eXplainable data processing (II/II)

Keynote

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In recent years, disruptive technologies have emerged and have revolutionized our communication capabilities over the internet. One of those technologies is Deep Learning. It fits under the broader branch of Artificial Intelligence known as Machine Learning.

Although this disruptive technology has created many new opportunities, it has unfortunately also become a means for achieving ill-intentioned goals. Fake news, disinformation campaigns, and manipulated images and videos have plagued the internet which has had serious consequences on our society. The myriad of information available online means that it may be difficult to distinguish between true and fake news, leading many users to unknowingly share fake news, contributing to the spread of misinformation. The use of Deep Learning to create fake images and videos has become known as deepfake. This means that there are ever more effective and realistic forms of deception on the internet, making it more difficult for internet users to distinguish reality from fiction.

Some of the goals of spreading false information and deepfakes are described below:

- **To distort peoples' beliefs and influence behaviour:** pseudo-scientific information and conspiracy theories can both have very serious consequences. Pseudo-scientific information often regards health and propagates quickly on social networks and news sites, convincing its readers to change their lifestyle or undertake an alternative treatment for an illness, claiming it to be a cure without any scientific evidence. The negative impact on fake health news has become very evident during the Coronavirus pandemic. False claims regarding Covid-19 prevention and cures have led many people to disobey the health measures taken by the authorities, such as wearing a mask, and many believed that getting vaccinated would be harmful for them or that it simply was not necessary. The power of social media in propagating false information is reflected in the fact that antivaccination became a movement. Many people have lost their lives and others have had to undergo severe illness because the belief that Covid does not exist led them to not following the advice of health authorities. Conspiracy theories claim to have discovered a secret plot behind which stands a powerful organization. A powerful example of the damage caused by the spread of such theories can be seen in the example of the Pizzagate conspiracy theory. This theory emerged in 2016 during the US elections and it claimed that Democratic Party officials had connections with restaurants with an alleged human trafficking and sex ring[1]. The listed restaurants experienced many threats and both owners and employees were harassed, as the fake news spread through social media. This theory led to a shooting at one of the pizzerias, carried out by a man who believed the fake news.

- **Political propaganda:** Political parties have been known to use propaganda prior to the invention of the internet. However, new technologies have helped politicians create more convincing propaganda through manipulating images and videos in their favor or to the disadvantage of their opponents. Moreover, online communication channels make it easy for propaganda to spread and reach a wider audience. This has been shown to profoundly influence public opinion. Psychological studies have demonstrated that, even if an image has been proven to be false, the human mind can continue to associate it negatively at an unconscious level, which may in turn affect the political party they support. For example, in 2020, Republican Paul A. Gosar tweeted a deepfake image of Obama shaking the hand of Iranian President,

[1] https://www.washingtonpost.com/local/pizzagate-from-rumor-to-hashtag-to-gunfire-in-dc/2016/12/06/4c7def50-bbd4-11e6-94ac-3d324840106c_story.html

Hasan Rouhani, to undermine his opponent's image. Presumably, the Republican did not know it was a deepfake image.

- **Cybercrime:** Deepfake images and videos can be used to blackmail people in power with the aim of manipulating them. It is also possible to deepfake someone's voice and therefore, take on their identity with the aim of obtaining money.
- **Damage reputation:** Fake news, images and videos can be used to portray someone in a negative light or even accuse them of a crime.

However, when we consider these enormous challenges facing us on the internet, we must not forget of the great advantages that technological development has brought into our society. The internet has itself evolved to optimize the connection between humans, creating faster, more creative and effective communication channels in the form of online newspapers, forums, chats, social networks, blogs and microblogs. It currently enables access to vast amounts of information on virtually any topic, greatly contributing to the spread of valuable knowledge among different countries and organizations. Today, a growing number of citizens are much more informed, not only about their local communities but also about what is happening around the world. They form opinions and world views and become active members of society, often voicing their concerns on social networks on topics such as pollution, global warming, the pandemic, war, politics, ethics and other social issues. None of this would have been possible if humans from across the world had not been able to communicate, share information and collaborate over the internet. Thus, the internet has played a central role in shifting our perspectives and shaping our identity.

Here are some examples of how Deep Learning has transformed communications:

- Computational linguistics, where it provides capabilities for natural language processing, speech recognition and machine translation. The applications of computational linguistics include automated translation, automated grammar and spelling check, automated readers for the blind and computer interfaces that recognize and respond to human speech.
- Computer vision, where it provides capabilities for image processing and analysis, pattern and object recognition and signal processing. The applications of computer vision include facial recognition, advanced image editing, generation of highly realistic images and videos which can be used in filmmaking, creating realistic online interaction between users, even if they speak in different languages.

Currently, there are solutions aimed at detecting false messages, manipulating images or videos, and disinformation campaigns on social networks and other media using various artificial intelligence techniques, such as natural language processing or deep learning. Given that fauxtography is a criminal act and the falsity of the images/videos may have to be evidenced in court, technologies designed for this purpose cannot merely point to what they consider to be faux. Instead, they must provide detailed human-understandable reasoning behind the decision they have made, so that it can be used as evidence in court. To this end, Explainable Artificial Intelligence or XAI is needed. XAI is crucial, as its white-box approach means that human experts can interpret the internal workings of the model and thus, ensure that responsible decisions are made. In other words, XAI makes it possible for humans to rely on technology in scenarios where opaque technologies could not be used.

Deep Convolutional Generative Adversarial Network (DCGAN) is one of the main technologies that enables the generation of highly realistic images. It uses two networks; the Generative Adversarial Network, which creates fake images, and the Convolutional Neural Network as the discriminator which differentiates the fake image from the real ones. The process of generating an image consists in the generator continually modifying it until the discriminator is no longer able to tell if the image is fake or not. This demonstrates the importance of being ahead of such technologies, through the development of robust tools that will serve to identify and prevent fauxtography. Thus, as ironic as it may seem, technology is an enabler of both, the problem and the solution.

However, most of these proposals do not take into account the ethical impact that these methods may have on citizens' rights, especially as to what is false and what is not. It is therefore necessary to explore new methodologies and technological solutions for the effective detection of the spread of false news, disinformation campaigns and information issues and to take ethical measures in advance to mitigate their negative effects on electoral manipulation as well as possible damage to public health or individual honor.

There are a number of studies aimed at analyzing the phenomenon of false news and disinformation campaigns on social networks and other media, both from a sociological and a technological point of view. However, research aimed at creating methodologies or frameworks with the current sociological and technological approach is not common. At the technological level, there are solutions based on PLN techniques for analyzing the semantic content of messages disseminated by users, as well as sentiment analysis for detecting possible hate campaigns or supporting terrorist targets.

There are also approaches based on perceptual hashing algorithms for viewing images and videos and their relationship to the spread of movements related to disinformation campaigns or terrorist movements.

On the other hand, there are proposals to detect false profiles or influencers on social networks using network graph analysis and a degree of centrality that shows the importance and influence of users on each other, as well as advanced feature extraction, including time series features that show consistency of behavior patterns. Graph neural networks are currently one of the most fruitful lines of research in the field of behavioral analysis, false reports or fauxtography on social networks (i.e., images used for dubious or false purposes in relation to the messages in which they are used).

Although approaches based on deep neural networks work very well compared to symbolic techniques, the resulting models are not reasonably interpretable to humans. Failure to understand why a model performs a particular classification or prediction in turn makes it difficult to create models that take into account the ethical and legal aspects that countermeasures may have to mitigate false reports or disinformation campaigns on citizens, especially when legitimate freedom of expression is violated. In this regard, it is necessary to examine artificial intelligence algorithms, natural language processing, and eXplainable Graphical Neural Networks, such as those based on neuro-symbolic approaches that allow models to be interpreted and ethical design rules to be followed.

The main challenges to be addressed in this area are:

- Considering the ethics of extracting data from the internet. The data extractions systems must work according to an ethical framework which complies with the law. This will make it possible to use technologies that detect deepfakes and online fraud as evidence in court. Thus, algorithms must be developed for the ethical reception of data from websites, blogs, e-mails, banners and social networks, as well as ontologies for the characterization of social relations, influence and information flows.

- Research the potential of eXplorable Graphical Convolutional Neural Networks. They are a subset of Deep Learning Neural Networks which can make inferences and predictions from the data shown on graphs. They could provide optimal tools for the recognition of patterns in the propagation of messages across different social media platforms.

- Research in the field of eXplainable Deep Behavioral Sequence Clustering. This technology is capable of automatically clustering sequences of data. Frameworks could be developed to detect spurious profiles.

- Investigate the capabilities of eXplainable Principal Component Analysis and reverse engineering for the detection of synthetic content. eXplainable Principal Component Analysis can increase the interpretability of data while reducing their dimensionality. Moreover, reverse engineering is capable of examining deepfake images and using deductive reasoning to determine whether an image is real or fake.

- Explore the possible applications of Recurrent Neural Networks. This type of artificial neural network is capable of speech recognition and natural language processing, to learn patterns of disinformation and fake news on social networks. Thus, Recurrent Neural Networks predicting disinformation campaigns among the most vulnerable citizens.

