# TEXT 1

## Ten typical jobs graduates can do in IT

The IT industry is host to a whole range of job titles. To help you, we have deciphered ten of the top IT job titles you might encounter when searching for graduate jobs.

To make sure you find the right graduate IT job with the right employer, always check job descriptions carefully when applying so that you understand the skills and responsibilities of the role.

The IT industry is well known for its wide range of job titles which can make it hard for graduates interested in this sector to nail exactly what people do.

As a job-hunting graduate, you have got a lot on your plate, so we have decoded some of the more common job titles you may come across during your graduate job search. However, pay close attention to the job description of positions you apply for. Make note of the key skills and competences wanted and ask questions at interviews to find out more specific information about what the role will involve day to day. This will ensure that you find the right graduate job in IT with the right employer.

## Graduate job 1: Software engineer

Also known as: application programmer, software architect, system programmer/engineer.

This job in brief: The work of a software engineer typically includes designing and programming system-level software: operating systems, database systems, embedded systems and so on. They understand how both software and hardware function. The work can involve talking to clients and colleagues to assess and define what solution or system is needed, which means there is a lot of interaction as well as full-on technical work. Software engineers are often found in electronics and telecommunications companies. A computing, software engineering or related degree is needed.

Key skills include:

-analysis,

-logical thinking,

-teamwork

-attention to detail.

## Graduate job 2: Systems analyst

Also known as: product specialist, systems engineer, solutions specialist, technical designer.

This job in brief: Systems analysts investigate and analyze business problems and then design information systems that provide a workable solution, typically in response to requests from their business or a customer. They gather requirements and identify the costs and the time needed to implement the project. The job needs a mix of business and technical knowledge, and a good understanding of people. It is a role for analyst programmers to move into and typically requires a few years’ experience from graduation.

Key skills include:

-ability to extract and analyze information,

-good communication

-persuasion

-sensitivity.

## Graduate job 3: Business analyst

Also known as: business architect, enterprise-wide information specialist.

This job in brief: Business analysts are true midfielders, equally happy talking with technology people, business managers and end users. They identify opportunities for improvement to processes and business operations using information technology. The role is project based and begins with analyzing a customer’s needs, gathering, and documenting requirements and creating a project plan to design the resulting technology solution. Business analysts need technology understanding, but do not necessarily need a technical degree.

Key skills include:

-communication

-presentation

-facilitation

-project management

-problem solving.

## Graduate job 4: Technical support

Also known as: helpdesk support, IT support analyst, operations analyst.

This job in brief: These are the professional troubleshooters of the IT world. Many technical support specialists work for hardware manufacturers and suppliers solving the problems of business customers or consumers, but many works for end-user companies supporting, monitoring, and maintaining workplace technology and responding to users’ requests for help. Some lines of support require professionals with specific experience and knowledge, but tech support can also be a good way into the industry for graduates.

Key skills include:

-wide ranging tech knowledge

-problem solving

-communication/listening

-patience

-diplomacy.

## Graduate job 5: Network engineer

Also known as: hardware engineer, network designer.

This job in brief: Network engineering is one of the more technically demanding IT jobs. Broadly speaking the role involves setting up, administering, maintaining, and upgrading communication systems, local area networks and wide area networks for an organization. Network engineers are also responsible for security, data storage and disaster recovery strategies. It is a highly technical role, and you will gather a stock of specialist technical certifications as you progress. A telecoms or computer science-related degree is needed.

Key skills include:

-specialist network knowledge

-communication

-planning

-analysis

-problem solving.

## Graduate job 6: Technical consultant

Also known as: IT consultant, application specialist, enterprise-wide information specialist.

This job in brief: The term ‘consultant’ can be a tagline for many IT jobs, but typically technical consultants provide technical expertise to, and develop and implement IT systems for, external clients. They can be involved at any or all stages of the project lifecycle: pitching for a contract; refining a specification with the client team; designing the system; managing part or all the project; after sales support... or even developing the code. A technical degree is preferred, but not always necessary.

Key skills include:

-communication

-presentation

-technical and business understanding

-project management

-teamwork.

## Graduate job 7: Technical sales

Also known as: sales manager, account manager, sales executive.

This job in brief: Technical sales may be one of the least hands-on technical roles, but it still requires an understanding of how IT is used in business. You may sell hardware or extol the business benefits of whole systems or services. Day to day, the job could involve phone calls, meetings, conferences and drafting proposals. There will be targets to meet and commission when you reach them. A technology degree is not necessarily essential, but you will need to have a thorough technical understanding of the product you sell.

