**ACTIVIDAD #1**

**Tipo actividad: Reading: "10 Examples of How Big Data Is Changing our World" and related activities**

**Study some vocabulary about the text "10 Examples of How Big Data Is Changing our World".**

1. **Volume:** Refers to the sheer size or quantity of data generated, processed, and stored. In big data, large volumes of data need specialized tools and approaches for effective analysis.

2. **Variety:** Encompasses the different types and formats of data, including structured, semi-structured, and unstructured data. Big data involves handling diverse data types, such as text, images, videos, and more.

3. **Velocity:** Represents the speed at which data is generated, collected, and processed. Big data applications often deal with high-velocity streams of data in real-time, requiring quick analysis and response.

4. **Veracity:** Refers to the reliability and accuracy of the data. In big data, ensuring the quality and trustworthiness of data is crucial for making informed decisions.

5. **Value:** Signifies the significance and usefulness of the insights derived from big data analysis. The ultimate goal is to extract valuable information and actionable insights to drive decision-making.

**3) Reading: "10 Examples of How Big Data Is Changing our World".**

**10 Examples of How Big Data Is Changing our World**

You are probably already aware of what big data is. However, you may not be as familiar with some of the examples of big data and its impact on everyday life that we will discuss in this article. Or that its origins date back to the bubonic plague, the first time statistical science was put at the service of complex problems.

It was John Graunt, in 1663, who applied statistical systems to mortality rates and the evolution of the plague in England. Then would come primitive computing instruments such as the drilling machine in 1884. However, the takeoff of big data itself had to wait until the advent of modern computing.

In 2001 Doug Laney, a Gartner analyst, defined the three Vs of big data, i.e., the requirements for datasets to be valid for large scale analysis. Over time, three more Vs would be added, making the requirements as follows:

* Volume
* Variety
* Velocity
* Veracity
* Value
* Variability

Apache Hadoop, one of the first open-source systems for extensive data analysis, was developed as early as 2005. However, at the end of that decade, the big leap took place, with data storage services in the cloud and, as early as 2012, the Obama administration's Big Data Research and Development Initiative in the USA.

**10 examples of big data in the real world**

Today, big data is an everyday tool in many areas while conquering new and disparate spheres. In fact, the big data market is expected to be worth more than $420 billion by 2027. These are but a few examples.

**SELF-DRIVING VEHICLES: BIG DATA BEHIND THE WHEEL**

The challenges presented by autonomous driving have tempered the enthusiastic predictions of recent years. Like the flying cars predicted in Back to the Future, they are taking a little longer to arrive than expected. What is certain is that big data will play a crucial role in this transition.

All the information generated by a self-driving car's sensors and the information received from satellites and sensors in the environment amounts to between 50 and 70 terabytes of data every eight hours of driving. It is enough to think that one terabyte can store 250 HD movies to understand the magnitude of the data processed.

Structuring all this data from cameras and other sensors requires the use of big data. And not just for day-to-day driving but also for assessing driving habits and urban planning. In addition to Tesla, companies such as Waymo, GM Cruise, or Argo AI are investing billions of dollars in this technology.

**2. CIVIL AVIATION: AN EXAMPLE OF BIG DATA BEYOND AUTOMATION**

Aviation is another transportation sector where big data has become a key ally. Although the complexity of air traffic is somewhat less than that of road traffic, it is estimated that the new generation of aircraft will generate between five and seven terabytes of information per flight.

In a few years, aviation will likely be virtually autonomous, but there are also other examples of big data in different areas today:

Air traffic and environment. The use of big data will make it possible to optimize air traffic to reduce pollution and fuel consumption. It is estimated that 7.8 million tons of fuel are wasted each year due to poor traffic management.

Aircraft maintenance. It will make it possible to predict parts wear and tear and fleet renewal schedules and manage spare parts inventories.

**3. AGRICULTURE FOR AN OVERPOPULATED WORLD**

While not one of the pioneering sectors in big data, agriculture is beginning to embrace this technology to meet the challenges of production and climate change.

This revolution has gone hand in hand with the growing use of satellite technologies such as Sentinel and on-the-ground sensors such as weather stations and soil sensors. This is evidenced by the fact that manufacturers such as John Deere, traditionally dedicated to manufacturing agricultural machinery, have begun to develop and implement data capture devices.

**4. BIG DATA FOR ENVIRONMENTAL PROTECTION**

Ecological challenges mark the 21st century. If driving a vehicle involves great complexity, the balance of an ecosystem is several orders of magnitude above that. This is why, among the practical examples of big data, the study of ecosystems is one of the clearest.

Today, big data makes it possible to study in real-time the evolution of the Amazon rainforests, the Arctic ice masses, or the management of agricultural land. Other fields in which big data is destined to play a crucial role will be the control of animal migrations or the sustainability of industrial practices. Large multinationals are also beginning to use big data to determine the carbon footprint of their manufacturing and transportation processes.

