# Computer Vision

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Applying vision with Artificial Intelligence to improve business processes Without being aware of it, every day we use visual information to make some of our most important decisions.

But this category of information is not being leveraged by our companies in their digital transformation processes. A transformation that is **changing the way we interact with customers**, making our employees more productive, optimizing operations, and adapting our products and services to better reach our markets. We are focused on many types of data, but not visual data.

IDC Research Spain in its latest forecasts tells us that by 2021, 50% of organizations' revenue will come from the transformation of **digital business models based on platform economies** and data monetization. And by 2023, we will reach 80% of that share. Thanks to cognitive technologies, we will be able to monetize data in completely innovative ways.

The same market analysts indicate that by 2022, **75% of companies will incorporate intelligent automation** into technology and process development, using software based on Artificial Intelligence (AI) to uncover insights that help guide innovation. And an undeniably important application is computer vision.

There is no doubt that images and videos can help us improve, automate, and secure many business processes. This is because **solutions based on Computer Vision** can combine all the necessary components to harness much of the value of our visual assets. The process of digitalization is a race for the survival of companies, with Artificial Intelligence being the key to this journey.

### Let's imagine for a moment that we could be capable of:

Leveraging untapped image and video assets, or real-time captures.

Searching for information in your work environment in the same way you search the web to find things and people in real time.

Using machine learning to gain deeper insights from visual sources.

Scaling insights across our organization.

Increasing the potential for efficiency, accuracy, and scalability enabled by the cost of implementation or the human eye's inability to accurately detect the most subtle differences.

### **Every company needs [artificial] vision**

Artificial Intelligence applied to our data repositories can help us automate a multitude of tasks related to our internal processes and customers, define the most relevant KPIs, and reinforce the reasoning behind a particular decision. In short, it allows us to **predict**, **prescribe**, and act.

In practice, if we leverage the cognitive technologies already available on the market, we will be able to **monetize data in ways we never imagined**. It's all about using Artificial Intelligence to provide maximum value to all types of businesses in an agile manner.

Sometimes this will mean extracting knowledge from documentary information, other times through virtual assistants to

support customers or employees, or analyzing audio recordings to perform transcriptions, analyze trends, or gauge the sentiment of conversations. And going one step further, **applying Computer Vision in numerous and exciting work scenarios**, as we will see later.

Because every day, more companies of all sizes are implementing new computer vision solutions to drive their growth and operational efficiency in powerful use cases, ranging from marketing management to manufacturing processes. And if managed properly, these solutions require **little investment**, are **quick** to implement, and provide **scalable value**.

In a Forrester survey conducted with over 1,600 decision-makers in data and analytics whose companies are adopting AI, 83% of participants reported that they have implemented or are in the process of implementing a Computer Vision solution, or plan to do so within the next 12 months.

Source: The Forrester New Wave<sup>™</sup>- Computer Vision Platforms, Q4 2019







### ¿What is Computer Vision?

Computer vision is one of the **central application areas of Artificial Intelligence** (AI), aimed at creating solutions that enable AI-powered applications to "see" the world and make sense of it.

Of course, machines do not have biological eyes like ours, but they are **capable of processing images**, whether from a live camera or from photographs or videos in digital format. This ability to process images is key to creating software that can emulate human visual perception.

Today, technology is available to everyone to leverage this visual data just like any other data. With it, we can **train a Machine Learning model** to apply transformations and calculations to analyze image data and thus detect patterns within it.

In a quick summary, the possible applications of visual analysis are:

- Image classification
- Object detection
- Semantic segmentation (individual pixels of the image are classified based on the object they belong to)
- Image analysis
- Face detection (including analysis and recognition of gender, age, and emotional state)
- Optimal character recognition (OCR)

And by adding the ability to analyze video sequences, we introduce these additional applications:

- Motion detection
- Human pose detection, to identify behaviors
- Anomaly detection, when something unexpected occurs in the frame
- Etc.

The application scenarios are truly numerous, ranging from intelligent monitoring, security, or identity validation to advertising segmentation, automatic generation of titles and tags for content indexing, digitization of forms, and the ability to recognize handwritten text.



