economy.

If you could implement a single measure in Granada, or in Andalusia, for the development of an AI ecosystem, what would it be?

Very difficult question. But it seems that getting the University to attract the best researchers and undergraduate and postgraduate students from Spain and Europe can start that virtuous cycle for companies to follow.

Thank you very much, Victoriano, for participating in this interview. We are willing to see you more frequently in Granada and collaborating deeply with DaSCI.



DaSCI Predoc Experiences

Antonio Rafael Moya Martín-Castaño

DaSCI: Antonio, what inspired you to go into science?

Antonio: I would really be lying if I said it wasn't inertia. Firstly, you finish your degree, then you do a master and after all someone offers you to continue doing something that, up to that point, you like. So that, you think: "why not?" Maybe sometimes you considered whether to continue or not, but in my case, I enjoyed the research enough to keep on working on

"I enjoy the research enough to keep on working on this area"

this area

If you could go back in time and visit you when you were in high school... What advice would you give yourself?

This answer changes constantly depending on my mood, but I would really advise me to take the same decisions I have followed so far, as the training and experiences I have had over the years have been quite good (sometimes there are bad moments, but it happens always in our lives).

In terms of your current research, do you think industry will be reluctant to adopt new federated learning tools?

I think that today, in every algorithm used for different tasks, they try to get as much benefit as possible, so these techniques are and will continue being used in the industry.

What is your "scientific" goal for the new year?

I have already had some years of teaching and that is a purpose that I had, and that I have already fulfilled. Therefore, and taking into account that I have a couple of ideas for articles that I am currently developing, my purpose has to be to publish an article, as I haven't done it yet and I think it should give me enormous satisfaction to see that after so much time spent I have finally achieved my first publication.

"Since I was at secondary school I loved teaching, and I have really enjoyed the experiences I have had as a teacher"

What would be your ideal team?

Actually, not a very big group and varied enough. It isn't necessary that everyone follow similar lines to mine. I'm a curious person and I like talking with the rest of the group about what they are doing and learning things that don't necessarily have to be useful in my line (in fact, sometimes this allows me to disconnect and that's good). Also, obviously, as I suppose most people would ask for, a group with whom you can also have a good social relationship, with whom you can also talk about things outside of the work and the world of research.

If you had to choose between research and teaching, which would you choose and why?

This question is very difficult to me, because ever since I was at secondary school I loved teaching and I have really enjoyed the experiences I have had as a teacher at university up to the present day. From that point of view, I would go for teaching, but I also think that the wear and tear of the years can make you "hate" it a little, and I have not yet had enough wear and tear in that sense.

On the other hand, research allows you to develop (usually) your own ideas and gives you a mixture of feelings between frustration and maximum happiness (there are not too many occasions with feelings between both grades) that also makes it difficult to leave this idea.

"Researching allows you to develop your own ideas and gives you a mixture of feelings between frustration and maximum happiness"



I studied at the University of Granada (UGR) both double degree in Computer Engineering and Mathematics and a master in Data Science and Computer Engineering. Nowadays I'm focused on Deep Learning. In fact, I'm a PhD student at the University of Cordoba (UCO) and I'm studying how to improve the optimization of the architecture of Deep Neural Networks through the use of evolutionary algorithms.

That's why I can't answer this question properly, because if I answer it on a day of frustration with research I would probably go for teaching and if I answer it on another day, I would probably go for research.

Improving Data Science Users' Experience with Computational Intelligence



Secondly, INTENSE will propose an experience enhancement of professionals in data science. These proposals focus on the improvement of existing algorithms and the addition of new capabilities, such as their use under complex conditions or the development of models respecting the privacy of user data or the extraction of sequences of events meeting temporal constraints. It is interesting to mention the work that will be carried out to develop new approaches to address problems with few labelled data. Two problems that

Finally, to give visibility to the research results, INTENSE is expected to provide integrated solutions including the developed models into the currently most relevant software platforms and tools to facilitate their use by a wider user community.

García Martínez, Carlos
Gibaja Galindo, Eva Lucrecia
Luque Rodríguez, María
Romero Moralez, Cristóbal
Romero Salguero, José Raúl
Ventura Soto, Sebastián
Zafra Gómez, Amelia

Barbudo Lunar, Rafael
Espejo Muñoz, Álvaro
Esteban Toscano, Aurora
*Feldt, Robert (Chalmers University of
Technology, Sweden)*
*Fournier-Viger, Philippe (Harbin Institute of
Technology, China)*
*Krzysztof, Cios (Virginia Commonwealth
University, USA)*
Luna Ariza, José María
Moya Martín-Castaño, Antonio Rafael
Moyano Murillo, José María
Ramírez Quesada, Aurora

Funding Programme	State Program for R&D&I Oriented to the Challenges of Society.
Funding Entity	State Research Agency. Ministry of Science, Innovation and Universities
Principal Researcher	Sebastián Ventura Soto José Raúl Romero Salguero
Start	01/09/2021
End	31/08/2024
Partners	University of Córdoba