References:

- Abilhoa, W., & Oliveira, P. (2020). Density classification based on agents under majority rule: Connectivity influence on performance. Advances in Intelligent Systems and Computing, 1003, 163-170.
- Abrishambaf, O., Faria, P., Gomes, L., Spínola, J., Vale, Z., & Corchado, J. (2017). Implementation of a real-time microgrid simulation platform based on centralized and distributed management. Energies, 10(6).
- Acharya, U., Oh, S., Hagiwara, Y., Tan, J., & Adeli, H. (2018). Deep convolutional neural network for the automated detection and diagnosis of seizure using EEG signals. Computers in Biology and Medicine, 100, 270-278.
- Adadi, A., & Berrada, M. (2018). Peeking Inside the Black-Box: A Survey on Explainable Artificial Intelligence (XAI). IEEE Access, 6, 52138-52160.
- Akbari, Z., & Unland, R. (2019). Towards computer-aided differential diagnosis: A holonic multi-agent based medical diagnosis system. Advances in Intelligent Systems and Computing, 801, 361-365.
- Alam, M., Peltonen, J., Nummenmaa, J., & Järvelin, K. (2019). Tree-structured hierarchical Dirichlet process. Advances in Intelligent Systems and Computing, 801, 291-299.
- Alashhab, S., Gallego, A.J., & Lozano, M. (2019). Hand gesture detection with convolutional neural networks. Advances in Intelligent Systems and Computing, 800, 45-52.
- Alfakih, A., Yang, S., & Hu, T. (2020). Multi-view cooperative deep convolutional network for facial recognition with small samples learning. Advances in Intelligent Systems and Computing, 1003, 207-216.
- Algarvio, H., Lopes, F., & Santana, J. (2019). Simple and linear bids in multi-agent daily electricity markets: A preliminary report. Advances in Intelligent Systems and Computing, 800, 196-203.
- Ali, I., Hussain, T., Khan, K., Iqbal, A., & Perviz, F. (2020). The Impact of IEEE 802.11 Contention Window on The Performance of Transmission Control Protocol in Mobile Ad-Hoc Network. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(3), 29–48. https://doi.org/10.14201/ADCAIJ2020932948
- Al-Lohibi, H., Alkhamisi, T., Assagran, M., Aljohani, A., & Aljahdali, A. O. (2020). Awjedni: A Reverse-Image-Search Application. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal (ISSN: 2255-2863). Salamanca, 9(3). https://doi.org/10.14201/ADCAIJ2020934968
- Alonso, R. S., Sittón-Candanedo, I., Casado-Vara, R., Prieto, J., & Corchado, J. M. (2020). Deep reinforcement learning for the management of software-defined networks and network function virtualization in an edge-IoT architecture. Sustainability, 12(14), 5706.
- Amador-Domínguez, E., Hohenecker, P., Lukasiewicz, T., Manrique, D., & Serrano, E. (2020). An ontology-based deep learning approach for knowledge graph completion with fresh entities. Advances in Intelligent Systems and Computing, 1003, 125-133.
- Amami, R., & Ben Ayed, D. (2019). Robust noisy speech recognition using deep neural support vector machines. Advances in Intelligent Systems and Computing, 800, 300-307.
- Andrade, R., Pinto, T., Praça, I., & Vale, Z. (2019). UCB1 based reinforcement learning model for adaptive energy management in buildings. Advances in Intelligent Systems and Computing, 801, 3-11.
- Andrianov, A., Guerriero, E., & Ziabari, S. (2020). Cognitive modeling of mindfulness therapy: Effect of yoga on overcoming stress. Advances in Intelligent Systems and Computing, 1003, 79-86.
- Arroyave, M., Castillo, L., Isaza, G., & Bedia, M. (2019). Interaction analysis in asperger through virtual media of text communication. Advances in Intelligent Systems and Computing, 801, 400-408.
- Assiri, F. (2020). Methods for Assessing, Predicting, and Improving Data Veracity: A survey. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(4), 5–30. https://doi.org/10.14201/ADCAIJ202094530
- Balakrishnan, G., Zhao, A., Sabuncu, M., Guttag, J., & Dalca, A. (2019). VoxelMorph: A Learning Framework for Deformable Medical Image Registration. IEEE Transactions on Medical Imaging, 38(8), 1788-1800.

- Barredo Arrieta, A., Díaz-Rodríguez, N., Del Ser, J., Bennetot, A., Tabik, S., Barbado, A., Garcia, S., Gil-Lopez, S., Molina, D., Benjamins, R., Chatila, R., & Herrera, F. (2020). Explainable Artificial Intelligence (XAI): Concepts, taxonomies, opportunities and challenges toward responsible AI. Information Fusion, 58, 82-115.
- Basarslan, M. S., & Kayaalp, F. (2020). Sentiment Analysis with Machine Learning Methods on Social Media. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal (ISSN: 2255-2863). Salamanca, 9(3). https://doi.org/10.14201/ADCAIJ202093515
- Batista, F., Rey, A., & Queiruga-Dios, A. (2020). A review of SEIR-D agent-based model. Advances in Intelligent Systems and Computing, 1004, 133-140.
- Becerra-Bonache, L., & Jiménez-López, M. (2019). Natural language complexity and machine learning. Advances in Intelligent Systems and Computing, 801, 240-247.
- Behfar, S., & Behfar, Q. (2019). Relationship of Weak Modularity and Intellectual Property Rights for Software Products. Advances in Intelligent Systems and Computing, 805, 171-178.
- Biggio, B., & Roli, F. (2018). Wild patterns: Ten years after the rise of adversarial machine learning. Pattern Recognition, 84, 317-331.
- Bocewicz, G., Nielsen, P., Banaszak, Z., & Thibbotuwawa, A. (2019). Routing and scheduling of unmanned aerial vehicles subject to cyclic production flow constraints. Advances in Intelligent Systems and Computing, 801, 75-86.
- Botana López, A. (2019). Deep Learning in Biometrics: A Survey. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 8(4), 19–32. https://doi.org/10.14201/ADCAIJ2019841932
- Boutaba, R., Salahuddin, M., Limam, N., Ayoubi, S., Shahriar, N., Estrada-Solano, F., & Caicedo, O. (2018). A comprehensive survey on machine learning for networking: evolution, applications and research opportunities. Journal of Internet Services and Applications, 9(1).
- Buda, M., Maki, A., & Mazurowski, M. (2018). A systematic study of the class imbalance problem in convolutional neural networks. Neural Networks, 106, 249-259.
- Cabezuelo, A. (2020). Exploitation of open data repositories for the creation of value-added services. Advances in Intelligent Systems and Computing, 1003, 134-141.
- Cai, J., Luo, J., Wang, S., & Yang, S. (2018). Feature selection in machine learning: A new perspective. Neurocomputing, 300, 70-79.
- Camara, J. (2019). Automatic screening of glaucomatous optic papilla based on smartphone images and patient's anamnesis data. Advances in Intelligent Systems and Computing, 801, 366-369.
- Candanedo, I. (2019). A self-organized multiagent system for industry 4.0. Advances in Intelligent Systems and Computing, 801, 409-413.
- Canito, A., Fernandes, M., Conceição, L., Praça, I., & Marreiros, G. (2019). A big data platform for industrial enterprise asset value enablers. Advances in Intelligent Systems and Computing, 800, 145-154.
- Carneiro, J., Alves, P., Marreiros, G., & Novais, P. (2020). A conceptual group decision support system for current times: Dispersed group decision-making. Advances in Intelligent Systems and Computing, 1003, 150-159.
- Carneiro, J., Conceição, L., Martinho, D., Marreiros, G., & Novais, P. (2019). A framework for group decision-making: Including cognitive and affective aspects in a MCDA method for alternatives rejection. Advances in Intelligent Systems and Computing, 800, 264-275.
- Carrera, Á., Merino, E., Aznar, P., Fernández, G., & Iglesias, C. (2019). An agent-based simulation model for emergency egress. Advances in Intelligent Systems and Computing, 801, 140-148.
- Casado-Vara, R. (2019). Blockchain-based distributed cooperative control algorithm for WSN monitoring. Advances in Intelligent Systems and Computing, 801, 414-417.
- Casado-Vara, R. (2019). New approach to power system grid security with a blockchain-based model. Advances in Intelligent Systems and Computing, 801, 418-421.
- Casado-Vara, R. (2019). Stochastic approach for prediction of WSN accuracy degradation with blockchain technology. Advances in Intelligent Systems and Computing, 801, 422-425.
- Casado-Vara, R., Chamoso, P., De la Prieta, F., Prieto, J., & Corchado, J. M. (2019). Non-linear adaptive closed-loop control system for improved efficiency in IoT-blockchain management. Information Fusion, 49, 227-239.