## What benefits can Computer Vision bring us?



#### Detection

By applying object detection, from identifying protective equipment on people to searching for facilities from satellite photos.



#### Workplace safety

With IoT Edge-enabled cameras, staff can be monitored within a controlled environment to determine entry into restricted areas, the amount of time spent there, and the number of people inside.



#### **Quality control**

Classifying objects based on different levels of deterioration or ripeness to discard them on a production line in real time, or massively through batch processes. This is achieved by applying Deep Learning to image detection.



#### Maintenance

Locating anomalies to focus predictive maintenance efforts on areas of greatest need, helping to plan work orders in the plant.



#### Inspections

Analyzing up to thousands of images per hour obtained through video, regular photography, Scanning Electron Microscopes (SEM), or X-rays to detect anomalies, identify, classify, and count cells, fibers, or any other elements.



#### Damage assesment

Locating and classifying the level of damage, being able to identify the parts that comprise the damage for subsequent automation of repair cost evaluation.



#### Thermography

Using thermal cameras and other spectrums to analyze and detect defects in industrial installations and machinery of all types.



#### **Measurements**

Automating the measurement of distances between two objects to check if they comply with regulations, or measuring the volume of a truck's load.



Microsoft researchers have developed an Artificial Intelligence system that can generate captions for images that, in many cases, are more accurate than the descriptions people are capable of writing.

## A technology that is already available, scalable, and secure

Today, there are several technological platforms that enable the development of Artificial Intelligence solutions. Among them, **Microsoft Azure** stands out because it provides the necessary elements to launch a true end-to-end project.

Azure's public cloud enterprise services platform is democratizing these types of solutions, making them **accessible to all kinds of businesses**, minimizing the necessary investments for their development and deployment, and offering a 99.9 percent availability guarantee. Microsoft Azure provides a scalable, secure, and reliable cloud platform for Al solutions, which includes data storage, computing, and services. Among the many enterprise services, the following stand out:

- Azure Machine Learning: A platform for training, deploying, and managing machine learning models.
- Cognitive Services: A set of services that developers can use to build AI solutions.
- Azure Bot Service: A cloud-based platform for developing and managing bots.



If we focus on Computer Vision, Azure offers a set of Cognitive Services solutions that specifically encapsulate workloads to successfully tackle computer vision projects. Among other services, we highlight **Custom Vision** (for image classification and object detection), **Face** (for face detection), the **OCR** API (for recognizing characters in small text blocks), the **Reading** API (for larger text blocks), and **Form Recognizer** (for form recognition). All these services are available to developers to create solutions in an agile manner and in the shortest time possible.



## Firm commitment to regulatory compliance

All of this is carried out while guaranteeing the **complete security and confidentiality** of the processed data. Both images and videos are automatically deleted after being processed in the cloud.

Moreover, Microsoft does not use customer data to train the underlying models. This ensures that **image/video data never leave the local environment** of each client, nor are they stored in the edge gateway where the container runs.

Emphasizing this crucial aspect of data protection, it is widely known that biometric data are considered a special category under Article 9, paragraph 1 of the European General Data Protection Regulation (GDPR) 2016/679. This includes not only fingerprints but also physical, physiological, or behavioral characteristics that can be associated with and used to uniquely identify individuals.

In this regard, all these restrictions, as well as their exceptions (which do exist), are carefully considered by Turing when developing Computer Vision solutions for its clients, always ensuring **strict regulatory compliance.** 



#### **About Turing Challenge**

Agility is the word that best defines us. We are a young company, strongly committed to #AgileAI, which we apply to develop solutions based on Artificial Intelligence. These are realized in projects involving Virtual Assistants, Audio Analytics, Computer Vision, and Knowledge Mining.

To achieve this, we rely on Cognitive Services technologies available within Microsoft Azure's platform. In doing so, we leverage the most innovative and ever-evolving technology, where clients only pay based on the number of transactions, thus maximizing their investments. This allows us to offer truly competitive solutions in both cost and timelines.

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