**5. CLIMATE CHANGE: THE MOST COMPLEX DATASET**

Climate change could be considered the biggest challenge for big data. Indeed, the butterfly effect theory uses the example of a storm caused by the flapping of an insect. Such are the infinite factors at play. The potential of this technology to detect trends in global warming is highlighted by the UN's Data for Climate Action initiative, which seeks to unify datasets to facilitate their analysis.

**6. TOWARDS ENERGY EFFICIENCY THROUGH BIG DATA**

The energy sector, which involves a growing number of sources such as wind and photovoltaics, requires careful production and consumption monitoring. The advent of smart meters, which allow consumption to be measured in real time, is another example of big data, as millions of measurements need to be processed throughout the day. Renewable energies pose an added challenge, as their production is less stable and predictable.

Thus, the ability to anticipate demand and allocate resources will be essential to manage the energy mix. The advent of smart homes and IoT, with which every device will provide information on consumption, is another example of big data in the real world.

**7. AN ALLY FOR E-LEARNING**

As education moves away from the classroom and begins to extend to all kinds of devices and realities, the role of big data is becoming more relevant. In fact, the term BDE (big data education) has already been coined. One of the most obvious examples of its use is the monitoring of student performance and study habits. But that is not all.

E-learning is here to stay and with it there is a multitude of data to process: from the attention of students to the automation of placement tests and the estimation of results. It will also make it possible to identify the school dropout risks based on their profiles and results. It will certainly not replace teachers, but it will free them from numerous tasks.

**8. THE ENGINE OF FINANCIAL MARKETS**

Big data has become a basic tool of the financial industry. Every day, risk analysts, banking or credit providers turn to this tool to assess market trends and anticipate events, especially in stock market environments. It has also become a tool for detecting tax fraud. The field of insurance, closely linked to financial markets, is another example of big data, this time applied to the calculation of policies and risk profiles.

**9. A HEALTHCARE REVOLUTION**

Genome sequencing and associated gene therapies are making possible unprecedented treatments in the world of medicine. And with them, the amount of data available has multiplied exponentially, since the aim is to have individualized genetic information. Similarly, the study of cancer diseases is another area in which increasingly complex data sets are being generated.

It is not surprising, then, that some of the most prominent examples of big data applied to medicine are related to genetic material and oncology. Thus, the British 100,000 Genomes project is using big data to understand the genetic causes behind the most common tumors. Biobank is another project for mass collection of biological, sociological and demographic data from 500,000 British citizens for use in the national healthcare system.

**10. COMMERCE, A MATURE INDUSTRY**

Along with search, e-commerce was one of the first sectors to have large digital databases on the Internet. Thus, multinationals such as Amazon were quick to capitalize on the information about transactions made on their website and market it to third parties for advertising purposes.

Of course, it was also used to fine-tune their own marketing campaigns and better understand their customers' profiles. Today, big data is applied throughout the value chain: from production and transportation to shopping in physical stores.

In short, as these ten examples of big data show, it is an omnipresent technology that, coupled with artificial intelligence and machine learning analysis systems, is destined to shape our future.

**4) Matching reading activity about the previous reading.**

**Column 1: Headings**

1. Autonomous Driving Data Challenges

2. Aviation and Big Data

3. Big Data in Agriculture

4. Big Data for Environmental Protection

5. Climate Change and Big Data

6. Energy Efficiency through Big Data

7. Big Data in E-Learning

8. Financial Markets and Big Data

9. Healthcare Revolution with Big Data

10. Big Data in Commerce

**Column 2: Definitions**

A. Involves the study of ecosystems in real-time, including the Amazon rainforests and Arctic ice masses.

B. Focuses on the challenges and data generated by self-driving vehicles, including sensor information and driving habits.

C. Applies big data to optimize air traffic, reduce pollution, and manage aircraft maintenance.

D. Utilizes big data for predicting parts wear and tear in aircraft, managing spare parts inventories, and optimizing air traffic.

E. Aims to address production and climate change challenges in agriculture through satellite and sensor technologies.

F. Examines the role of big data in studying global warming trends and the UN's Data for Climate Action initiative.

G. Monitors and manages energy production and consumption, especially with renewable energy sources.

H. Applies big data in the field of e-learning for student performance monitoring and automation of tests.

I. Plays a crucial role in financial markets for assessing trends, anticipating events, and detecting tax fraud.

J. Revolutionizes healthcare through genome sequencing, gene therapies, and individualized genetic information.

K. Involves the application of big data throughout the e-commerce value chain, from production to shopping.

**5) Open-ended questions about the previous text.**

1. How does big data play a crucial role in the challenges presented by autonomous driving, and what kind of information is processed by self-driving cars on a daily basis?

2. In what ways is big data utilized in the field of aviation, and how does it contribute to optimizing air traffic, reducing pollution, and managing aircraft maintenance?

3. Can you provide examples of how big data is applied in the agricultural sector to address production and climate change challenges, and what technologies are commonly used for this purpose?