DaSCI in media

Granada applies to host the Agency and the National Centre for Artificial Intelligence

The University of Granada has requested the Andalusian Regional Government the support to apply at the National Government to become the host city of the Agency and the National Centre for Artificial Intelligence

IDEAL

Granada pide ser sede de la agencia y el centro nacional de inteligencia artificial

La UGR traslada a Junta y Gobierno la petición para los dos proyectos, uno de ellos recogido en los presupuestos para este 2022



Acceso al edificio de la UGR, donde se encuentra el trabajo de la UGR y se instalará la sede de la agencia. / Foto: UGR

El Gobierno presentó en marzo de 2019 el Plan Nacional de Inteligencia Artificial. El presidente, Pedro Sánchez, aceptó el Plan de la Comisión de

The UGR analyses whether artificial intelligence could replace the 'judge person'.

MI UGR Fotos Videos Descuentos para Universitarios

● CULTURA DIGITAL Directo | La OTAN hará todo lo necesario para defender a sus aliados

La UGR analiza si la inteligencia artificial podría sustituir al 'juez persona'

Granada refuerza su candidatura a la Agencia de Inteligencia Artificial con unas jornadas junto al Consejo General del Poder Judicial

Reunión sobre los aspectos legales de la inteligencia artificial. / Foto: UGR

ANDREA G. PARRA Granada Miércoles, 2 marzo 2022, 20:56

IDEAL

The General Council of the Judiciary defends the role of the "judge person" in Granada in the face of the challenge of artificial intelligence

El Consejo General del Poder Judicial en Granada el papel del "juez persona" reto de la inteligencia artificial

• El órgano participativo organiza con la UGR la tercera edición de las jornadas sobre tecnología, que se ofrece como "herramienta" para agilizar el trabajo en los juzgos

Reunión de las jornadas de la UGR. / Foto: UGR

Granada Hoy

Francisco Herrera, director of the DaSCI Institute, participates in the radio show "Hoy por Hoy"

Enrique Árbol has talked to Francisco Herrera, director of the DaSCI Institute and Councillor of the Granada City Council about the news published these days in different newspapers of the province about the intention of making Granada the next host of the National Centre and the State Agency for the supervision of Artificial Intelligence.

You can listen to the full content, at the following link (in Spanish)

https://play.cadenaser.com/audio/1641986087_569726/



playSER EN DIRECTO A LA CARTA PARRILLA BOLETÍN INFORMATIVO

RADIO GRANADA Hoy por Hoy Granada Hoy por Hoy Granada

HOY POR HOY GRANADA PODCAST

Entrevista con el concejal de Ciencia e Innovación de Granada, Paco Herrera

Publicado el 10-04-2022 10:14:54 CET

The new supercomputer at the UGR reduces procedures that could take 25 years to 24 hours.

The University of Granada consolidates its position as a national benchmark in high-performance computing, with a new computer: Albaicín, one of the 10 most powerful computers in Spain and the first in Andalusia.

MI UGR Fotos Videos Descuentos para Universitarios

El nuevo supercomputador de la UGR reduce a 24 horas procedimientos que podrían durar 25 años

La Universidad se consolida como referente nacional en computación de altas prestaciones, con un nuevo ordenador, Albaicín, entre los 10 más potentes de España y el primero de Andalucía

El nuevo supercomputador de la UGR. / Foto: UGR

IDEAL

Up To Date

DaSCI Webinars

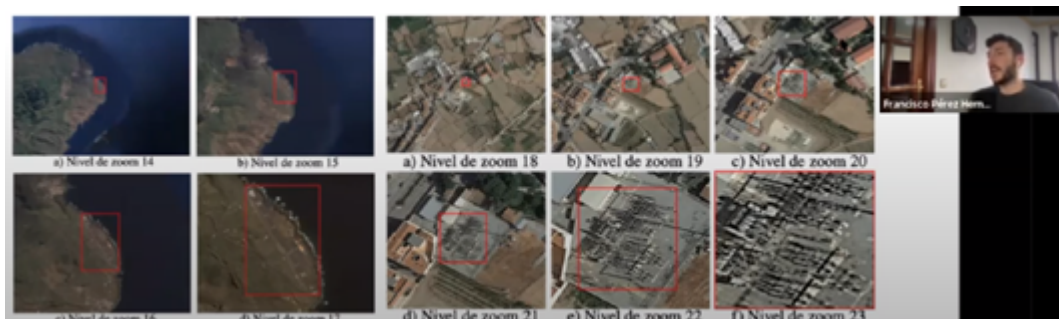


The aim of the webinar organisation team is to consolidate DaSCI Webinars as a training tool for all the DaSCI members, as well as an instrument to build bridges between among DaSCI members and the speakers.

DaSCI Webinar started 2022 with a DaSCI Reading given by PhD Isaac Martín from the King Juan Carlos University. PhD Isaac Martín leads the Data Science Lab from the same University, and he presented to DaSCI the DSGAME game, which is a board game about how to design and manage a data science project. The talk resulted in a breath of fresh air for all the assistants, since PhD Isaac Martín could show us that there are other ways to teach and learn science in general, and data science in particular.