- Casado-Vara, R., de la Prieta, F., Prieto, J., & Corchado, J. M. (2018, November). Blockchain framework for IoT data quality via edge computing. In Proceedings of the 1st Workshop on Blockchain-enabled Networked Sensor Systems (pp. 19-24).
- Casado-Vara, R., De la Prieta, F., Prieto, J., & Corchado, J. M. (2019, December). Improving temperature control in smart buildings based in IoT network slicing technique. In 2019 IEEE Global Communications Conference (GLOBECOM) (pp. 1-6). IEEE.
- Casado-Vara, R., González-Briones, A., Prieto, J., & Corchado, J. (2019). Smart Contract for Monitoring and Control of Logistics Activities: Pharmaceutical Utilities Case Study. Advances in Intelligent Systems and Computing, 771, 509-517.
- Casado-Vara, R., Martín del Rey, A., Alonso, R. S., Trabelsi, S., & Corchado, J. M. (2020). A new stability criterion for IoT systems in smart buildings: Temperature case study. Mathematics, 8(9), 1412.
- Casado-Vara, R., Martin-del Rey, A., Affes, S., Prieto, J., & Corchado, J. (2020). IoT network slicing on virtual layers of homogeneous data for improved algorithm operation in smart buildings. Future Generation Computer Systems, 102, 965-977.
- Casado-Vara, R., Martin-del Rey, A., Affes, S., Prieto, J., & Corchado, J. M. (2020). IoT network slicing on virtual layers of homogeneous data for improved algorithm operation in smart buildings. Future Generation Computer Systems, 102, 965-977.
- Casado-Vara, R., Novais, P., Gil, A. B., Prieto, J., & Corchado, J. M. (2019). Distributed continuous-time fault estimation control for multiple devices in IoT networks. IEEE Access, 7, 11972-11984.
- Casado-Vara, R., Novais, P., Gil, A., Prieto, J., & Corchado, J. (2019). Distributed Continuous-Time Fault Estimation Control for Multiple Devices in IoT Networks. IEEE Access, 7, 11972-11984.
- Casado-Vara, R., Prieta, F., Rodriguez, S., Prieto, J., & Corchado, J. (2020). Cooperative algorithm to improve temperature control in recovery unit of healthcare facilities. Advances in Intelligent Systems and Computing, 802, 49-62.
- Casado-Vara, R., Prieto-Castrillo, F., & Corchado, J. (2018). A game theory approach for cooperative control to improve data quality and false data detection in WSN. International Journal of Robust and Nonlinear Control, 28(16), 5087-5102.
- Castellanos-Garzón, J., Mezquita Martín, Y., Jaimes S., J., & López G., S. (2019). A data mining approach applied to wireless sensor neworks in greenhouses. Advances in Intelligent Systems and Computing, 801, 431-436.
- Chakchouk, F., Piechowiak, S., Mandiau, R., Vion, J., Soui, M., & Ghedira, K. (2019). Fault tolerance in DisCSPs: Several failures case. Advances in Intelligent Systems and Computing, 800, 204-212.
- Chamoso, P., González-Briones, A., De La Prieta, F., Venyagamoorthy, G., & Corchado, J. (2020). Smart city as a distributed platform: Toward a system for citizen-oriented management. Computer Communications, 152, 323-332.
- Chamoso, P., González-Briones, A., De La Prieta, F., Venyagamoorthy, G. K., & Corchado, J. M. (2020). Smart city as a distributed platform: Toward a system for citizen-oriented management. Computer communications, 152, 323-332.
- Chavez, J., Gómez, J., & Córdoba, E. (2019). Coordination platform for a swarm of mobile robots. Advances in Intelligent Systems and Computing, 800, 230-237.
- Chimeno, S. (2019). Customer experience management (CEM). Advances in Intelligent Systems and Computing, 801, 465-470.
- Chimeno, S., Fernández, J., Sánchez, S., Ramón, P., Ospina, Ó., Muñoz, M., & Hernández, A. (2020). Domestic violence prevention system. Advances in Intelligent Systems and Computing, 802, 10-14.
- Ching, T., Himmelstein, D., Beaulieu-Jones, B., Kalinin, A., Do, B., Way, G., Ferrero, E., Agapow, P.M., Zietz, M., Hoffman, M., Xie, W., Rosen, G., Lengerich, B., Israeli, J., Lanchantin, J., Woloszynek, S., Carpenter, A., Shrikumar, A., Xu, J., Cofer, E., Lavender, C., Turaga, S., Alexandari, A., Lu, Z., Harris, D., Decaprio, D., Qi, Y., Kundaje, A., Peng, Y., Wiley, L., Segler, M., Boca, S., Swamidass, S., Huang, A., Gitter, A., & Greene, C. (2018). Opportunities and obstacles for deep learning in biology and medicine. Journal of the Royal Society Interface, 15(141).
- Choon, Y., Mohamad, M., Deris, S., Illias, R., Chong, C., Chai, L., Omatu, S., & Corchado, J. (2014). Differential bees flux balance analysis with OptKnock for in silico microbial strains optimization. PLoS ONE, 9(7).
- Cialfi, D., & Colantonio, E. (2019). Do ICTs Matter for Italy?. Advances in Intelligent Systems and Computing, 805, 162-170.

- Çoban, S., Sanchez-Anguix, V., & Aydoğan, R. (2020). Predicting shuttle arrival time in istanbul. Advances in Intelligent Systems and Computing, 1003, 44-51.
- Costa, Â., Novais, P., Corchado, J., & Neves, J. (2012). Increased performance and better patient attendance in an hospital with the use of smart agendas. Logic Journal of the IGPL, 20(4), 689-698.
- Cui, B., & Créput, J.C. (2019). Matlab GUI application for moving object detection and tracking. Advances in Intelligent Systems and Computing, 801, 353-356.
- Czyczyn-Egird, D., & Slowik, A. (2019). Defect prediction in software using predictive models based on historical data. Advances in Intelligent Systems and Computing, 801, 96-103.
- Da, K., Li, T., Zhu, Y., Fan, H., & Fu, Q. (2020). Kullback-leibler averaging for multitarget density fusion. Advances in Intelligent Systems and Computing, 1003, 253-261.
- Davies, M., Srinivasa, N., Lin, T.H., Chinya, G., Cao, Y., Choday, S., Dimou, G., Joshi, P., Imam, N., Jain, S., Liao, Y., Lin, C.K., Lines, A., Liu, R., Mathaikutty, D., McCoy, S., Paul, A., Tse, J., Venkataramanan, G., Weng, Y.H., Wild, A., Yang, Y., & Wang, H. (2018). Loihi: A Neuromorphic Manycore Processor with On-Chip Learning. IEEE Micro, 38(1), 82-99.
- De Luca, F., Fensore, S., & Meschieri, E. (2019). A Statistical Tool as a Decision Support in Enterprise Financial Crisis. Advances in Intelligent Systems and Computing, 805, 75-82.
- De Luca, F., Fensore, S., & Meschieri, E. (2019). Effective Land-Use and Public Regional Planning in the Mining Industry: The Case of Abruzzo. Advances in Intelligent Systems and Computing, 805, 154-161.
- Dell'Aversana, R., & Bucciarelli, E. (2019). Towards a Natural Experiment Leveraging Big Data to Analyse and Predict Users' Behavioural Patterns Within an Online Consumption Setting. Advances in Intelligent Systems and Computing, 805, 103-113.
- Deniziak, R., & Michno, T. (2019). World wide web CBIR searching using query by approximate shapes. Advances in Intelligent Systems and Computing, 801, 87-95.
- Deniziak, R., & Michno, T. (2020). Graph of primitives matching problem in the world wide web CBIR searching using query by approximate shapes. Advances in Intelligent Systems and Computing, 1004, 77-84.
- Dijk, F., & Treur, J. (2019). A computational analysis of psychopathy based on a network-oriented modeling approach. Advances in Intelligent Systems and Computing, 800, 344-356.
- Dong, Z., & Luo, Z. (2019). Optimal Noise Manipulation in Asymmetric Tournament. Advances in Intelligent Systems and Computing, 805, 28-35.
- Duan, Y., Edwards, J., & Dwivedi, Y. (2019). Artificial intelligence for decision making in the era of Big Data – evolution, challenges and research agenda. International Journal of Information Management, 48, 63-71.
- Dunkel, J., Hermoso, R., & Rückauf, F. (2019). Exploiting user movements to derive recommendations in large facilities. Advances in Intelligent Systems and Computing, 801, 123-131.
- Ebrahimi, M., & Hajizade, A. (2019). An agent-based model for energy management of smart home: Residences' satisfaction approach. Advances in Intelligent Systems and Computing, 801, 378-384.
- Ebrahimi, M., Ebrahimi, M., & Abdi, B. (2020). An agent-based approach for market-based customer reliability enhancement in distribution systems. Advances in Intelligent Systems and Computing, 1004, 171-176.
- Elsken, T., Metzen, J., & Hutter, F. (2019). Neural architecture search: A survey. Journal of Machine Learning Research, 20.
- Espanha, R., Thiele, F., Shakirin, G., Roggenfelder, J., Zeiter, S., Stavrinou, P., Alves, V., & Perkuhn, M. (2019). Combining image and non-image clinical data: An infrastructure that allows machine learning studies in a hospital environment. Advances in Intelligent Systems and Computing, 800, 324-331.
- Espensen, A., Aver, O., Poulsen, P., Sung, I., & Nielsen, P. (2020). Seabed coverage path re-routing for an autonomous surface vehicle. Advances in Intelligent Systems and Computing, 1004, 85-92.
- Faia, R., Pinto, T., Abrishambaf, O., Fernandes, F., Vale, Z., & Corchado, J. (2017). Case based reasoning with expert system and swarm intelligence to determine energy reduction in buildings energy management. Energy and Buildings, 155, 269-281.
- Fatima, N. (2020). Enhancing Performance of a Deep Neural Network by Comparing Optimizers Experimentally. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal (ISSN: 2255-2863). Salamanca, 9(2). https://doi.org/10.14201/ADCAIJ2020927990

