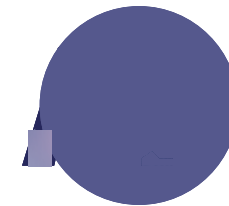


Capacity load balancing through blockchain

Artificial Intelligence, blockchain
and IoT for the tourism sector

Prof. Juan M. Corchado
jm@corchado.net







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AIR

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Natural Language Processing

RESEARCH

Deep learning
Blockchain
Deep tech

ARTIFICIAL INTELLIGENCE

Member of DIGIS3

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Latest news: [Community Days: Cybersecurity in Industry 5.0 organised by IoT Digital Innovation hub](#)

Marketplace    

ABOUT ▾ MEMBERS SERVICES RESOURCES ▾ EVENTS ▾ SUCCESS CASES TRAINING NEWS

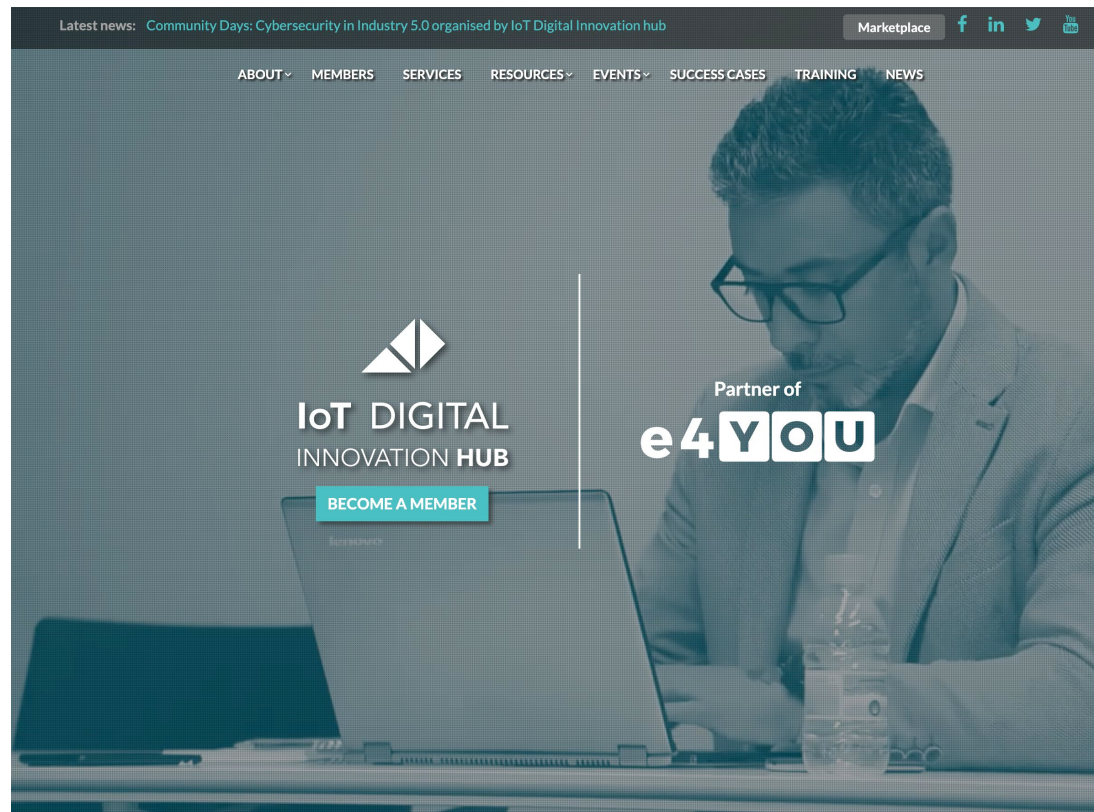


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TECHNICAL ADVICE AND MENTORING

The IoT DIH provides technical advice and mentoring to SMEs that wish to integrate IoT into their processes and services. The IoT DIH is a member of an Industry 4.0 working...

<https://innovationhub.es>

WORK OPPORTUNITIES

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JAN

Full Stack Developer

Minimum requirements: REST APIs, NoSQL databases, Javascript (ES5, ES6), Angular, etc.