Key skills include:

-product knowledge

-persuasion

-interpersonal skills

-drive

-mobility

-business awareness.

## Graduate job 8: Project manager ✓

Also known as: product planner, project leader, master scheduler.

This job in brief: Project managers organize people, time, and resources to make sure information technology projects meet stated requirements and are completed on time and on budget. They may manage a whole project from start to finish or manage part of a larger ‘program’. It is not an entry- level role: project managers must be pretty clued up[[1]](#footnote-1). This requires experience and a good foundation of technology and soft skills, which are essential for working with tech development teams and higher-level business managers.

Key skills include:

-organization

-problem solving

-communication

-clear thinking

-ability to stay calm under pressure.

## Graduate job 9: Web developer ✓

Also known as: web designer, web producer, multimedia architect, internet engineer.

**This job in brief:** Web development is a broad term and covers everything to do with building websites and all the infrastructure that sits behind them. The job is still viewed as the trendy side of IT years after it first emerged. These days web development is technical and involves some hardcore programming as well as the more creative side of designing the user interfaces of new websites. The role can be found in organizations large and small.

Key skills include:

-basic understanding of web technologies (client side, server side and databases)

-analytical thinking

-problem solving

-creativity.

Usually, an independent entrepreneur or a community of collaborators. Rarely a paid position.

## Graduate job 10: Software tester ✓

Also known as: test analyst, software quality assurance tester, QA analyst.

**This job in brief:** Bugs can have a massive impact on the productivity and reputation of an IT firm. Testers try to anticipate all the ways an application or system might be used and how it could fail. They do not necessarily program, but they do need a good understanding of code. Testers prepare test scripts and macros, and analyze results, which are fed back to the project leader so that fixes can be made. Testers can also be involved at the early stages of projects in order to anticipate pitfalls before work begins. You can potentially get to a high level as a tester.

Key skills include:

-attention to detail

-creativity

-organization

-analytical and investigative thinking

-communication

Ten typical jobs graduates can do in IT. (2017). Available at: https://targetjobs.co.uk/career- sectors/it-and-technology/advice/286189-ten-typical-jobs- graduates-can-do-in-it [Accessed 19 Feb. 2017].

##### Make a chart including the main characteristics of each job. Be ready to discuss and comment on them

# TEXT 2

## Computers make the world smaller and smarter

The ability of tiny computing devices to control complex operations has transformed the way many tasks are performed, ranging from scientific research to producing consumer products. Tiny 'computers on a chip' are used in medical equipment, home appliances, cars and toys. Workers use handheld computing devices to collect data at a customer site, to generate forms, to control inventory, and to serve as desktop organizers.

Not only is computing equipment getting **smaller**, but it is also getting **more sophisticated**. Computers are part of many machines and devices that once required continual human supervision and control. Today, computers in security systems result in **safer** environments, computers in cars improve energy efficiency, and computers in phones provide features such as call forwarding, call monitoring, and call answering.

These smart machines are designed to take over some of the basic tasks previously performed by people; by so doing, they make life a little **easier** and a little **more pleasant**. Smart cards store vital information such as health records, drivers' licenses, bank balances, and so on. Smart phones, cars, and appliances with built-in computers can be programmed to **better** meet individual needs. A smart house has a built-in monitoring system that can turn lights on and off, open and close windows, operate the oven, and more.

With small computing devices available for performing smart tasks like cooking dinner, programming the DVD recorder, and controlling the flow of information in an organization, people can spend more time doing what they often do best - being creative. Computers can help people work more creatively.

Multimedia systems are known for their educational and entertainment value, which we call **'edutainment'**. Multimedia combines text with sound, video, animation, and graphics, which greatly enhances the interaction between user and machine and can make information **more interesting** and appealing to people. Expert systems software enables computers to 'think' like experts. Medical diagnosis expert systems, for example, can help doctors pinpoint[[2]](#footnote-2) a patient's illness, suggest further tests, and prescribe appropriate drugs.

Connectivity enables computers and software that might otherwise be incompatible to communicate and to share resources. Now that computers are proliferating in many areas and networks are available for people to access data and communicate with others, personal computers are becoming interpersonal PCs. They have the potential to significantly improve the way we relate to each other. Many people today telecommute -that is, use their computers to stay in touch with the office while they are working at home. With the proper tools, hospital staff can get a diagnosis from a medical expert at hundreds or thousands of miles away. Similarly, the disabled can communicate more effectively with others using computers.