- Feng, G.H., & Mo, X.Q. (2019). Research on the Evaluation of Scientists Based on Weighted h-index. Advances in Intelligent Systems and Computing, 805, 125-133.
- Ferentinos, K. (2018). Deep learning models for plant disease detection and diagnosis. Computers and Electronics in Agriculture, 145, 311-318.
- Ferreira, M., Ramos, J., & Novais, P. (2019). Occurrences management in a smart-city context. Advances in Intelligent Systems and Computing, 801, 113-120.
- Fischer, T., & Krauss, C. (2018). Deep learning with long short-term memory networks for financial market predictions. European Journal of Operational Research, 270(2), 654-669.
- Fujino, S., Mori, N., & Matsumoto, K. (2019). Recognizing the order of four-scene comics by evolutionary deep learning. Advances in Intelligent Systems and Computing, 800, 136-144.
- Fukuda, K., Mori, N., & Matsumoto, K. (2019). A novel sentence vector generation method based on autoencoder and Bi-directional LSTM. Advances in Intelligent Systems and Computing, 800, 128-135.
- García, J., & Serrano, E. (2019). Automatic music generation by deep learning. Advances in Intelligent Systems and Computing, 800, 284-291.
- García, M., Domínguez, C., Heras, J., Mata, E., & Pascual, V. (2019). An on-going framework for easily experimenting with deep learning models for bioimaging analysis. Advances in Intelligent Systems and Computing, 801, 330-333.
- García, Ó., Alonso, R., Prieto, J., & Corchado, J. (2017). Energy efficiency in public buildings through context-aware social computing. Sensors (Switzerland), 17(4).
- García-Díaz, J., Noguera-Arnaldos, J., Hernández-Alcaraz, M., Robles-Marín, I., García-Sánchez, F., & Valencia-García, R. (2019). AllergyLESS. An intelligent recommender system to reduce exposition time to allergens in smart-cities. Advances in Intelligent Systems and Computing, 800, 61-68.
- García-Hernández, L., Salas-Morera, L., Pierreval, H., & Arauzo-Azofra, A. (2019). A novel hybrid multi-criteria decision-making model to solve UA-FLP. Advances in Intelligent Systems and Computing, 800, 292-299.
- García-Sánchez, F., García-Díaz, J., Gómez-Berbís, J., & Valencia-García, R. (2019). Ontology-based advertisement recommendation in social networks. Advances in Intelligent Systems and Computing, 800, 36-44.
- Gazafroudi, A. S., Corchado, J. M., Keane, A., & Soroudi, A. (2019). Decentralised flexibility management for EVs. IET Renewable Power Generation, 13(6), 952-960.
- Gazafroudi, A., Corchado, J., Keane, A., & Soroudi, A. (2019). Decentralised flexibility management for EVs. IET Renewable Power Generation, 13(6), 952-960.
- Gerwen, S., Meurs, A., & Treur, J. (2019). An adaptive temporal-causal network for representing changing opinions on music releases. Advances in Intelligent Systems and Computing, 800, 357-367.
- Giebas, D., & Wojszczyk, R. (2020). Multithreaded application model. Advances in Intelligent Systems and Computing, 1004, 93-103.
- Giménez, M., Jordán, J., Palanca, J., & Rincon, J. (2020). Rassel: Robot assistant for the elderly. Advances in Intelligent Systems and Computing, 802, 5-9.
- González, C., Andrade, J., Baggetro, A., & Domenech, A. (2020). LOWG – intelligent monitorization system with custom alerts to avoid the home basics services related risk. Advances in Intelligent Systems and Computing, 802, 15-19.
- González, M., López-Espín, J., Aparicio, J., & Giménez, D. (2019). A parallel application of matheuristics in data envelopment analysis. Advances in Intelligent Systems and Computing, 800, 172-179.
- González-Briones, A., Casado-Vara, R., Márquez, S., Prieto, J., & Corchado, J. (2020). Intelligent livestock feeding system by means of silos with IoT technology. Advances in Intelligent Systems and Computing, 802, 38-48.
- González-Briones, A., Castellanos-Garzón, J., Mezquita Martín, Y., Prieto, J., & Corchado, J. (2018). A framework for knowledge discovery from wireless sensor networks in rural environments: A crop irrigation systems case study. Wireless Communications and Mobile Computing, 2018.
- González-Briones, A., Chamoso, P., De La Prieta, F., Demazeau, Y., & Corchado, J. (2018). Agreement technologies for energy optimization at home. Sensors (Switzerland), 18(5).

- González-Briones, A., Chamoso, P., Yoe, H., & Corchado, J. (2018). GreenVMAS: Virtual organization based platform for heating greenhouses using waste energy from power plants. Sensors (Switzerland), 18(3).
- González-Briones, A., Valdeolmillos, D., Casado-Vara, R., Chamoso, P., García Coria, J., Herrera-Viedma, E., & Corchado, J. (2019). GarbMAS: Simulation of the application of gamification techniques to increase the amount of recycled waste through a multi-agent system. Advances in Intelligent Systems and Computing, 800, 332-343.
- Guo, L., Lei, Y., Xing, S., Yan, T., & Li, N. (2019). Deep Convolutional Transfer Learning Network: A New Method for Intelligent Fault Diagnosis of Machines with Unlabeled Data. IEEE Transactions on Industrial Electronics, 66(9), 7316-7325.
- Haan, R., Blankert, M., & Mohammadi Ziabari, S. (2020). Integrative biological, cognitive and affective modeling of caffeine use on stress. Advances in Intelligent Systems and Computing, 1003, 71-78.
- Hadizade, A. (2019). An agent-based model for optimal voltage control and power quality by electrical vehicles in smart grids. Advances in Intelligent Systems and Computing, 801, 388-394.
- Hamidi, M., Sheikhalishahi, M., & Martinelli, F. (2019). Privacy preserving Expectation Maximization (EM) clustering construction. Advances in Intelligent Systems and Computing, 800, 255-263.
- Hammal, M.A., Abreu, B., Plantevit, M., & Robardet, C. (2020). Sampling rank correlated subgroups. Advances in Intelligent Systems and Computing, 1003, 217-225.
- Hashemi, B., & Teimourzadeh Baboli, P. (2020). Technical evaluation of plug-in electric vehicles charging load on a real distribution grid. Advances in Intelligent Systems and Computing, 1004, 163-170.
- Hernández, E., González, A., Pérez, B., Luis Reboredo, A., & Rodríguez, S. (2019). Virtual organization for Fintech management. Advances in Intelligent Systems and Computing, 801, 201-210.
- Hernández-Perlines, F., & Xu, W. (2019). A Mediation Model of Absorptive and Innovative Capacities: The Case of Spanish Family Businesses. Advances in Intelligent Systems and Computing, 805, 83-90.
- Herrera, F., Matsui, K., & Rodríguez-González, S. (2020). Preface. Advances in Intelligent Systems and Computing, 1003, v-vi.
- Herrera-Viedma, E., Vale, Z., Nielsen, P., Rey, A., & Vara, R. (2020). Preface. Advances in Intelligent Systems and Computing, 1004, v-vi.
- Huang, M.H., & Rust, R. (2018). Artificial Intelligence in Service. Journal of Service Research, 21(2), 155-172.
- Hussain, A., Hussain, T., Ali, I., & Khan, M. R. (2020). Impact of Sparse and Dense Deployment of Nodes Under Different Propagation Models in Manets. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(1), 61–84. https://doi.org/10.14201/ADCAIJ2020916184
- Hussain, N., Mirza, H. T., & Hussain, I. (2019). Detecting Spam Review through Spammer's Behavior Analysis. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 8(2), 61–71. https://doi.org/10.14201/ADCAIJ2019826171
- Inés, A., Domínguez, C., Heras, J., Mata, E., & Pascual, V. (2019). Towards integrating imageJ with deep biomedical models. Advances in Intelligent Systems and Computing, 801, 334-338.
- Iwasaki, R., Hasegawa, T., Mori, N., & Matsumoto, K. (2019). Relaxation method of convolutional neural networks for natural language processing. Advances in Intelligent Systems and Computing, 800, 188-195.
- Jeter, S., Rock, C., Benyo, B., Adler, A., Yaman, F., Beckerle, M., Mulvehill, A., & Hoh, R. (2020). Semantic links across distributed heterogeneous data. Advances in Intelligent Systems and Computing, 1003, 107-115.
- Jiménez-Bravo, D., De Paz, J., & Villarrubia, G. (2019). Twitter's experts recommendation system based on user content. Advances in Intelligent Systems and Computing, 801, 251-258.
- Johnson, J., & Khoshgoftaar, T. (2019). Survey on deep learning with class imbalance. Journal of Big Data, 6(1).
- Jove, E., Casteleiro-Roca, J.L., Quintián, H., Méndez-Pérez, J.A., & Calvo-Rolle, J. (2020). A global classifier implementation for detecting anomalies by using one-class techniques over a laboratory plant. Advances in Intelligent Systems and Computing, 1004, 149-160.
- Jozi, A., Pinto, T., Praça, I., Silva, F., Teixeira, B., & Vale, Z. (2019). Genetic fuzzy rule-based system using MOGUL learning methodology for energy consumption forecasting. ADCAIJ: Advances in