22
JAN

Cloud Developer

Minimum requirements: REST APIs, NoSQL databases, AWS, etc.



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Quiénes somos

DIGIS3, liderado por el centro tecnológico AIR Institute, surge como resultado del continuo crecimiento de los DIHs existentes en la región y está formado por las siguientes entidades:

- El **Air-Institute** es una organización privada de investigación sin ánimo de lucro, cuya misión es la promoción y el desarrollo de la investigación científica en el ámbito de la informática y la inteligencia artificial.
- El **Instituto de Competitividad Empresarial de Castilla y León (ICE)** es el instrumento de la Junta de Castilla y León para el desarrollo empresarial y los servicios a empresas. Se enmarca dentro de la Consejería de Economía y Hacienda, y trabaja fundamentalmente en el área de la innovación, la financiación y la internacionalización.
- La asociación **DIHBU**, Centro de Innovación Digital experto en Industria 4.0, formado por empresas industriales, centros de conocimiento y desarrolladores de soluciones de Industria 4.0 en Castilla y León.
- La asociación **DIH-LEAF**, Centro de Innovación Digital orientado a los sectores ganadero, ambiental, agrícola y forestal, involucrando, entre otros, universidades y centros tecnológicos, empresas y asociaciones de productores, con el fin de dar respuesta al desafío de la digitalización e innovación tecnológica de este amplio sector productivo.
- La **Fundación Centro de Supercomputación de Castilla y León (SCAYLE)**, como socio experto en supercomputación.
- La **Universidad de León** como socio experto en supervisión, control y automatización de procesos industriales e infraestructuras críticas así como en Industria 4.0, Internet de las Cosas, Ciencia de Datos, Inteligencia Artificial, Visión por Computador, Robótica, Fabricación Aditiva o Tecnología Aeroespacial.



SOCIOS VINCULADOS



<https://digis3.eu>



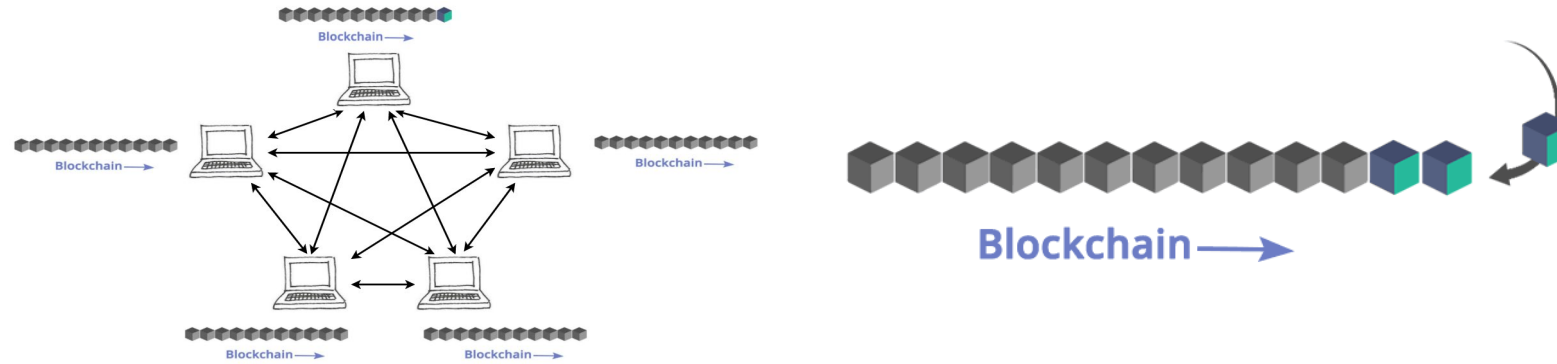
Artificial Intelligence

- Cybersecurity
- Data Science
- Machine Learning
- IoT
- Bioinformatics
- Neuro Science
- Blockchain
- Fintech
- Intelligent Textile
- Smart Cities
- Smart Grids
- Industry 4.0





Blockchain



Block:	#	1
Nonce:	295680	
Data:	Data 1	
Prev:	00	
Hash:	0000b34a55e438d917eb39d4c62101f2e3e28a43ad4e8b2eff68ff7cf78f9bc2	

