Module 1

Copyright and Maths.

Deliverable: IO1.A4.1

IPin STEAM

DATE

ASOCIACIÓN VALENCIA INNOHUB.
Authored by: María Gómez Rojas
Project Number: 2020-1-UK01-KA201-078934

Co-funded by the Erasmus+ Programme of the European Union

REVISION HISTORY

Version	Date	Author	Description	Action	Pages
1.0	20/01/2021	HESO	Creation	C	TBS

(*) Action: C = Creation, I = Insert, U = Update, R = Replace, D = Delete

REFERENCED DOCUMENTS

ID	Reference		Title
1	2020-1-UK01-KA201-078934		IPinSTEAM Proposal
2			

APPLICABLE DOCUMENTS

ID	Reference		Title
1			
2			

Contents

1. Title of the Module

1.1 Learning Outcomes

The main purpose of this module is to teach and explain what copyright is and what its applications can be in the field of mathematics, statistics, and big data. However, these two concepts are quite complicated to put together since copyright has not been used in this field so far. We will try to explain their possible applications in the future and the current situation of both disciplines.

After completing this module, you will be able to:

- To know the basic principles of intellectual property, specifically copyright.
- See how everything around us works and the influence of copyright on it.
- Relate the concepts of copyright and mathematics and learn more about how they are linked.

Estimated seat time: X hours

1.2 Main Content

1.2.1 Terms and Definitions

One of the most important IP concepts is Copyright. Everyone has heard the term copyright more than once, but do we really know what it is or what it is used for? In order to be aware of what copyright is, we should first know what Intellectual Property is and what is the place of copyright in this legal discipline.

First of all, Intellectual Property (IP) refers to an economic and cultural good, which concerns goods that are intangible, in other words, ideas or thoughts. Any intellectual production not explicitly covered by legislation cannot be considered Intellectual Property in the legal sense.

Copyright is one of the elements of Intellectual Property, which focuses on the exclusive right of the owner of the copyright. All authors, only for the simple fact of being authors, have a series of rights over their works that give them full capacity and exclusivity to be able to exploit them. These rights are known as Copyright and are of two types: moral rights and economic rights.

Both concepts are fundamental to know what copyright is and all the fields it can include, as well as its characteristics at a legal perspective.

Moral rights are inalienable and specific to the creator of a copyrighted material, and also allow the author to protect his or her work from being modified or released publicly without his or her permission. Economic rights, which are more commonly understood than moral rights, provide authors control over their intellectual property goods and a way to benefit from their creations' exploitation.

Why do we need copyright? Copyright is a way of attributing authorship to someone who has created a work, as well as providing them with a series of rights as author. It is a way of protecting this work so that the rights to its content can be managed by its creator. Copyright is automatically protected from

the moment a work is created, and they, like the most of Berne Convention countries (170+), do not need copyright licensing or other formalities for protection, permitting their creations to be distributed without concern of unauthorized access or piracy. With these rights, you also obtain the moral and economic rights to what you have protected with the copyright.

As these ideas are protected, it is necessary to ask for permission to use them. First of all, depending on whether copyright has been established, we need to know if any permission is needed to use them. Once this step is done, the next step is to identify the owner of the idea, as well as the rights that belong to the owner, so that we also know which rights to apply for in order to be able to make use of the idea. Subsequently, an agreement must be reached with the owner about the price to be able to use the idea, which depends more on the relationship between the applicant and the owner of the idea.

Copyrights offer a number of advantages over other IP forms, such as a legal life that is essentially longer - the creator's life plus 70 years! Many copyrights will not generate revenue for the duration of the founder's statutory life or longer.

Further advantage of copyrights is that the owner is entitled to true injuries as well as any extra perks enjoyed by the perpetrator, as well as constitutional damages. When compared to a patent case, calculating remuneration for a copyright dispute could be less difficult.

Finally, copyrights are often inexpensive and simple to get. When copyrightable works are fixed in a significant medium, artists gain protection and ownership of the work. Following that, the copyright owner obtains insurance without having to file a formal deed with the authorities.

