Learning algorithms applied to digital marketing

The online recommendation mechanisms used by firms like Amazon and Netflix are among the most common examples of the usability of learning algorithms. Using data collected from millions of buyers and users, learning systems are able to predict items you might want, according to your previous purchases or viewing habits.

In addition, learning algorithms may act directly on search engines. Google, Microsoft Bing and other search engines use learning algorithms to improve their minute-by-minute capabilities. They are able to collect and analyse data on which links users click in response to queries to improve their results to posterior queries.

According to Pedro Domingos in the book "The revolution of the master algorithm", advertising on the web is just the beginning of a much larger phenomenon. In all markets, producers and consumers have to establish a connection before the transaction may take place. In pre-internet times, the main obstacles were physical. We could only buy books at our local bookstore, and it had limited shelf space. But when we can download any book to our e-reader whenever we want, the problem becomes the overwhelming number of choices.

How to look up on the shelves of a bookstore that has millions of book titles for sale? The same applies to other items such as videos, music, news, tweets, bloggers or simple web pages. And It may also be applied to all goods and services that may be made available at a distance: shoes, flowers, appliances, hotel rooms or classes. How do we find and compare them? This is one of the problems that define the information age, and machine learning may a big part of the solution. The learning algorithms may guarantee clicks, which are potential business opportunities and thus growth and visibility for a company.

Another potential of using automatic learning is the personalization of educational services. Web-based learning systems still offer educational resources in the same way for students with different profiles. The personalization of e-learning, generally, relying on explicit information reached based on the recent browsing history of browsers, allows exploring similarities and distinctions between user preferences and between the contents of learning resources.

The Labour Observatory and the challenge of digitalization in Aveiro

In order to respond to its mission of contributing for a prospective vision of the priorities and qualification needs of Aveiro, more specifically identifying the competences for the digital transformation required by the labour market of the Aveiro territory, the Aveiro Labour Observatory has been conducting a series of research and information gathering activities in close collaboration with local actors and the most representative companies of the region in the sectors of Industry, ITCE (Information Communication and Electronic Technologies), and Tourism and Services.

In the pursuit of its mission, the Aveiro Labour Observatory team intends to support companies, training entities, as well as citizens and the local political players. In general, it intends to create greater awareness of the need for development and continuous investment in the areas of digital transformation and the development of competences for it, which enhance the creation of quality jobs, better quality of life and increased competitiveness and sustainability of Aveiro.

On its research and information gathering activities, through workshops, interviews and questionnaires, the Aveiro Labour Observatory has counted on the crucial collaboration of more than 50 actors and companies representing the Aveiro Industry, TICE and Tourism / Services sectors.

The results related to technologies and emerging professions in the ITCE and Industry sectors in Aveiro show great opportunities related to data, artificial intelligence and machine learning. In the case of the Tourism and Services sector, which is still a sector with low levels of technology adoption, for most firms "digitalization" essentially means its visibility in the market, therefore the focus inevitably goes through the area of Digital Marketing. Being mostly micro and small firms, its priority is to hire professionals with technical business competence and, at the same time, digital marketing competence to promote the business.

Figure 1 - Technologies and Professions most needed in Aveiro

	Technology	Profissions
ICTE	• Big data and Advanced Analytics • Automation and robotics	• Data analysts and scientists • AI and Machine Learning specialists
INDUTRY	• Big data and Advanced Analytics • IA e Machine Learning	• Developers • AI and Machine Learning specialists
TURISM	• Online management platforms • Apps • QR CODE	• Sector professionals (with competences specific to their technical functions) accumulate digital marketing competences

Source: Report on the Identification of Gaps and Qualification Priorities in the Context of Digital Transformation , 2020

Did you know?

Eurostat, through the "EU Survey on ICT usage and e-commerce in enterprises" introduces the **percentage of enterprises with high levels of digital intensity.** The digital intensity score is based on the number of the 12 technologies pointed out are used by each firm. High levels of digital intensity are attributed to companies using at least 7 of the listed digital technologies. The survey was applied to companies with 10 or more employees, from the manufacturing and services sectors, with the exception of the financial sector. In this digital age, technological intensity is vital for economic growth and, as all sectors are affected, it is an opportunity to promote greater economic equality, both within a country and globally. It is important to note

that to improve their technological capabilities, countries will need a skilled workforce in order to use the technology productively. The percentage of firms with high levels of digital intensity in Portugal has fluctuated greatly since 2015, but the indicator got generally better in the country. In 2016 and 2017, Portugal reached a percentage of companies with high levels of digital intensity above the European Union average (Figure 1). In 2019, the country with the highest percentage of companies with high levels of digital intensity was Denmark, with 53.1%, followed by Finland, with 52.3% and the last place in the ranking was occupied by Greece with only 6.1%. Portugal is on the 17th place with 24.5% of companies with high levels of digital intensity, below the European Union average of 25.8%.