Block:	#	2
Nonce:	22262	
Data:	Data 2	
Prev:	0000b34a55e438d917eb39d4c62101f2e3e28a43ad4e8b2eff68ff7cf78f9bc2	
Hash:	00006abeb3c617c86cf6716ddc81a34f14f5cd3fe2165022e299f85ae4a316eb	

Block:	#	3
Nonce:	57965	
Data:	Data 3	
Prev:	00006abeb3c617c86cf6716ddc81a34f14f5cd3fe2165022e299f85ae4a316eb	
Hash:	00004c9f2ae89f50ae200c08825316306546e7028709656fc20aa670287894ff	



Capacity load balancing through blockchain, Artificial Intelligence and Digital Twins in Formentera island



Problem description

- To find the well-being and enjoyment of visitors and residents.
- To avoid overcrowded tourism.
- To prevent the ecological destruction of landscapes.



Solution

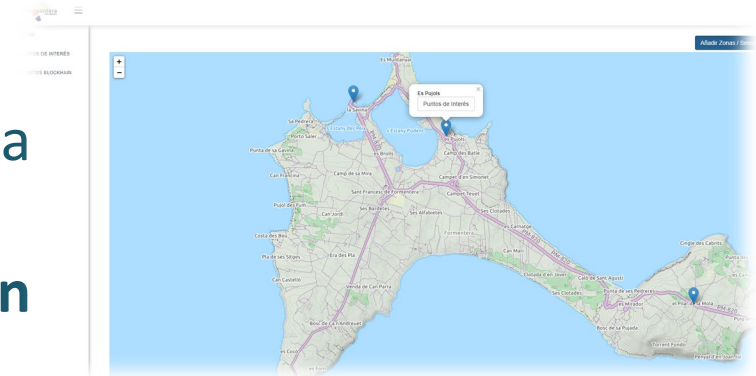
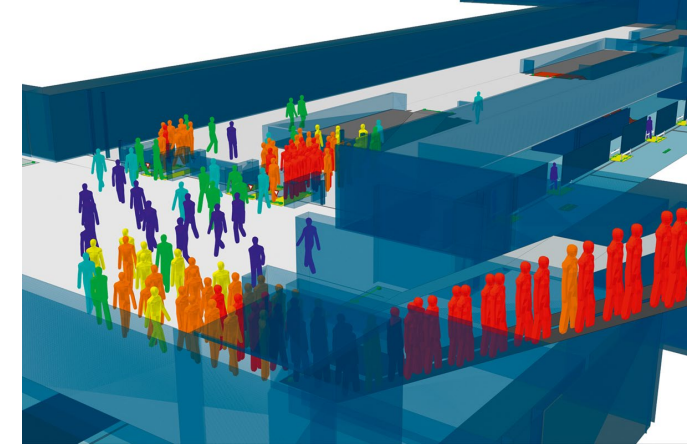
- **To balance the flow of visitors to less visited areas without harming:**
 - The economic activities carried out on **Formentera** island.
 - The quality of life of the inhabitants of the island.
- **To establish a loyalty system for sustainable tourism based on Smart Contracts:**
 - Promotion of establishments.
 - Real-time load estimation reporting.
 - Discounts based on overcrowding.