Distributed Computing and Artificial Intelligence Journal, 8(1), 55–64. https://doi.org/10.14201/ADCAIJ2019815564

- Khalid, Q., Lujak, M., Fernández, A., & Doniec, A. (2019). On the use of elevators during emergency evacuation. Advances in Intelligent Systems and Computing, 801, 149-156.
- Khorram, M., Faria, P., & Vale, Z. (2020). Lighting consumption optimization in a SCADA model of office building considering user comfort level. Advances in Intelligent Systems and Computing, 1004, 20-28.
- Khorram, M., Faria, P., Abrishambaf, O., & Vale, Z. (2019). Demand response implementation in an optimization based SCADA model under real-time pricing schemes. Advances in Intelligent Systems and Computing, 801, 21-29.
- Kłos, S., & Patalas-Maliszewska, J. (2019). The use of the simulation method in analysing the performance of a predictive maintenance system. Advances in Intelligent Systems and Computing, 801, 42-49.
- Kłos, S., & Patalas-Maliszewska, J. (2020). Using the simulation method for modelling a manufacturing system of predictive maintenance. Advances in Intelligent Systems and Computing, 1004, 57-64.
- Kluz, R., Antosz, K., Trzepieciński, T., & Gola, A. (2020). Predicting the error of a Robot's positioning repeatability with artificial neural networks. Advances in Intelligent Systems and Computing, 1004, 41-48.
- Kocian, A., & Chessa, S. (2019). Auto Regressive Integrated Moving Average Modeling and Support Vector Machine Classification of Financial Time Series. Advances in Intelligent Systems and Computing, 805, 1-8.
- Kocian, A., & Chessa, S. (2019). Static dataflow analysis for soft real-time system design. Advances in Intelligent Systems and Computing, 801, 175-182.
- Kondoh, M., Matsumoto, K., & Mori, N. (2019). Development of agent predicting werewolf with deep learning. Advances in Intelligent Systems and Computing, 800, 18-26.
- Kong, B., Lim, K., & Kwon, J. (2019). Fire detection using DCNN for assisting visually impaired people in IoT service environment. Advances in Intelligent Systems and Computing, 800, 10-17.
- Lao, Y., Dong, Z., & Yang, X. (2019). Scholarship, Admission and Application of a Postgraduate Program. Advances in Intelligent Systems and Computing, 805, 57-66.
- Lawhern, V., Solon, A., Waytowich, N., Gordon, S., Hung, C., & Lance, B. (2018). EEGNet: A compact convolutional neural network for EEG-based brain-computer interfaces. Journal of Neural Engineering, 15(5).
- Lawless, W. (2019). The Mathematics of Interdependence for Superordinate Decision-Making with Teams. Advances in Intelligent Systems and Computing, 805, 91-102.
- Leyva-Pupo, I., Cervelló-Pastor, C., & Llorens-Carrodeguas, A. (2019). The resources placement problem in a 5G hierarchical SDN control plane. Advances in Intelligent Systems and Computing, 801, 370-373.
- Li, S., Song, W., Fang, L., Chen, Y., Ghamisi, P., & Benediktsson, J. (2019). Deep learning for hyperspectral image classification: An overview. IEEE Transactions on Geoscience and Remote Sensing, 57(9), 6690-6709.
- Li, T., Chen, H., Sun, S., & Corchado, J. (2019). Joint Smoothing and Tracking Based on Continuous-Time Target Trajectory Function Fitting. IEEE Transactions on Automation Science and Engineering, 16(3), 1476-1483.
- Li, T., Corchado, J., & Sun, S. (2019). Partial consensus and conservative fusion of gaussian mixtures for distributed PHD fusion. IEEE Transactions on Aerospace and Electronic Systems, 55(5), 2150-2163.
- Li, T., Fan, H., García, J., & Corchado, J. (2019). Second-order statistics analysis and comparison between arithmetic and geometric average fusion: Application to multi-sensor target tracking. Information Fusion, 51, 233-243.
- Li, T., Sahu, A., Talwalkar, A., & Smith, V. (2020). Federated Learning: Challenges, Methods, and Future Directions. IEEE Signal Processing Magazine, 37(3), 50-60.
- Li, T.C., Su, J.Y., Liu, W., & Corchado, J. (2017). Approximate Gaussian conjugacy: parametric recursive filtering under nonlinearity, multimodality, uncertainty, and constraint, and beyond. Frontiers of Information Technology and Electronic Engineering, 18(12), 1913-1939.

- Li, X., Chen, H., Qi, X., Dou, Q., Fu, C.W., & Heng, P.A. (2018). H-DenseUNet: Hybrid Densely Connected UNet for Liver and Tumor Segmentation from CT Volumes. IEEE Transactions on Medical Imaging, 37(12), 2663-2674.
- Lin, H.W., Huang, J.B., Lin, K.B., & Chen, S.H. (2019). Do Information Quantity and Transmission Make a Difference to the Stable Contrarian?. Advances in Intelligent Systems and Computing, 805, 9-17.
- Lin, T.Y., Goyal, P., Girshick, R., He, K., & Dollar, P. (2020). Focal Loss for Dense Object Detection. IEEE Transactions on Pattern Analysis and Machine Intelligence, 42(2), 318-327.
- Lipton, Z. (2018). The mythos of model interpretability: In machine learning, the concept of interpretability is both important and slippery.. Queue, 16(3).
- Liu, R., Fan, H., & Xiao, H. (2020). A forward-backward labeled multi-bernoulli smoother. Advances in Intelligent Systems and Computing, 1003, 244-252.
- Llamas-Pombo, E. (2019). Visualizing history: A virtual timeline for teaching and learning historical sciences. Advances in Intelligent Systems and Computing, 801, 315-321.
- Llorens-Carrodeguas, A., Cervelló-Pastor, C., & Leyva-Pupo, I. (2019). Software defined networks and data distribution service as key features for the 5G control plane. Advances in Intelligent Systems and Computing, 801, 357-360.
- Lopez-Castaño, C., Ferrin-Bolaños, C., & Castillo-Ossa, L. (2019). Computer vision and the internet of things ecosystem in the connected home. Advances in Intelligent Systems and Computing, 800, 213-220.
- Loukanova, R. (2019). Formalisation of Situated Dependent-Type Theory with Underspecified Assessments. Advances in Intelligent Systems and Computing, 805, 49-56.
- Loukanova, R. (2019). Syntax-semantics interfaces of modifiers. Advances in Intelligent Systems and Computing, 801, 231-239.
- Ludeiro, A. (2019). Blockchain technology for luggage tracking. Advances in Intelligent Systems and Computing, 801, 451-456.
- Marcondes, F., Almeida, J., & Novais, P. (2020). A short survey on chatbot technology: Failure in raising the state of the art. Advances in Intelligent Systems and Computing, 1003, 28-36.
- Márquez Sánchez, S. (2020). Integral Support Predictive Platform for Industry 4.0. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(4), 71–82. https://doi.org/10.14201/ADCAIJ2020947182
- Martín-Gómez, L., Pérez-Marcos, J., Navarro-Cáceres, M., & Rodríguez-González, S. (2019). Convolutional neural networks and transfer learning applied to automatic composition of descriptive music. Advances in Intelligent Systems and Computing, 801, 275-282.
- Martins, R., Almeida, J., Henriques, P., & Novais, P. (2019). Domain identification through sentiment analysis. Advances in Intelligent Systems and Computing, 800, 276-283.
- Mattos, T., & Oliveira, P. (2019). Guided evolutionary search for boolean networks in the density classification problem. Advances in Intelligent Systems and Computing, 800, 69-77.
- Mezquita, Y. (2020). Internet of things platforms based on blockchain technology: A literature review. Advances in Intelligent Systems and Computing, 1004, 205-208.
- Miranda, G., Pasti, R., & Castro, L. (2020). Detecting topics in documents by clustering word vectors. Advances in Intelligent Systems and Computing, 1003, 235-243.
- Mishra, V. priy. (2020). Texture Analysis using wavelet Transform. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 10(1), 5–13. https://doi.org/10.14201/ADCAIJ2021101513
- Mishra, V. priy. (2020). Texture Analysis using wavelet Transform. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 10(1), 5–13. https://doi.org/10.14201/ADCAIJ2021101513
- Mohammadi, M. (2020). Developing a framework for distributed and multi-agent management of future sustainable energy systems. Advances in Intelligent Systems and Computing, 1004, 192-196.
- Moreno, E., Vázquez–Polo, F., Negrín, M., & Martel–Escobar, M. (2019). Subgroup Optimal Decisions in Cost–Effectiveness Analysis. Advances in Intelligent Systems and Computing, 805, 67-74.
- Moreno, P.B. (2019). Administration 4.0: The challenge of institutional competitiveness as a requisite for development. Advances in Intelligent Systems and Computing, 801, 437-443.