Distance learning and videoconferencing are concepts made possible with the use of an electronic classroom or boardroom accessible to people in remote locations. Vast databases of information are currently available to users of the Internet, all of whom can send mail messages to each other. The information superhighway is designed to significantly expand this interactive connectivity so that people all over the world will have free access to all these resources.

People power is critical to ensuring that hardware, software, and connectivity are effectively integrated in a socially responsible way. People - computer users and computer professionals - are the ones who will decide which hardware, software, and networks endure and how great an impact they will have on our lives. Ultimately people power must be exercised to ensure that computers are used not only efficiently but in a socially responsible way.

Glendinning, Eric H.; McEwan, John (2006). Oxford English for Information Technology, Second Edition, Oxford University Press. Oxford: Oxford University Press.

## Find the answers to these questions in the text

1. Name some types of devices that use “computers on a chip.”

**Medical equipment, home appliances, cars and toys.**

2. What uses of handheld computers are mentioned in the text.

**To collect data at a customer site, to generate forms, to control inventory, and to serve as desktop organizers.**

3. What are the benefits of using computers with the following items?

A) Security systems:

**computers in security systems result in safer environments.**

B) Cars:

**computers in cars improve energy efficiency.**

C) Phones:

**computers in phones provide features such as call forwarding, call monitoring, and call answering.**

4. What smart devices are mentioned in the text?

**-Smart cards**

**-Smart phones**

**-Smart cars**

**-Smart appliances**

**-Smart houses**

5. What smart devices are mentioned in the text?

See above!

6. What are the advantages of multimedia?

**Multimedia systems are known for their educational and entertainment value, which we call 'edutainment'. Multimedia combines text with sound, video, animation, and graphics, which greatly enhances the interaction between user and machine and can make information more interesting and appealing to people.**

7. What can medical expert systems do?

**Medical diagnosis expert systems, for example, can help doctors:**

**-pinpoint a patient's illness.**

**-suggest further tests.**

**-prescribe appropriate drugs.**

8. How can computers help the disabled?

**The disabled can communicate more effectively with others.**

9. What types of computing systems are made available to people in remote locations using electronic classrooms or boardrooms?

**Distance learning and videoconferencing are concepts made possible with the use of an electronic classroom or board-room accessible to people in remote locations.**

10. What aspects of computing can people power determine?

**People power is critical to ensuring that hardware, software, and connectivity are effectively integrated in a socially responsible way.**

**People --computer users and computer professionals-- are the ones who will decide which hardware, software, and networks endure and how great an impact they will have on our lives.**

**Ultimately people power must be exercised to ensure that computers are used not only efficiently but in a socially responsible way.**

Find the comparative and superlative adjectives used in the text and make sentences.

* **Smaller:** Each square of the mantle contains four smaller squares of various sizes and colors.
* **More sophisticated:** In this case it will be necessary to adopt a more sophisticated approach, combining methodologies or embedding narrative.
* **Safer:** Do the proposals that are now before us make our world a safer place?
* **Easier:** We aim to make it easier to create the right business environment.
* **More pleasant:** This is generally perceived as more pleasant and greatly contributes to the comfort of the vehicle passengers.
* **Better:** This car is certainly better, but it is much more expensive.
* **More interesting:** We thought it was more interesting to offer smaller prices to the customers, but it was not possible.

# TEXT 3

## Six Important Stages in the Data Processing Cycle

Much of data management is essentially about extracting useful information from data. To do this, data must go through a data mining process to be able to get meaning out of it. There is a wide range of approaches, tools, and techniques to do this, and it is important to start with the most basic understanding of processing data.

### What is Data Processing?

Data processing is simply the conversion of raw data to meaningful information through a process. Data is manipulated to produce results that lead to a resolution of a problem or improvement of an existing situation. Like a production process, it follows a cycle where inputs (raw data) are fed to a process (computer systems, software, etc.) to produce output (information and insights).

Generally, organizations employ computer systems to carry out a series of operations on the data to present, interpret, or obtain information. The process includes activities like data entry, summary, calculation, storage, etc. Useful and informative output is presented in various appropriate forms such as diagrams, reports, graphics, etc.