Operation

BIM Today (2017). Using BIM to enhance 3D crowd simulation – and vice versa

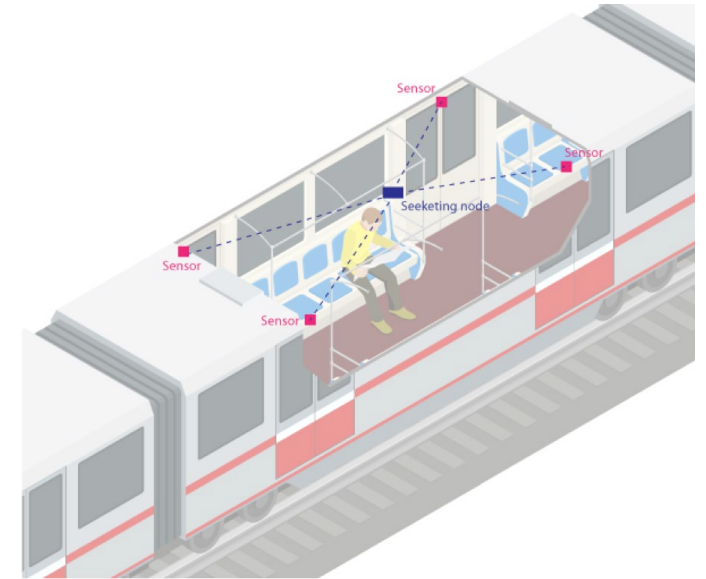
- **Data sources:**
 - Information from the Tourism Intelligence System (SIT).
 - Capacity control and presence of tourists (Seeketing).
 - Weather forecast. Traffic data (cars, flights, port).
 - Information on **events** (culture, sports, etc.).
- **Artificial Intelligence models based on Digital Twins:**
 - Detection of users who have changed the flow, the area to which it belongs and the specific incentive.
 - Prediction of tourist flows and occupancy based on intelligent agents (simulations using Digital Twins).
 - Recommendation of points of interest within the island to optimise load balancing.



Opportunities

- Real-time load capacity reporting.
- **Promotion and management of tourist destinations in a sustainable way.**
 - Autonomous.
 - Decentralized.
- **Applicable at international level.**
- **Usable worldwide without the need for knowledge of Artificial Intelligence or Blockchain.**

 **Seeketing**



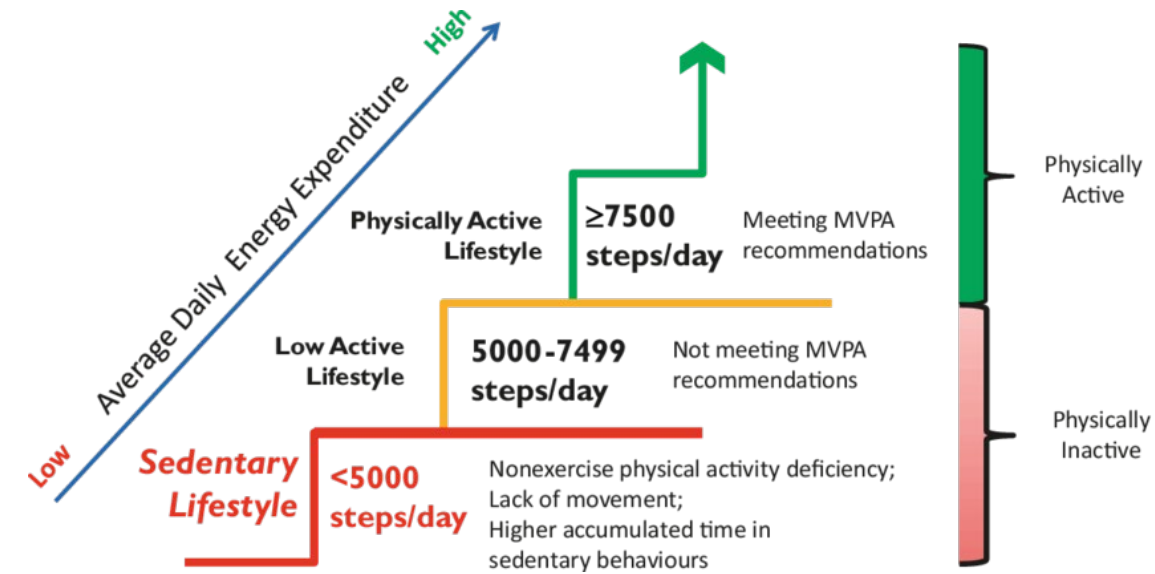
 **ALASTRIA**

Promoting active mobility of citizens and tourists through Internet of Things and Green Digital Tokens



Problem description

- One of the **endemic problems** of society is the **sedentary lifestyle**, which hits young people as a risk to their physical and mental health as adults.
- To find new solutions that encourage **active mobility** of citizens to reduce sedentary lifestyles, reduce pollution and traffic jams in big cities, as well as mitigate climate change.
- In this sense, the use of digital technologies and the paradigm of smart cities and territories can help build such solutions.