Now it is time to talk about the fundamentals of what mathematics is. Mathematics is a formal science which, following logical reasoning, studies the properties, abstract structures and relationships between abstract entities such as numbers, geometric figures, icons, glyphs or symbols in general, and the relationship between them. Mathematics has evolved on the basis of calculating and measurement, including the systematic study of the structure and motion of real items, through abstraction and the use of logic in reasoning.

Mathematics is part of a universal language that anyone, with a minimum of training, can understand. It is just a matter of studying it with time, patience, and intelligent work. Nevertheless, mathematics is part of our daily lives. All technological or scientific advances in history have been possible, in part, thanks to this science and to the mathematicians who have contributed to its progress. Theorems such as that of Pythagoras, systems such as the law of universal gravitation, the laws of thermodynamics or the theory of relativity, are fundamental principles created by this discipline.

1.2.2 Theory behind the IP implementation

Although the relationship between copyright and mathematics is almost non-existent, as this discipline is not copyrightable, it has a strong link concerning the outcome of projects, development of computer projects, etc.

However, on this issue, since at the mathematical level we cannot get into how copyright can affect it. Nevertheless, as this module is also focused on BigData, we will see what controversies the symbiosis between both disciplines can generate.

From the outset, we must bear in mind that copyright often creates more problems than we realise. It is still a way of protecting and obtaining certain copyrights. In this case, we will talk about one related to one of the most exact sciences there is: mathematics.

First, there was a case in the Netherlands where mathematics and copyright are fully involved. A few years ago, a Dutch mathematics teacher created a website for his subject to help his students more and to give them more resources to better understand his lessons and, of course, to make studying easier for them.

In addition to his own exercises, he completed his website by copying and pasting links from a mathematics book from a Dutch publisher. The teacher's intention, according to his statements, was to make it easier to do the homework and to be better prepared for the exams.

The problem arose from the copying of the links to the publisher's pdf files. The latter decided to denounce the mathematics teacher, since he was infringing the copyright to which the mathematics exercises were subject.

In a case like this, there are two variables that affect both parties. Firstly, it can be argued that the exercises do indeed belong to the publisher, since they are protected by copyright, and it is the publisher who owns the rights to this work. On the other hand, we are faced with the dilemma that is constantly raised in this module: Mathematics is an exact science and does not belong to anyone, so this form of legislation should not be the case.

Finally, the court ruled in favour of the publisher. However, it was pointed out that the links with which the teacher had worked are not in themselves copyright infringements, but they do make it much easier to access the content.

On the other hand, we can talk about another case that, although it is about Big Data, has a lot to do with the implementation of IP in our society.

Big Data is a very useful tool, as it is a fundamental part of databases for data analysis methods. Being such an important tool, it clashes with the lack of legislation on this topic.

It is not just that there is a lack of legislation on this issue, but also that it is not protected in the same way in all countries, which contributes to making it difficult for companies to defend their defence strategies.

