Press release
Nota de prensa

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The BANYAN project concludes with advances in traffic modeling and automated planning of Radio Access Networks

The Innovative Training Networks (ITN) project "**BANYAN: Big Data Analytics for Radio Access Networks**," funded by the European Union through the H2020-ICT-2019 program, has come to an end this year, leaving behind a series of milestones that mark innovations in the field of telecommunications. **Led by Marco Fiore**, Research Professor at IMDEA Networks, BANYAN has developed innovative tools for data-driven 5G Radio Access Networks (RAN), while also successfully training new PhD candidates specialized in this field.

"The research conducted within BANYAN has been groundbreaking in several areas. For one, **the project has unveiled previously unknown aspects of mobile service demand in various contexts, such as urban areas, indoor environments, or during special events**," explains Dr. Fiore. These findings have enabled the creation of accurate models of user behavior and mobile traffic, essential tools for improving the planning and management of modern radio access networks. "As representative examples, we were able to reveal how the introduction of 5G has been fostering an increased consumption of certain mobile applications (in particular associated to gaming), or we demonstrated how large public protests generate dramatic surges of traffic only for specific classes of services (notably, navigation and messaging)."

Another key achievement of BANYAN has been the **development of an artificial intelligence (AI)-based solution** for modeling signal propagation in dense radio access environments. This technique not only allows for precise planning of the wireless network infrastructure but also reduces the computation time for designing indoor wireless networks compared to traditional tools. This represents a significant advancement for efficiently designing networks in smart cities and large indoor spaces like shopping malls or airports.

Commercialization

The project's results have not only remained in the academic sphere but have also found commercial applications. "Part of the tools developed during BANYAN have been integrated into the radio planning software commercialized by **Ranplan Wireless**, one of the project's partners," highlights Fiore. This underscores the importance of the project's impact on the telecommunications industry.

Academically, the work has been presented at leading conferences such as ACM IMC, IEEE INFOCOM, and the IEEE JSAC journal, further emphasizing BANYAN's contribution to

scientific knowledge in the field of radio access networks.

Challenges

The BANYAN project successfully tackled several complex challenges, including:

1. Measuring, characterizing, and modeling traffic demand for individual mobile services on a large scale (e.g., entire cities or countries) in both indoor and outdoor environments.
2. Developing AI-based tools for generating realistic radio frequency propagation in both indoor and outdoor scenarios with high accuracy and low complexity.
3. Creating optimization models for automated network planning.
4. Designing AI solutions for the autonomous management of mobile networks, tested on experimental platforms.

Thanks to the studies conducted under BANYAN, foundational components have been laid for the future of beyond-5G systems, demonstrating how big data analytics and artificial intelligence can transform the way telecommunications networks are planned and managed.

Source(s): IMDEA Networks Institute

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About us

IMDEA Networks Institute, promoted by the Regional Government of Madrid, is a research organization on computer and communication networks whose multinational team is engaged in cutting-edge fundamental science and technology. As a growing, English speaking institute located in Madrid, Spain, IMDEA Networks offers a unique opportunity for pioneering scientists to develop their ideas. IMDEA Networks has established itself internationally at the forefront in the **development of future network principles and technologies**. Our team of highly-reputed researchers is designing and creating today the networks of tomorrow.

Some keywords that define us: 5G, Big Data, blockchains and distributed ledgers, cloud computing, content delivery networks, data analytics, energy-efficient networks, fog and edge computing, indoor positioning, Internet of Things (IoT), machine learning, millimeter-wave communication, mobile computing, network economics, network measurements, network security, networked systems, network protocols and algorithms, network virtualization (software defined networks – SDN and network function virtualization – NFV), privacy, social networks, underwater networks, vehicular networks, wireless networks and more…

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