Tudor-Locke, Catrine & Craig, Cora & Thyfault, John & Spence, John. (2013). A step-defined sedentary lifestyle index. Applied physiology, nutrition, and metabolism.

Solution

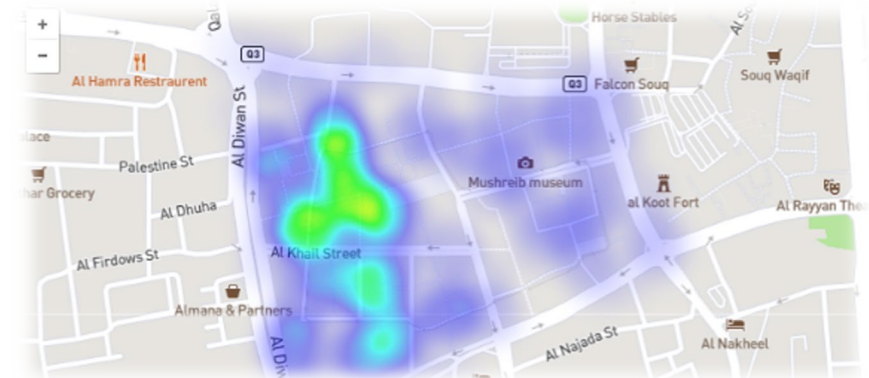
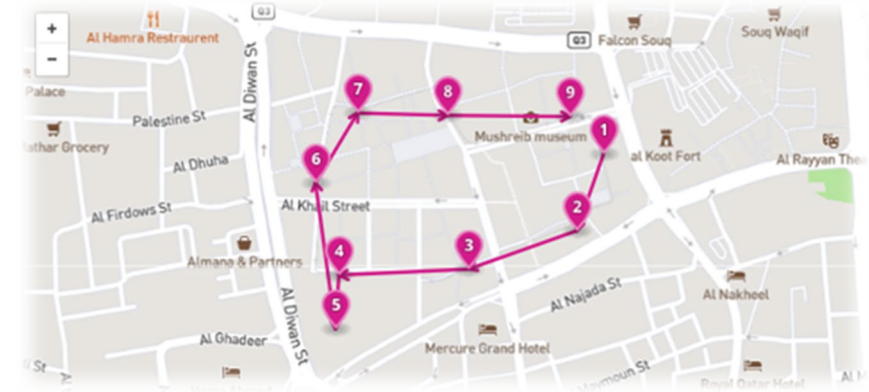
- **Platform** based on **Internet of Things** and **Green Digital Tokens** technologies for the **promotion of active mobility** of citizens.
- Through the use of **IoT devices** and **wearables** (e.g., activity wristbands, smartphones), users **obtain digital tokens** based on **how much they actively move** around (e.g., walking, cycling, etc.).
- These **digital tokens** can be used to **access municipal services** (e.g., renting tennis courts, attending cultural events) or **obtain products o services** provided by companies in exchange for advertising on the app.



<https://www.spain.info/en/discover-spain/cycle-touring-spain/>

Operation

- **Data sources:**
 - App running on smartphones and activity wristbands.
 - Users' **location** (GPS, Galileo).
 - **Sensors** (accelerators, inclinometers, magnetometers).
 - **Activity** frameworks: Google Fit, Apple Healthkit.
 - **Maps** and **traffic**: Google Maps, OpenStreetMap.
 - **Weather** (OpenWeatherMap). **Events** (EventBrite).
 - Active mobility **rentals services** (bicycles, etc.).
- **Green Digital Tokens:**
 - Low-energy blockchain technologies to exchange tokens.
 - Users obtain digital tokens according to its active mobility.
 - Users can exchange tokens for public and private services.



<https://deepint.net/>

Opportunities

- **Social benefits:**

- Any citizen or tourist can download the app for free and use it in the participating cities that joins the platform. The partner municipalities provide access to municipal services (sports and cultural) to encourage active travel.
- **This results in healthier citizens, less congested and polluted cities, as well as higher use of cultural and sport services.**

- **New business models:**

- The data, functionalities and results of the platform are available (through CKAN) so that **new business models and new academic research** can be generated.