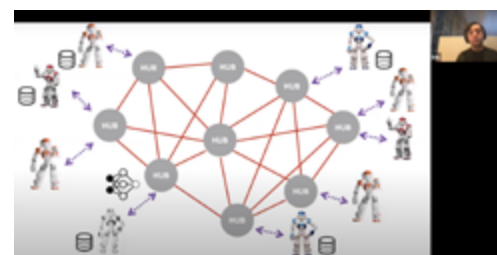
DaSCI Webinars closed the month of January with the talk delivered by PhD Eduardo Castello, who is a Marie Curie Fellow in the Human Dynamics and the City Science groups at the MIT Media Lab. The seminar opened our mind in relation to blockchain technology, which we usually only link to cryptocurrencies. PhD Eduardo Castello illustrated us how to apply the blockchain technology in robotics for making robotic operations more secure, autonomous, flexible and even profitable.



The month of february was starred by two PhD students of DaSCI, namely Ivan Sevillano and Francisco Pérez from the University of Granada. Ivan Sevillano offered a snapshot on Explicable Artificial Intelligence, and he introduced some of his initial contributions to the field, which are centred on evaluation measures for the explanations given by explainable models. Francisco Pérez is one of our PhD students who is nearly close to defend his PhD thesis, which is focused in the development of deep learning methodologies to image processing applied to the detection of singular infraestructures like airports and electrical substations. Ivan and Francisco showed a real mastery of the domains of their PhD thesis, and we are convinced that Francisco Pérez will be successful in his PhD Viva.

Prof. Risto Miikkulainen is a Professor of Computer Science at the University of Texas and Associate VP of Evolutionary Artificial Intelligence at Cognizant. Prof Miikkulainen talked about the fusion of evolutionary learning and deep learning,

and he showed his last contribution of that fusion in forms of new loss and activation functions for deep learning.



The next seminar in DaSCI Webinar will show the mathematical foundations of deep learning, and it will be given by Prof. Gitta Kutyniok from Ludwig-Maximilians Universität München (Germany). We are eager to listen to Prof. Kutyniok and to deepen our knowledge on deep learning.

Seminars are an instrument to build bridges among DaSCI members and speakers

Up To Date

Season 2 of SintonIA

@SintonIA_DaSCI - Artificial Intelligence (AI) on air.

We are now at the halfway point of season 2 of SintonIA. Throughout these months we have consolidated our commitment to the general public, and we present our new and brand new cycle on bio-inspired algorithms.

This new cycle brings brand new themes, DNA, ants, neurons and much more. We inaugurated the cycle with Óscar Córdón, professor at the University of Granada, talking about algorithms based on ant colonies, and we delved into their myriad uses, from finding the shortest paths on google maps to optimizing assembly lines.

However, we have also continued our neural networks cycle, looking back to a much more recent past, and chatting with Ignacio Aguilera, PhD student at the institute, about Recurrent Neural Networks. You can't miss his yoga class - recurrent!

We can't forget our star topics: the applications of artificial intelligence. In an episode aired earlier this year, we dedicated our interview to Sergio Damas. In this episode we talked about forensic science and how Artificial Intelligence can help solve cases, reconstruct faces and identify victims in a CSI-style case.

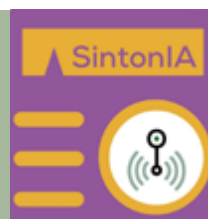
Soon we will be back with the continuation of our two active cycles -the neural networks and bio-inspired algorithms- and many more podcasts full of news and experts who will tell us their experience and put a face to these technologies. Stay tuned and subscribe to our podcast on Google Podcast, Spreaker and Spotify podcasts.



"A time series is a sequence of values where the current state depends (in part) on previous states."

IGNACIO AGUILERA
SintonIA S2E17

Latest SintonIA episodes Season 2



E15

CSI..A: Dr. Forensics in AI

Guest: SERGIO DAMAS

E16

Ant colonies. Cycle bioinspired algorithms

Guest: OSCAR CORDÓN

E17

Recurrent Networks. RRNN cycle.

Guest: IGNACIO AGUILERA

E18

Genetic Algorithms. Bioinspired Algorithms Cycle.

Guest: ANABEL GÓMEZ

E19

Graphs

Guest: CLARA GRIMA and LUISMA ESCUDERO

Spreaker
From iHeart

Spotify

About the DaSCI Institute

A total of 20 research projects and 12 contracts with companies partially finance the research activity of the institute, which currently has 90 PhD researchers (21.11% of whom are women) and tutors a hundred pre-doctoral students.

The communication strategy in social networks of the DaSCI institute is mainly divided into two pillars: institutional communication and science dissemination. In total, profiles on Facebook, Twitter and LinkedIn are used to provide news about the institute. A through them we work on the communication of calls for proposals and results of current projects, as well as collaborations with companies. Other profiles of the institute bring us closer to society with tiktok and instagram accounts, mainly to focus on the brand "SintonIA, La IA en las Ondas" with which our podcast is known.