1.2.3 Practical examples

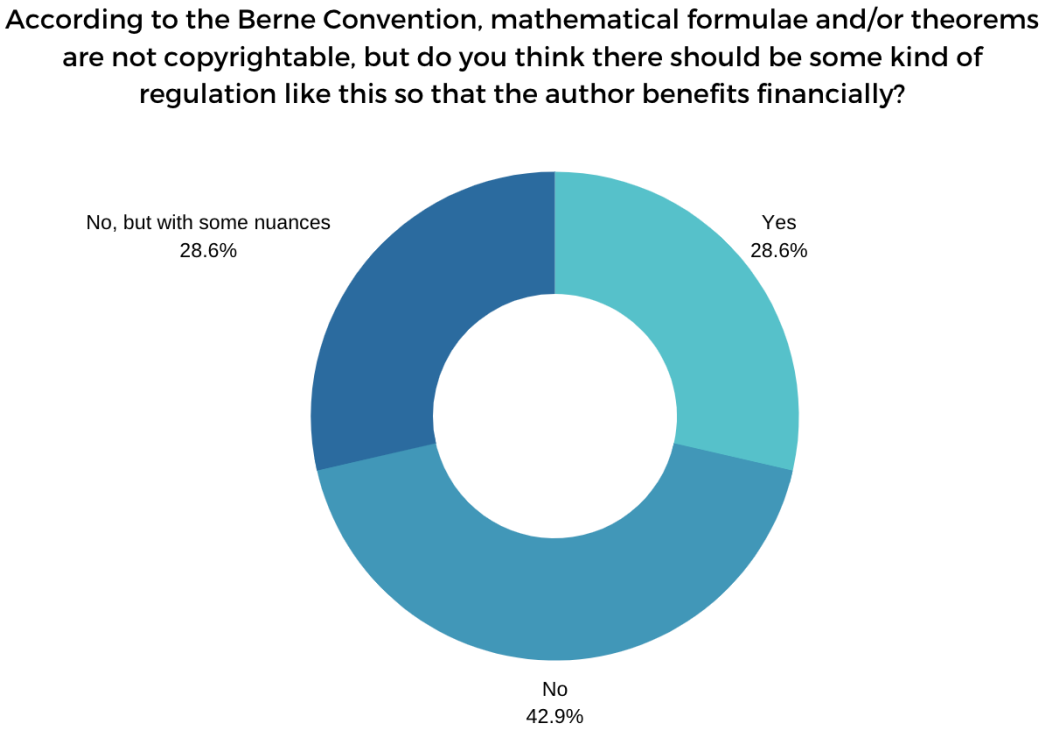
As we have seen throughout this module, the implementation of these two disciplines is more complicated than it seems, which is why, for the practical examples section, a survey has been carried

out with mathematicians from several Spanish universities so that, as far as possible, they can provide a more specific vision of this subject.

In the first question to the experts, they were asked something very basic but necessary for the continuation of the survey, which was whether they knew what copyright was. All of them agreed that they did know what it was, which gives the following questions a higher level of veracity.

We then asked them about the Berne Agreement. This agreement concluded, among other things, that mathematics could not be protected by copyright. However, as our experts have a very good background in the field of mathematics, we asked them whether they considered this decision to be the right one.

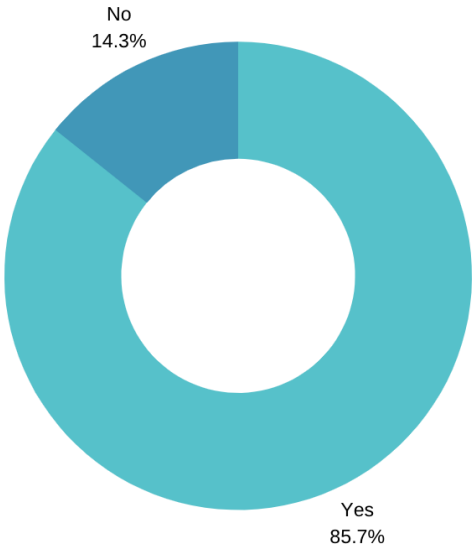
As we can see in the diagram, the opinions on this issue are quite different from each other, which means that there is no equality of opinion among the mathematicians surveyed.



The experts were then questioned about another important subject in the union of mathematics and copyright: open licenses. Free licenses, which advocate for a freer and more shared use of works and allow writers the option of not exercising all the exploitation rights given by copyright law, might be another alternative to copyright protection.

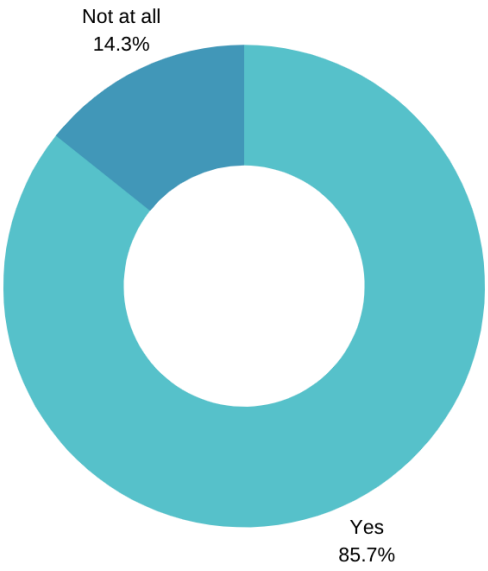
The response of the experts was almost unanimous. Except for one person, all would agree to implement a free licensing system.