Walker, B. (2021). What does it mean to be healthy? SVP Marketing & Analytics



Crowdsourced obtention and analytics of data about the crowding of public spaces for the benefit of public transport and mobility in cities



Problem description

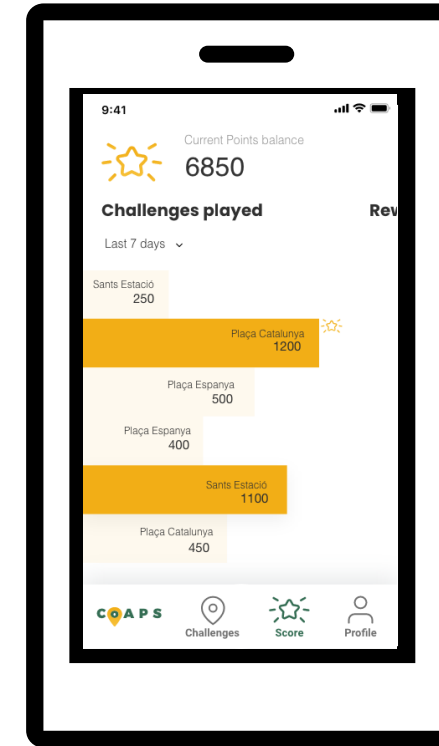
- **COVID-19** is still spreading, and spatial distancing is one of the preventative measures taken worldwide.
- **Future pandemics could arise** in the future.
- With mobility restrictions being eased in most countries, people are encouraged to go back to work, and **the use of Public Transport (PT) and public spaces grow steadily.**



-

Operation

- **Data sources:**
 - **Mobile app:** users' location (GPS).
 - **Maps:** points of interest, transport stations.
 - **Traffic data:** vehicles, buses, trains, etc.
 - **User's perception of crowdedness.**
- **Gamification:**
 - Users are encouraged to use public transport and receive rewards by its use.
 - Rewards include tickets, discounts, etc.
- **Artificial Intelligence:**
 - Prediction of potential citizen infections.
 - Recommendations to improve urban mobility.