### Stages of the Data Processing Cycle

**1) Collection** is the first stage of the cycle and is very crucial since the quality of **data collected** will impact heavily on the output. The collection process needs to ensure that the data gathered are both defined and accurate, so that subsequent decisions based on the findings are valid. This stage provides both the baseline from which to measure, and a target on what to improve. Some types of data collection include:

-**census** (data collection about everything in a group or statistical population),  
-**sample survey** (collection method that includes only part of the total population),  
-and **administrative by-product** (data collection is a byproduct of an organization’s day-to-day operations).

**2) Preparation** is the manipulation of data into a form suitable for further analysis and processing. Raw data cannot be processed and must be checked for accuracy. Preparation is about constructing a **dataset** from one or more data sources to be used for further exploration and processing. Analyzing data that has not been carefully screened for problems can produce highly misleading results that are heavily dependent on the quality of data prepared.

**3) Input** is the task where verified data is coded or converted into machine readable form so that it can be processed through a computer. **Data entry** is done using a keyboard, digitizer, scanner, or data entry from an existing source. This time-consuming process requires speed and accuracy. Most data need to follow a formal and strict syntax since a great deal of processing power is required to breakdown the complex data at this stage. Due to the costs, many businesses are resorting to outsource this stage.

**4) Processing** is when the data is subjected to various means and methods of manipulation, the point where a computer program is being executed, and it contains the program code and its current activity. The process may be made up of multiple threads of execution that simultaneously execute **instructions**, depending on the operating system. While a computer program is a passive collection of instructions, a process is the actual execution of those instructions. Many software programs are available for processing large volumes of data within very short periods.

**5) Output and interpretation** is the stage where processed information is now transmitted to the user. Output is presented to users in various report formats like printed report, audio, video, or on monitor. Output need to be **interpreted** so that it can provide meaningful information that will guide future decisions of the company.

**6) Storage** is the last stage in the data processing cycle, where data, instruction and information are held for future use. The importance of this cycle is that it allows quick access and **retrieval** of the processed information, allowing it to be passed on to the next stage directly, when needed. Every computer uses storage to hold system and application software.

The **Data Processing Cycle** is a series of steps carried out to extract information from raw data. Although each step must be taken in order, the order is cyclic. The output and storage stage can lead to the repeat of the data collection stage, resulting in another cycle of data processing. The cycle provides a view on how the data travels and transforms from collection to interpretation, and ultimately, used in effective business decisions.

**About the Author:** Phillip Harris is data management enthusiast, and he has written numerous blogs and articles on effective document management and data processing.

Important Stages in the Data Processing Cycle. [online] Enterprise Features. Available at: <http://www.enterprisefeatures.com/6-important-stages-in-the-data-processing-cycle/> [Accessed 19 Feb. 2017].

Ahmed Elgammal is the director of AICAN, a supposedly artificial intelligence project, who claims to have created an algorithm that measures artistic creativity. But Professor Ahmed has neither shown the algorithm nor defined what artistic creativity is. His few talks and articles leave a skeptic feeling. The most that he has shown is that his program is more a sort algorithm than anything else, in which originality is a variable (understanding originality as the use of a pattern that has not been used before, chronologically speaking). Therefore, the algorithm is heavily dependent on dates (which, with great imagination, he has named as a "time machine" procedure). One might think that his articles and public appearances are more intended to arouse expectation and thus obtain funds for his project, which does not seem to have gone beyond a theoretical proposal based on many "adjustments" (for example, based on a psychological interpretation of some aspects that he claims to have incorporated into his algorithm).

# TEXT 4

## Can You Teach Creativity to a Computer?

From Picasso’s “The Young Ladies of Avignon” to Munch’s “The Scream,” what was it about some paintings that arrested people’s attention upon viewing them, that cemented them in the canon of art history as iconic works?

In many cases, it is because the artist incorporated a technique, form or style that had never been used before. They exhibited a creative and innovative flair that would go on to be mimicked by artists for years to come.

Throughout human history, experts have often highlighted these artistic innovations, using them to judge a painting’s relative worth. But can a painting’s level of creativity be quantified by Artificial Intelligence (AI)?

At Rutgers’ Art and Artificial Intelligence Laboratory, my colleagues and I proposed a novel algorithm that assessed the creativity of any given painting, while considering the painting’s context within the scope of art history.

In the end, we found that, when introduced with a large collection of works, the algorithm can successfully highlight paintings that art historians consider masterpieces of the medium.

The results show that humans are no longer the only judges of creativity. Computers can perform the same task – and may even be more objective.