- Morioka, Y., Inoue, K., Yoshioka, M., Teranishi, M., & Murayama, T. (2019). Blur restoration of confocal microscopy with depth and horizontal dependent PSF. Advances in Intelligent Systems and Computing, 801, 167-174.
- Mozaffari, M., Saad, W., Bennis, M., Nam, Y.H., & Debbah, M. (2019). A Tutorial on UAVs for Wireless Networks: Applications, Challenges, and Open Problems. IEEE Communications Surveys and Tutorials, 21(3), 2334-2360.
- Nascimento, J., Pinto, T., & Vale, Z. (2019). Electricity price forecast for futures contracts with artificial neural network and spearman data correlation. Advances in Intelligent Systems and Computing, 801, 12-20.
- Nassaj, A. (2019). A novel agent-based platform for wide-area monitoring and control in power systems. Advances in Intelligent Systems and Computing, 801, 385-387.
- Nassaj, A. (2020). Adjusting the framework of multi-agent systems (MAS) and internet of things (IoT) for smart power grids. Advances in Intelligent Systems and Computing, 1004, 188-191.
- Newman, A., Steen, C., Liu, C., Gentles, A., Chaudhuri, A., Scherer, F., Khodadoust, M., Esfahani, M., Luca, B., Steiner, D., Diehn, M., & Alizadeh, A. (2019). Determining cell type abundance and expression from bulk tissues with digital cytometry. Nature Biotechnology, 37(7), 773-782.
- Nieves, E. (2019). Stock recommendation platform based on the environment. INSIDER. Advances in Intelligent Systems and Computing, 801, 395-399.
- Nogueira-Rodríguez, A., López-Fernández, H., & Glez-Peña, D. (2020). Deep learning techniques for real time computer-aided diagnosis in colorectal cancer. Advances in Intelligent Systems and Computing, 1004, 209-212.
- Noi, P., & Kappas, M. (2018). Comparison of random forest, k-nearest neighbor, and support vector machine classifiers for land cover classification using sentinel-2 imagery. Sensors (Switzerland), 18(1).
- Oliveira, P., Pedrosa, T., Novais, P., & Matos, P. (2019). Towards to secure an IoT adaptive environment system. Advances in Intelligent Systems and Computing, 801, 349-352.
- Omatu, S. (2019). Classification of human body smell by learning vector quantization. Advances in Intelligent Systems and Computing, 800, 86-93.
- Omatu, S., Mohamad, M., Novais, P., Díaz-Plaza, E., & Coria, J. (2020). Preface. Advances in Intelligent Systems and Computing, 802, v-vi.
- Ortega, A., Frossard, P., Kovacevic, J., Moura, J., & Vandergheynst, P. (2018). Graph Signal Processing: Overview, Challenges, and Applications. Proceedings of the IEEE, 106(5), 808-828.
- Pagliari, C., & Mattoscio, N. (2019). The Logistic Map: An AI Tool for Economists Investigating Complexity and Suggesting Policy Decisions. Advances in Intelligent Systems and Computing, 805, 18-27.
- Pasti, R., Vilasbôas, F., Roque, I., & Castro, L. (2020). A sensitivity and performance analysis of word2vec applied to emotion state classification using a deep neural architecture. Advances in Intelligent Systems and Computing, 1003, 199-206.
- Patalas-Maliszewska, J., & Kłos, S. (2019). Modelling of knowledge resources for preventive maintenance. Advances in Intelligent Systems and Computing, 801, 50-57.
- Patil, M. S., Chickerur, S., Meti, A., Nabapure, P. M., Mahindrakar, S., Naik, S., & Kanyal, S. (2019). LSTM Based Lip Reading Approach for Devanagiri Script. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 8(3), 13–26. https://doi.org/10.14201/ADCAIJ2019831326
- Pawlewski, P. (2019). Practical application of a multimodal approach in simulation modeling of production and assembly systems. Advances in Intelligent Systems and Computing, 801, 58-66.
- Pekel Özmen, E., & Pekel, E. (2019). Estimation of Number of Flight Using Particle Swarm Optimization and Artificial Neural Network. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 8(3), 27–33. https://doi.org/10.14201/ADCAIJ2019832733
- Pérez-Marcos, J., Sánchez-Moreno, D., Batista, V., & Muñoz, M. (2019). Estimated rating based on hours played for video game recommendation. Advances in Intelligent Systems and Computing, 801, 300-307.
- Pérez-Pons, . M. E., Parra-Domínguez, J., Chamoso, P., Plaza, M. ., & Alonso , R. (2020). Efficiency, profitability and productivity: Technological applications in the agricultural sector. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(4). https://doi.org/10.14201/ADCAIJ2020944754

- Perscheid, C., & Uflacker, M. (2019). Integrating biological context into the analysis of gene expression data. Advances in Intelligent Systems and Computing, 801, 339-343.
- Persico, T., Sedda, G., & Liberatore, A. (2019). Exit, Voice and Loyalty in Consumers' Online-Posting Behavior: An Empirical Analysis of Reviews and Ratings Found on Amazon.com. Advances in Intelligent Systems and Computing, 805, 143-153.
- Pimpalkar, A. P., & Retna Raj, R. J. (2020). Influence of Pre-Processing Strategies on the Performance of ML Classifiers Exploiting TF-IDF and BOW Features. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(2), 49–68. https://doi.org/10.14201/ADCAIJ2020924968
- Pinto, F. (2019). Structured methods of representation of the knowledge. Advances in Intelligent Systems and Computing, 801, 213-221.
- Pinto, F. (2020). Application of the bayesian model in expert systems. Advances in Intelligent Systems and Computing, 1004, 117-124.
- Pinto, F. (2020). Formal representations of the knowledge. Advances in Intelligent Systems and Computing, 1004, 125-132.
- Porreca, F. (2019). Decision Analysis Based on Artificial Neural Network for Feeding an Industrial Refrigeration System Through the Use of Photovoltaic Energy. Advances in Intelligent Systems and Computing, 805, 134-142.
- Poza-Lujan, J.L., Posadas-Yagüe, J.L., & Kröner, S. (2019). Distributed System Integration Driven by Tests. Advances in Intelligent Systems and Computing, 800, 221-229.
- Poza-Lujan, J.L., Posadas-Yagüe, J.L., Munera, E., Simó, J., & Blanes, F. (2020). Object recognition: Distributed architecture based on heterogeneous devices to integrate sensor information. Advances in Intelligent Systems and Computing, 1003, 181-188.
- Prieta, F., Gil, A., Moreno, M., & Muñoz, M. (2019). Review of technologies and platforms for smart cities. Advances in Intelligent Systems and Computing, 801, 193-200.
- Prieta, F., Omatu, S., & Fernández-Caballero, A. (2019). Preface. Advances in Intelligent Systems and Computing, 800, v-vi.
- Queiroz, J., Leitão, P., Pontes, J., Chaves, A., Parra, J., & Perez-Pons, M. E. (2020). A Quality Innovation Strategy for an Inter-regional Digital Innovation Hub. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(4), 31–45. https://doi.org/10.14201/ADCAIJ2020943145
- Quintero-Bonilla, S., & Rey, A. (2020). Proposed models for advanced persistent threat detection: A review. Advances in Intelligent Systems and Computing, 1004, 141-148.
- Raissi, M., Perdikaris, P., & Karniadakis, G. (2019). Physics-informed neural networks: A deep learning framework for solving forward and inverse problems involving nonlinear partial differential equations. Journal of Computational Physics, 378, 686-707.
- Ramos, A., Calado, M., & Antunes, L. (2020). A gift-exchange model for the maintenance of group cohesion in a telecommunications scenario. Advances in Intelligent Systems and Computing, 1003, 189-196.
- Ramos, B., & Ramos, J. (2020). A healthcare decision support system to overcome therapeutic centres challenges. Advances in Intelligent Systems and Computing, 1003, 87-95.
- Ramos-González, J., & Martín-Gómez, L. (2019). A text mining-based approach for analyzing information retrieval in Spanish: Music data collection as a case study. Advances in Intelligent Systems and Computing, 801, 259-266.
- Rangel, J., & Pinzón, C. (2019). Multiagent system for semantic categorization of places mean the use of distributed surveillance cameras. Advances in Intelligent Systems and Computing, 801, 457-464.
- Rausch, I., Khaluf, Y., & Simoens, P. (2019). Applying scale-invariant dynamics to improve consensus achievement of agents in motion. Advances in Intelligent Systems and Computing, 801, 344-348.
- Rebollo, M., Palomares, A., & Carrascosa, C. (2019). Distributed group analytical hierarchical process by consensus. Advances in Intelligent Systems and Computing, 800, 238-246.
- Reñones, A., & Galende, M. (2020). F.A.I.R. open dataset of brushed DC motor faults for testing of AI algorithms. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(4), 83–94. https://doi.org/10.14201/ADCAIJ2020948394
- Rey, A., Queiruga Dios, A., Hernández, G., & Bustos Tabernero, A. (2020). Modeling the spread of malware on complex networks. Advances in Intelligent Systems and Computing, 1004, 109-116.