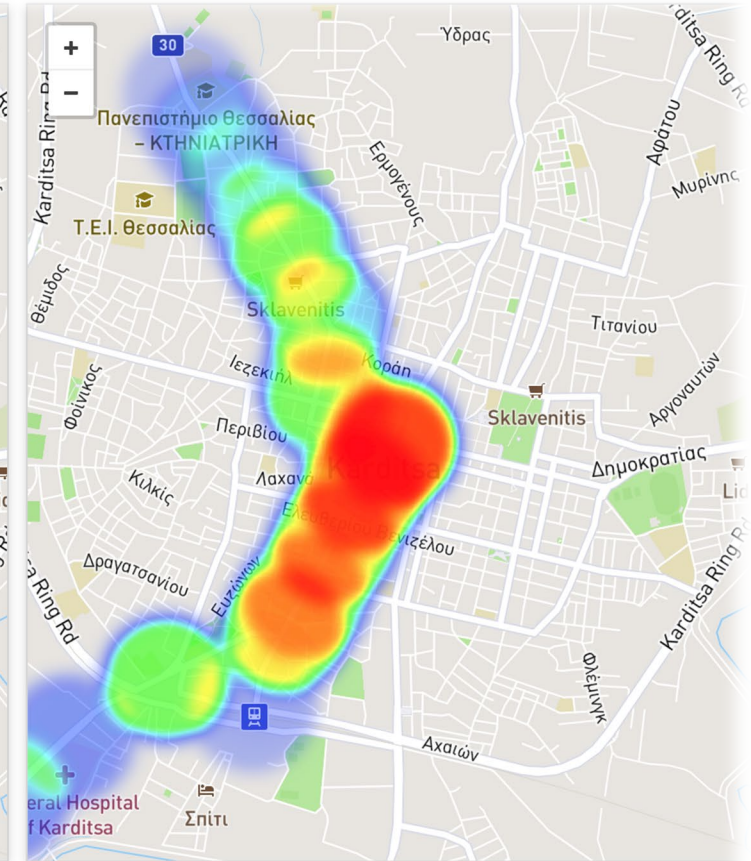
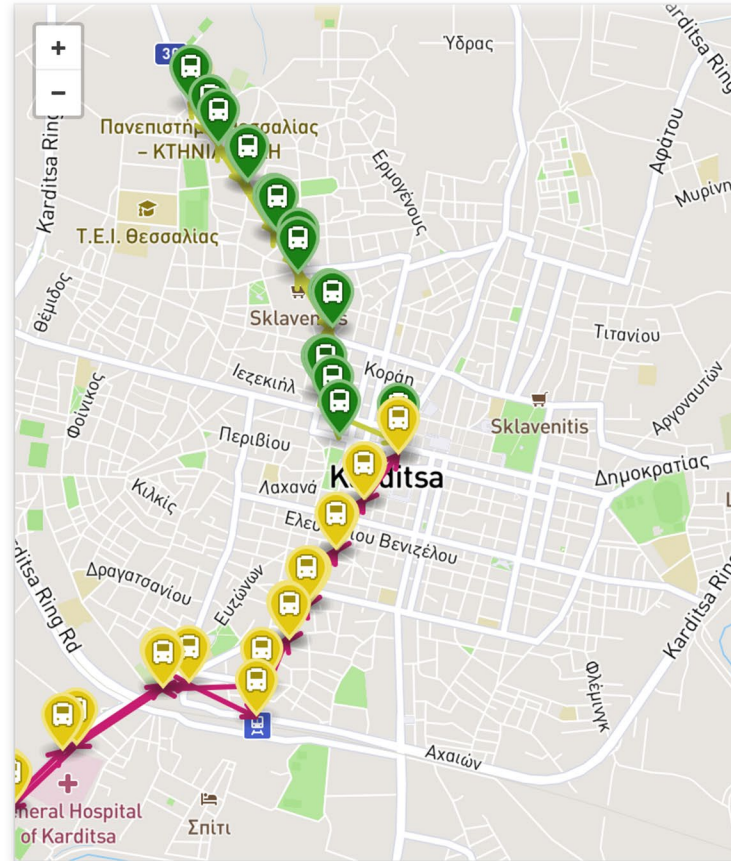


Opportunities

- **Social benefits:**
 - Reduction of urban pollution and improvement of air quality.
 - Reduction of traffic congestion.
 - Reduction of travel time.
 - Reduction of epidemic infection rates.