## Defining Creativity

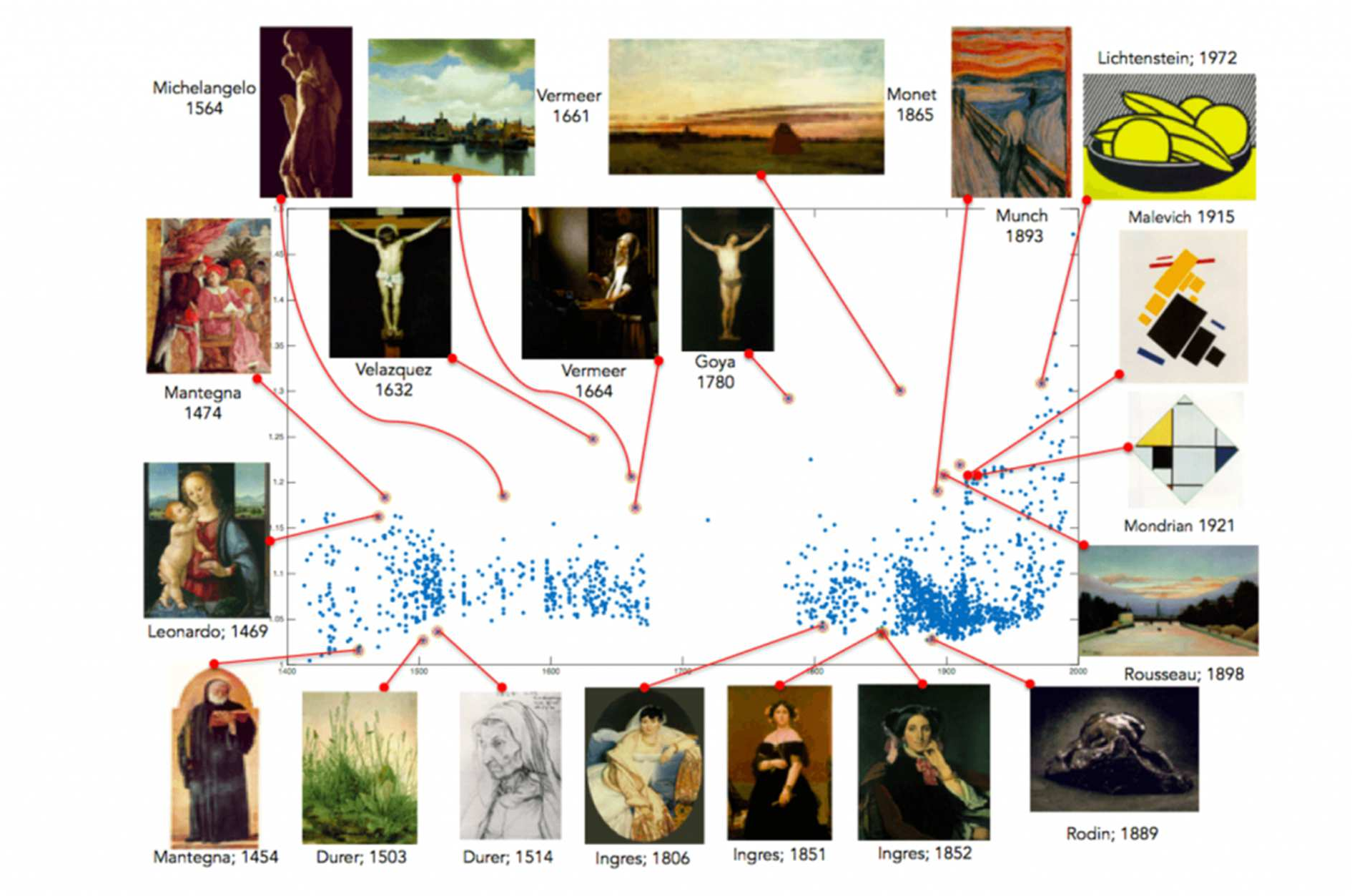
Of course, the algorithm depended on addressing a central question: how do you define --and measure-- creativity?

There is a historically long and ongoing debate about how to define creativity. We can describe a person (a poet or a CEO), a product (a sculpture or a novel) or an idea as being “creative.”

In our work, we focused on the creativity of products. In doing so, we used the most common definition for creativity, which emphasizes the originality of the product, along with its lasting influence.

These criteria resonate with Kant’s definition of artistic genius, which emphasizes two conditions: being original and “exemplary.”