Free licences could be another alternative to copyright protection as they advocate a freer and more shared use of works and give authors the possibility of not exercising all the exploitation rights provided for in copyright law. Do you think this type of protection would be more appropriate?



On the question of whether mathematics should belong to the public domain in any case, it was also widely accepted by the mathematical community we interviewed. Except for one person, the rest agreed that mathematics should belong to the public domain, as it is today.

Do you consider that mathematics should belong to the public domain in any case?



1.2.4 Case studies

This module was carried out among several mathematics graduates from the University of Valencia, the Autonomous University of Madrid, and the University of Valladolid. In the following, we will explain in more detail the above statistics on the relationship between mathematics and copyright.

On this subject, there are quite a few opinions in the mathematical community. As we have seen, it is a sufficiently controversial issue that it has very heterogeneous options.

First, a large part of the mathematical community has a clear opinion on the Berne Convention, particularly, on how it regulates the copyright system.

On this issue, many experts agree that the authorship of certain mathematical procedures should be reflected in some way, obviously, economically speaking. Their discovery or demonstration of achievement should be acknowledged and, therefore, there should be some form of protection.

On the other hand, the option is put forward that, as in most fields of interest for the development of humanity, in this case mathematics, the state should provide more funding and reward particularly relevant results in the field. This suggests a greater state interventionism, as well as a completely necessary impulse at the level of aid and support for research, which is fundamental for the progress of society.

From this, we can learn a lot, in addition to the different points of view provided by the experts, we have to elaborate our own thinking according to what we have been able to learn in this module.

1.3 Knowledge Assessment

Quiz-like assessment based on the main content. Please mark the correct answer with bold when required. Include 10 questions for your module. Increase gradually the level of difficulty.

Question 1: Copyright belongs to intellectual property
[True] [False]

Question 2: There are two types of copyright
[True] [False]

Question 3: Why can't mathematics be copyrighted?
[Because of the Berne Convention regulation]
[Because our legal system is different]
[Because we have not progressed far enough to consider it.]

Question 4: Tick the two correct copyright types
[Moral rights] [Economic rights] [Legal rights] [European Rights]

1.4 Skills Assessment

To begin, the purpose of the first question is to determine respondents' degree of awareness regarding copyright. Most of them appear to grasp what copyright is, which makes the remainder of the survey much simpler to understand. However, there are two persons who, while they understand what a copyright is, could not express it in their own words. This indicates that even if they are familiar with the phrase or have some idea of what it is, it is not a concept they have mastered. Because the two professions are so dissimilar, there is still a long way to go before both can be incorporated.

We have shown that copyright and mathematics are disciplines that feed off each other and require each other, but they are not complimentary. Although design necessitates mathematics, the latter is not normally copyrighted; the question is, should it be?

As a result, to have a more realistic and analytical view on this subject, we must ask ourselves some questions. To register anything as copyright implies a notion of ownership that is not prevalent in the mathematical community; thus, should we go into an area that is not ours, knowing that the rest of the cases beyond our borders have failed?

Several possibilities can be proposed in response to this thought. First and foremost, we might consider anything that can reward the mathematical community's efforts and all the conceivable applications that they have supplied us with and that have become a part of our everyday lives. However, we must keep in mind that there is no sense of ownership in this guild, in which merits are assigned to these people, so perhaps meddling in an area that does not belong to us is not the best thing to do.

2. References

https://carlosguerrero.es/2014/07/23/derechos-de-autor-y-formulas-matematicas/
https://www.rsme.es/politica-de-proteccion-de-datos/
https://www.europapress.es/portaltic/internet/noticia-condenan-profesor-matematicas-cogar-enlaces-ejercicios-20130117151904.html
https://www.expansion.com/juridico/actualidad-tendencias/2016/07/21/5790f26bca4741b53a8b459f.html
https://es.wikipedia.org/wiki/PageRank
https://yourbusiness.azcentral.com/trademark-food-7592.html
https://www.ted.com/talks/rob_reid_the_8_billion_ipod?language=es#t-165263
https://www.expansion.com/juridico/actualidad-tendencias/2016/07/21/5790f26bca4741b53a8b459f.html