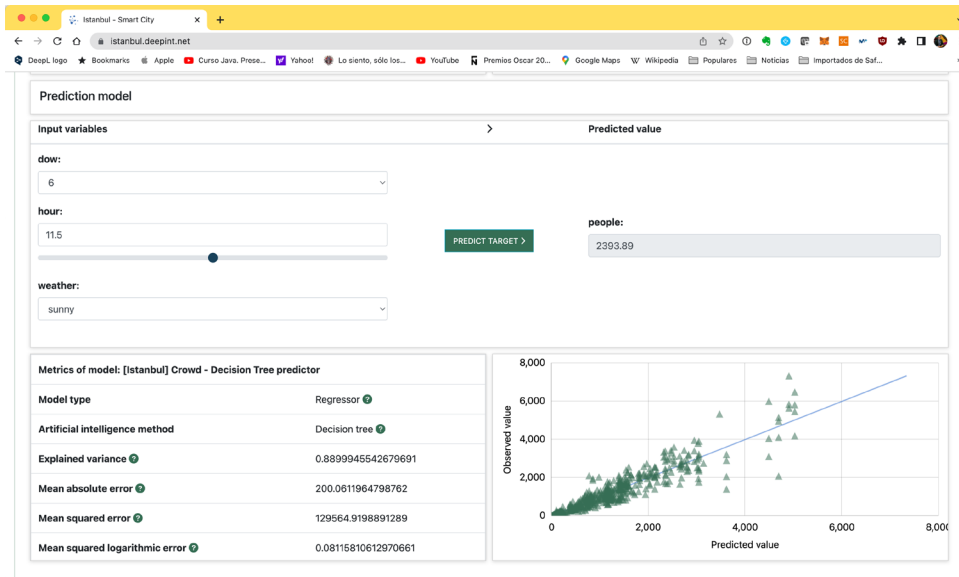


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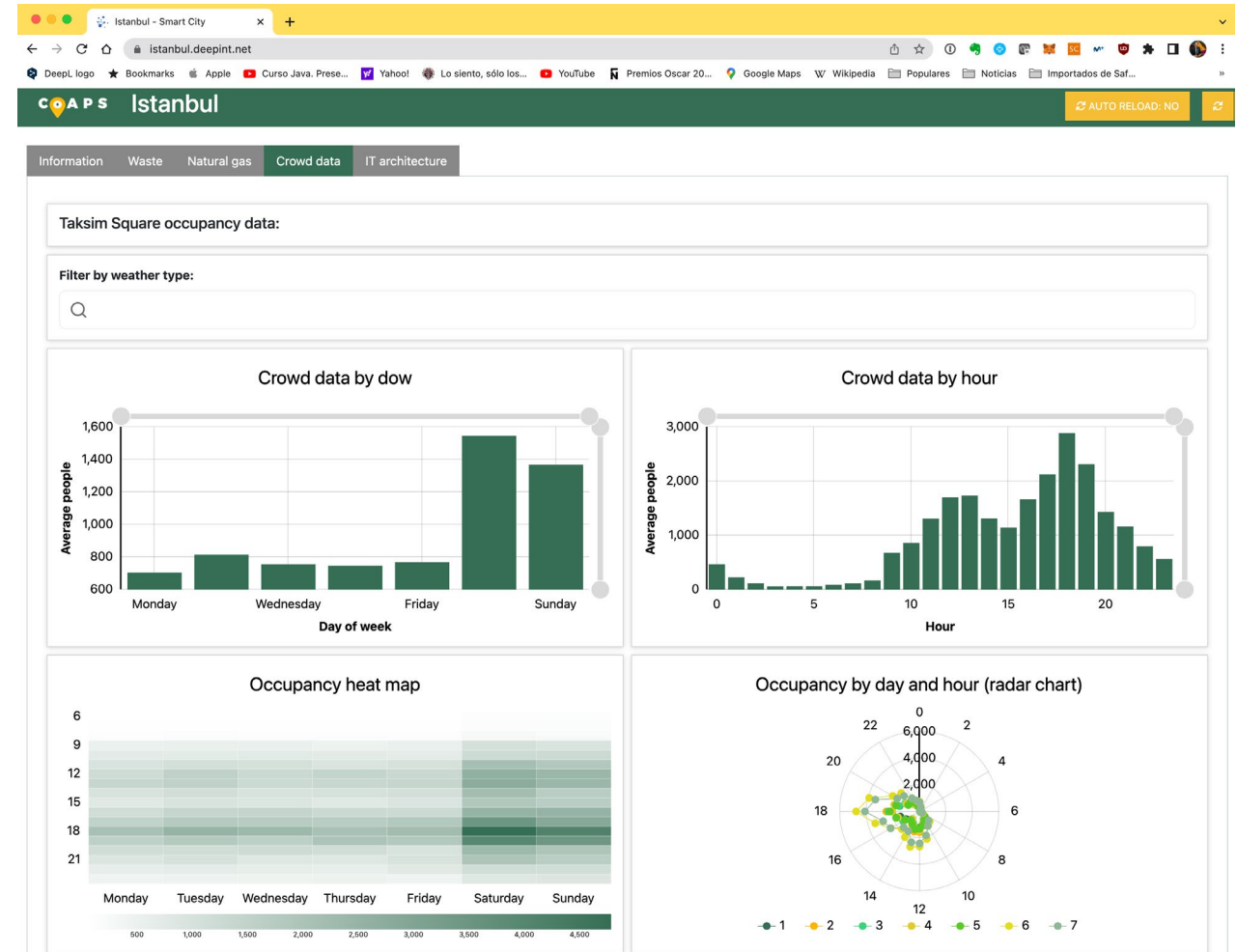


Opportunities

- **Economic benefits:**
 - Increased **local economic activity** (through tokens).



<https://deepint.net/>



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