Figure 1 – Percentage of Enterprises with High levels of Digital Intensity, 2015 - 2019
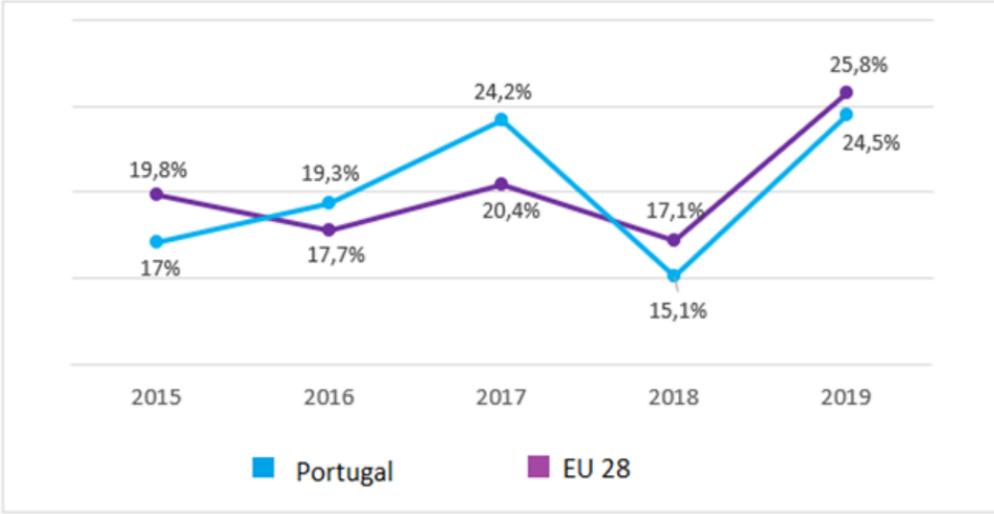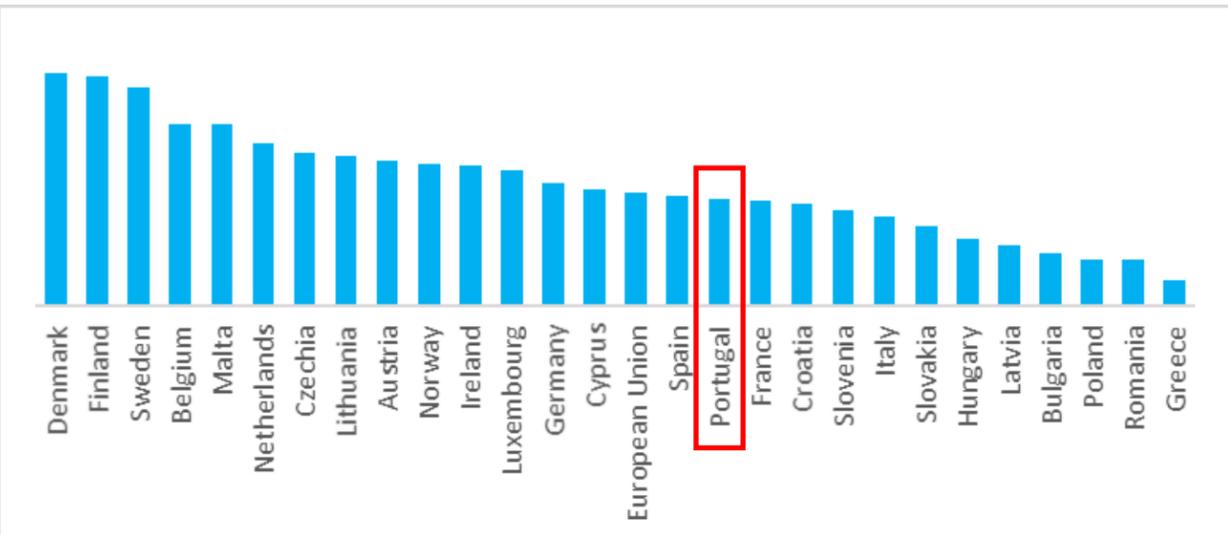

Figure 2 – Percentage of Enterprises with High levels of Digital Intensity on the total, 2019

Source: Eurostat - Community survey on ICT usage and eCommerce in Enterprises

The challenge of implementing digitalization in SMEs

SMEs - Small and Medium Enterprises, are considered the driving force in most economies, responsible for employment, innovation and growth. The attention to this segment of firms is justified by considering that they represent a significant and important part on the economy. Despite their undeniable importance for the socio-economic context, they encounter many difficulties in maintaining their business, consequently for their survival.

As technology is one of the main tools available to firms to achieve competitiveness, identifying elements that may contribute to the process of technology implementation and management is crucial for the growth and sustainability of SMEs.

One of the few studies focusing on the impact of digitalization on SMEs, Gruber (2019) recently identified four reasons to explain why digital transformation occurs slowly in SMEs. First, small businesses with specific focus are less exposed to the need for rapid digitisation. Second, these companies generally lack the skilled workforce and managerial vision to fully understand the impacts of digital transformation. Third, SMEs generally adopt a gradual approach to digitization compared to large companies. Finally, the investment in digitization in this type of firms depends a lot on the financial performance of the companies and, generally, they have more limited resources to use in this area.

At the same time that new technologies allow enterprises the opportunity to grow and offer more comfort to their clients, the democratization of access to technologies brings perspectives, previously unthinkable, also concerning the internationalization of SMEs.

In the tourism sector, for example, the implementation of technological solutions is determinant for competitiveness and make internationalization possible. Often the cost of implementing digitalization in this sector is very low and easy to access, with the skilled workforce playing a key role in this process. Digital marketing, for example, may be used as a tool for partnerships and showcase of a business.

Technology is one of the most important factors of change in the transformation of companies. Such transformations are not only restricted to the way to communicate and produce, but also induce new processes and instruments that completely reach the structure and behaviour of organizations, directly impacting on their management and sustainability.

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