- Roberto Casado-Vara, David García-Retuerta, Álvaro Bartolomé, Esteban Jove, José Luís Calvo-Rolle, Ángel Martín del Rey, Juan M. Corchado: Demand Control Ventilation Strategy by Tracing the Radon Concentration in Smart Buildings. SOCO 2020: 374-382
- Roberto Casado-Vara, Fernando de la Prieta, Javier Prieto, Juan M. Corchado: Improving Temperature Control in Smart Buildings Based in IoT Network Slicing Technique. GLOBECOM 2019: 1-6
- Rodrigues, N., Cruciol, L., & Weigang, L. (2019). A Genetic algorithm model for slot allocation optimization to Brazilian CTOP approach. Advances in Intelligent Systems and Computing, 800, 53-60.
- Rodríguez, S., Prieto, J., Faria, P., Kłos, S., Fernández, A., Mazuelas, S., Jiménez-López, M., Moreno, M., & Navarro, E. (2019). Preface. Advances in Intelligent Systems and Computing, 801, v-vi.
- Ruiz, J., Pérez, J., & Blázquez, J. (2019). Arrhythmia detection using convolutional neural models. Advances in Intelligent Systems and Computing, 800, 120-127.
- Rymarczyk, T., Kłosowski, G., & Gola, A. (2019). The use of artificial neural networks in tomographic reconstruction of soil embankments. Advances in Intelligent Systems and Computing, 801, 104-112.
- Sáenz-Peñafiel, J.J., Poza-Lujan, J.L., & Posadas-Yagüe, J.L. (2020). Smart cities: A taxonomy for the efficient management of lighting in unpredicted environments. Advances in Intelligent Systems and Computing, 1003, 63-70.
- Sagredo-Olivenza, I., Cárdenas-Bonett, M., & Gómez-Sanz, J. (2019). Using queueing networks to approximate Pedestrian simulations. Advances in Intelligent Systems and Computing, 801, 132-139.
- Saini, D., Zia, K., & Abusham, E. (2019). Prediction market index by combining financial time-series forecasting and sentiment analysis using soft computing. Advances in Intelligent Systems and Computing, 800, 180-187.
- Salazar, O., Ovalle, D., & Prieta, F. (2019). Towards an adaptive and personalized assessment model based on ontologies, context and collaborative filtering. Advances in Intelligent Systems and Computing, 801, 311-314.
- Sánchez, G., & Lobina, V. (2019). Programmed physical activity for the elderly as a motor of active ageing. Advances in Intelligent Systems and Computing, 801, 444-450.
- Sánchez, S. (2020). Electronic textiles for intelligent prevention of occupational hazards. Advances in Intelligent Systems and Computing, 1004, 217-220.
- Sánchez, S. M. (2020). Integral support predictive platform for industry 4.0. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(4), 71-82.
- Sanchez-Anguix, V., Chalumuri, R., & Julian, V. (2019). A multi-objective evolutionary proposal for matching students to supervisors. Advances in Intelligent Systems and Computing, 800, 94-102.
- Sánchez-Gómez, M., Castillo Alzuguren, A., & Martín-Cilleros, M. (2019). Analysis of quality of live in the deaf community from a blog. Advances in Intelligent Systems and Computing, 801, 322-329.
- Sánchez-Moreno, D., Pérez-Marcos, J., Gil González, A., Batista, V., & Moreno-García, M. (2019). Social influence-based similarity measures for user-user collaborative filtering applied to music recommendation. Advances in Intelligent Systems and Computing, 801, 267-274.
- Sánchez-Picot, Á., Sánchez-de-Rivera, D., Robles, T., & Jiménez, J. (2019). Time analysis of the integration of simulators for an AmI environment. Advances in Intelligent Systems and Computing, 801, 157-164.
- Sanchis, A. (2020). Design thinking for social challenges. Advances in Intelligent Systems and Computing, 802, 20-26.
- Sawhney, R., Shankar, R., & Jain, R. (2019). A comparative study of transfer functions in binary evolutionary algorithms for single objective optimization. Advances in Intelligent Systems and Computing, 800, 27-35.
- Schlemper, J., Caballero, J., Hajnal, J., Price, A., & Rueckert, D. (2018). A Deep Cascade of Convolutional Neural Networks for Dynamic MR Image Reconstruction. IEEE Transactions on Medical Imaging, 37(2), 491-503.
- Serrano, E., & Pozo-Jiménez, P. (2019). Social services diagnosis by deep learning. Advances in Intelligent Systems and Computing, 800, 316-323.
- Shen, P.H., Chen, S.H., & Yu, T. (2019). Google Trends and Cognitive Finance: Lessons Gained from the Taiwan Stock Market. Advances in Intelligent Systems and Computing, 805, 114-124.
- Shi, H., Xu, M., & Li, R. (2018). Deep Learning for Household Load Forecasting-A Novel Pooling Deep RNN. IEEE Transactions on Smart Grid, 9(5), 5271-5280.

- Shickel, B., Tighe, P., Bihorac, A., & Rashidi, P. (2018). Deep EHR: A Survey of Recent Advances in Deep Learning Techniques for Electronic Health Record (EHR) Analysis. IEEE Journal of Biomedical and Health Informatics, 22(5), 1589-1604.
- Shoeibi, N., & Shoeibi, N. (2020). Future of smart parking: Automated valet parking using deep Q-learning. Advances in Intelligent Systems and Computing, 1004, 177-182.
- Shoeibi, N., Karimi, F., & Corchado, J. (2020). Artificial intelligence as a way of overcoming visual disorders: Damages related to visual cortex, optic nerves and eyes. Advances in Intelligent Systems and Computing, 1004, 183-187.
- Shokri Gazafroudi, A., Soares, J., Fotouhi Ghazvini, M., Pinto, T., Vale, Z., & Corchado, J. (2019). Stochastic interval-based optimal offering model for residential energy management systems by household owners. International Journal of Electrical Power and Energy Systems, 105, 201-219.
- Silva, C., Faria, P., & Vale, Z. (2020). Study of multi-tariff influence on the distributed generation remuneration. Advances in Intelligent Systems and Computing, 1004, 14-19.
- Silva, I., Lima, A., Pasti, R., & Castro, L. (2019). Classifying emotions in Twitter messages using a deep neural network. Advances in Intelligent Systems and Computing, 801, 283-290.
- Silva, J., Praça, I., Pinto, T., & Vale, Z. (2020). Energy consumption forecasting using ensemble learning algorithms. Advances in Intelligent Systems and Computing, 1004, 5-13.
- Silva, J., Villa, J., & Cabrera, D. (2020). An intelligent approach to design and development of personalized meta search: Recommendation of scientific articles. Advances in Intelligent Systems and Computing, 1003, 99-106.
- Silva, J., Villa, J., & Cabrera, D. (2020). Sale forecast for basic commodities based on artificial neural networks prediction. Advances in Intelligent Systems and Computing, 1003, 37-43.
- Sirignano, J., & Spiliopoulos, K. (2018). DGM: A deep learning algorithm for solving partial differential equations. Journal of Computational Physics, 375, 1339-1364.
- Sitek, P., Wikarek, J., & Rutczyńska-Wdowiak, K. (2020). Capacitated vehicle routing problem with pick-up, alternative delivery and time windows (CVRPPADTW): A hybrid approach. Advances in Intelligent Systems and Computing, 1004, 33-40.
- Sitek, P., Wikarek, J., & Stefański, T. (2019). Food supply chain optimization – A hybrid approach. Advances in Intelligent Systems and Computing, 801, 33-41.
- Sittón-Candanedo, I. (2020). A new approach: Edge computing and blockchain for industry 4.0. Advances in Intelligent Systems and Computing, 1004, 201-204.
- Sittón-Candanedo, I. (2020). Edge computing: A review of application scenarios. Advances in Intelligent Systems and Computing, 1004, 197-200.
- Sittón-Candanedo, I., Alonso, R. S., Corchado, J. M., Rodríguez-González, S., & Casado-Vara, R. (2019). A review of edge computing reference architectures and a new global edge proposal. Future Generation Computer Systems, 99, 278-294.
- Sittón-Candanedo, I., Alonso, R. S., Corchado, J. M., Rodríguez-González, S., & Casado-Vara, R. (2019). A review of edge computing reference architectures and a new global edge proposal. Future Generation Computer Systems, 99, 278-294.
- Skrzeszewska, M., & Patalas-Maliszewska, J. (2020). Assessing the effectiveness of using the MES in manufacturing enterprises in the context of industry 4.0. Advances in Intelligent Systems and Computing, 1004, 49-56.
- Su, J., Vargas, D., & Sakurai, K. (2019). One Pixel Attack for Fooling Deep Neural Networks. IEEE Transactions on Evolutionary Computation, 23(5), 828-841.
- Takahashi, H., Ueno, M., & Isahara, H. (2020). A comparative study of the corpus for story creation system. Advances in Intelligent Systems and Computing, 1003, 18-27.
- Tavares, B., Correia, F., & Restivo, A. (2020). Trusted data transformation with blockchain technology in open data. Advances in Intelligent Systems and Computing, 1004, 213-216.
- Taverner, J., Ruiz, R., Val, E., Diez, C., & Alemany, J. (2020). Image analysis for privacy assessment in social networks. Advances in Intelligent Systems and Computing, 802, 1-4.
- Teranishi, M., Matsumoto, S., & Takeno, H. (2019). Peculiarity classification of flat finishing motion based on tool trajectory by using self-organizing maps. Advances in Intelligent Systems and Computing, 800, 78-85.