They are also consistent with contemporary definitions, such as Margaret A. Boden’s widely accepted notion of Historical Creativity (H-Creativity) and Personal/Psychological Creativity (P-Creativity). The former evaluates the novelty and utility of the work with respect to the scope of human history, while the latter evaluates the novelty of ideas with respect to its creator.



A graph highlighting certain paintings deemed most creative by the algorithm.

Credit: Ahmed Elgammal

## Building the Algorithm

Using computer vision, we built a network of paintings from the 15th to 20th centuries. Using this web (or network) of paintings, we were able to make inferences about the originality and influence of each individual work.

Through a series of mathematical transformations, we showed that the problem of quantifying creativity could be reduced to a variant of network centrality problems – a class of algorithms that are widely used in the analysis of social interaction, epidemic analysis and web searches. For example, when you search the web using Google, Google uses an algorithm of this type to navigate the vast network of pages to identify the individual pages that are most relevant to your search.

Any algorithm’s output depends on its input and parameter settings. In our case, the input was what the algorithm saw in the paintings: color, texture, use of perspective and subject matter. Our parameter setting was the definition of creativity: originality and lasting influence.

The algorithm made its conclusions without any encoded knowledge about art or art history and made its assessments of paintings strictly by using visual analysis and considering their dates.



The Scream.

Credit: Wikimedia Commons

## Innovation Identified

When we ran an analysis of 1,700 paintings, there were several notable findings. For example, the algorithm scored the creativity of Edvard Munch’s “The Scream” (1893) much higher than its late 19th-century counterparts. This, of course, makes sense: it has been deemed one of the most outstanding Expressionist paintings, and is one of the most-reproduced paintings of the 20th century.

The algorithm also gave Picasso’s “Ladies of Avignon” (1907) the highest creativity score of all the paintings it analyzed between 1904 and 1911. This is in line with the thinking of art historians, who have indicated that the painting’s flat picture plane and its application of Primitivism made it a highly innovative work of art – a direct precursor to Picasso’s Cubist style.

The algorithm pointed to several of Kazimir Malevich’s first Suprematism paintings that appeared in 1915 (such as “Red Square “) as highly creative as well. Its style was an outlier in a period then- dominated by Cubism. For the period between 1916 and 1945, most of the top-scoring paintings were by Piet Mondrian and Georgia O’Keeffe.

Of course, the algorithm did not always coincide with the consensus among art historians.

For example, the algorithm gave a much higher score to Domenico Ghirlandaio’s “Last Supper” (1476) than to Leonardo da Vinci’s eponymous masterpiece, which appeared about 20 years later. The algorithm favored da Vinci’s “St. John the Baptist” (1515) over his other religious paintings that it analyzed. Interestingly, da Vinci’s “Mona Lisa” did not score highly by the algorithm.



Picasso’s “Ladies of Avignon.”

Credit: Wally Gobetz via Flickr

## Test of Time

Given the departures from the consensus of art historians (notably, the algorithm’s evaluation of da Vinci’s works), how do we know that the algorithm generally worked?

As a test, we conducted what we called “time machine experiments,” in which we changed the date of an artwork to some point in the past or in the future and recomputed their creativity scores.

We found that paintings from the Impressionist, Post-Impressionist, Expressionist and Cubism movements saw significant gains in their creativity scores when moved back to around AD 1600. In contrast, Neoclassical paintings did not gain much when moved back to 1600, which is understandable, because Neoclassicism is considered a revival of the Renaissance.

Meanwhile, paintings from Renaissance and Baroque styles experienced losses in their creativity scores when moved forward to AD 1900.

We do not want our research to be perceived as a potential replacement for art historians, nor do we hold the opinion that computers are a better determinant of a work’s value than a set of human eyes.

Rather, we are motivated by Artificial Intelligence (AI). The goal of research in AI is to make machines that have perceptual, cognitive, and intellectual abilities like those of humans.

We believe that judging creativity is a challenging task that combines these three abilities, and our results are an important breakthrough: proof that a machine can perceive, visually analyze, and consider paintings much like humans can.

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Can You Teach Creativity to a Computer? (2017). [online] The Crux. Available at: <http://blogs.discovermagazine.com/crux/2015/07/30/creativity-computer/#.WKkIBFWLTIV> [Accessed 19 Feb. 2017].

1. Al tanto. [↑](#footnote-ref-1)
2. Determinar con precision. [↑](#footnote-ref-2)