- Teranishi, M., Matsumoto, S., & Takeno, H. (2020). Peculiarity classification of flat finishing motion based on tool trajectory by using self-organizing maps part 2: Improvement of clustering performance based on codebook vector density. Advances in Intelligent Systems and Computing, 1003, 116-124.
- Thibbotuwawa, A., Bocewicz, G., Nielsen, P., & Banaszak, Z. (2020). UAV mission planning subject to weather forecast constraints. Advances in Intelligent Systems and Computing, 1004, 65-76.
- Tipantuña-Topanta, G.J., Abad, F., Mollá, R., Poza-Lujan, J.L., & Posadas-Yagüe, J.L. (2019). Intelligent flight in indoor drones. Advances in Intelligent Systems and Computing, 800, 247-254.
- Toala, R., Durães, D., & Novais, P. (2020). Human-computer interaction in intelligent tutoring systems. Advances in Intelligent Systems and Computing, 1003, 52-59.
- Tschandl, P., Rosendahl, C., & Kittler, H. (2018). Data descriptor: The HAM10000 dataset, a large collection of multi-source dermatoscopic images of common pigmented skin lesions. Scientific Data, 5.
- Ueno, M., Hayakawa, D., & Isahara, H. (2019). Estimating the purpose of discard in mahjong to support learning for beginners. Advances in Intelligent Systems and Computing, 800, 155-163.
- Umer, M., Awais, M., & Muzammul, M. (2019). Stock Market Prediction Using Machine Learning(ML)Algorithms. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 8(4), 97–116. https://doi.org/10.14201/ADCAIJ20198497116
- Urrutia, A. (2019). An approach to measuring complexity within the boundaries of a natural language fuzzy grammar. Advances in Intelligent Systems and Computing, 801, 222-230.
- Usmankhujaev, S., Lee, S., & Kwon, J. (2020). Korean license plate recognition system using combined neural networks. Advances in Intelligent Systems and Computing, 1003, 10-17.
- Valencia-Hernández, D.S., Uribe-Hurtado, A.L., & Orozco-Alzate, M. (2019). A Web-based micro-service architecture for comparing parallel implementations of dissimilarity measures. Advances in Intelligent Systems and Computing, 800, 164-171.
- Vázquez, N. (2019). Implementation of automated pipelines to generate knowledge on challenging biological queries. Advances in Intelligent Systems and Computing, 801, 426-430.
- Venkataraman, A. (2020). Application of DCS for Level Control in Nonlinear System using Optimization and Robust Algorithms. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 9(1), 29–50. https://doi.org/10.14201/ADCAIJ2020912950
- Vicente, J., Gil, A., Luis Reboredo, A., Sánchez-Moreno, D., & Moreno-García, M. (2019). Moodsically. Personal music management tool with automatic classification of emotions. Advances in Intelligent Systems and Computing, 800, 112-119.
- Villegas-Jaramillo, E.J., & Orozco-Alzate, M. (2019). Computational analysis of multiple instance learning-based systems for automatic visual inspection: A doctoral research proposal. Advances in Intelligent Systems and Computing, 801, 374-377.
- Vinayakumar, R., Alazab, M., Soman, K., Poornachandran, P., Al-Nemrat, A., & Venkatraman, S. (2019). Deep Learning Approach for Intelligent Intrusion Detection System. IEEE Access, 7, 41525-41550.
- Vovsha, P. (2019). Decision-Making Process Underlying Travel Behavior and Its Incorporation in Applied Travel Models. Advances in Intelligent Systems and Computing, 805, 36-48.
- Wall, F. (2019). Effects of switching costs in distributed problem-solving systems. Advances in Intelligent Systems and Computing, 800, 1-9.
- Wang, J., Ma, Y., Zhang, L., Gao, R., & Wu, D. (2018). Deep learning for smart manufacturing: Methods and applications. Journal of Manufacturing Systems, 48, 144-156.
- Wang, M., & Deng, W. (2018). Deep visual domain adaptation: A survey. Neurocomputing, 312, 135-153.
- Wang, S., Tuor, T., Salonidis, T., Leung, K., Makaya, C., He, T., & Chan, K. (2019). Adaptive Federated Learning in Resource Constrained Edge Computing Systems. IEEE Journal on Selected Areas in Communications, 37(6), 1205-1221.
- Wang, Y., Chen, Q., Hong, T., & Kang, C. (2019). Review of Smart Meter Data Analytics: Applications, Methodologies, and Challenges. IEEE Transactions on Smart Grid, 10(3), 3125-3148.
- Wen, L., Gao, L., & Li, X. (2019). A new deep transfer learning based on sparse auto-encoder for fault diagnosis. IEEE Transactions on Systems, Man, and Cybernetics: Systems, 49(1), 136-144.
- Wen, L., Li, X., Gao, L., & Zhang, Y. (2018). A New Convolutional Neural Network-Based Data-Driven Fault Diagnosis Method. IEEE Transactions on Industrial Electronics, 65(7), 5990-5998.

- Wided, A., Okba, K., & Fatima, B. (2019). Load balancing with Job Migration Algorithm for improving performance on grid computing: Experimental Results. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 8(4), 5–18. https://doi.org/10.14201/ADCAIJ201984518
- Wided, A., Okba, K., & Fatima, B. (2020). Load balancing with Job Migration Algorithm for improving performance on grid computing: Experimental Results. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 8(4), 5–18. https://doi.org/10.14201/ADCAIJ201984518
- Wojszczyk, R., & Stola, P. (2019). Method of quality assessment of the implementation of design patterns used in production. Advances in Intelligent Systems and Computing, 801, 67-74.
- Wong, K., & Szeto, K. (2020). Multiple sources influence maximization in complex networks with genetic algorithm. Advances in Intelligent Systems and Computing, 1003, 226-234.
- Woźna-Szcześniak, B., & Szcześniak, I. (2019). Real-time conditional commitment logic and duration communication interpreted systems. Advances in Intelligent Systems and Computing, 800, 103-111.
- Yang, G., Yu, S., Dong, H., Slabaugh, G., Dragotti, P., Ye, X., Liu, F., Arridge, S., Keegan, J., Guo, Y., & Firmin, D. (2018). DAGAN: Deep De-Aliasing Generative Adversarial Networks for Fast Compressed Sensing MRI Reconstruction. IEEE Transactions on Medical Imaging, 37(6), 1310-1321.
- Yang, Q., Liu, Y., Chen, T., & Tong, Y. (2019). Federated machine learning: Concept and applications. ACM Transactions on Intelligent Systems and Technology, 10(2).
- Yigitcanlar, T., Butler, L., Windle, E., Desouza, K. C., Mehmood, R., & Corchado, J. M. (2020). Can building "artificially intelligent cities" safeguard humanity from natural disasters, pandemics, and other catastrophes? An urban scholar's perspective. Sensors, 20(10), 2988.
- Yigitcanlar, T., Kankanamge, N., Regona, M., Maldonado, A., Rowan, B., Ryu, A., Desouza, K., Corchado, J., Mehmood, R., & Li, R. (2020). Artificial intelligence technologies and related urban planning and development concepts: How are they perceived and utilized in Australia?. Journal of Open Innovation: Technology, Market, and Complexity, 6(4), 1-21.
- Yu, S. (2018). Neuro-Inspired Computing with Emerging Nonvolatile Memorys. Proceedings of the IEEE, 106(2), 260-285.
- Zhang, C., Patras, P., & Haddadi, H. (2019). Deep Learning in Mobile and Wireless Networking: A Survey. IEEE Communications Surveys and Tutorials, 21(3), 2224-2287.
- Zhang, L., Wang, S., & Liu, B. (2018). Deep learning for sentiment analysis: A survey. Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, 8(4).
- Zhang, W., Li, C., Peng, G., Chen, Y., & Zhang, Z. (2018). A deep convolutional neural network with new training methods for bearing fault diagnosis under noisy environment and different working load. Mechanical Systems and Signal Processing, 100, 439-453.
- Zhang, Z., Xiao, Y., Ma, Z., Xiao, M., Ding, Z., Lei, X., Karagiannidis, G., & Fan, P. (2019). 6G Wireless Networks: Vision, Requirements, Architecture, and Key Technologies. IEEE Vehicular Technology Magazine, 14(3), 28-41.
- Zhong, Z., Li, J., Luo, Z., & Chapman, M. (2018). Spectral-Spatial Residual Network for Hyperspectral Image Classification: A 3-D Deep Learning Framework. IEEE Transactions on Geoscience and Remote Sensing, 56(2), 847-858.
- Zhou, B., Lapedriza, A., Khosla, A., Oliva, A., & Torralba, A. (2018). Places: A 10 Million Image Database for Scene Recognition. IEEE Transactions on Pattern Analysis and Machine Intelligence, 40(6), 1452-1464.