COMBINATORIAL STUDY IMPLEMENTATION IN KAGGLE APPLICATIONS

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ABSTRACT

One of the core subjects of Mathematics is that students are expected to have the ability to understand concepts, explain the interrelationships between concepts and apply concepts accurately, efficiently and precisely in solving problems. There are many students who, after learning mathematics, are unable to understand even the simplest parts, many concepts are misunderstood so that mathematics is considered a difficult science. Understanding the concept is the most important part in learning mathematics, one of which is in combinatorial material, increasing the understanding of combinatorial concepts needs to be pursued for the success of students in learning. Combinatorial is a branch of mathematics for calculating the number of possible arrangements of objects without having to enumerate all possible arrangements. Kaggle is a site or platform that holds competitions in the field of Data Science, kaggle is also a common (practically) Science learning resource. For this reason, an early introduction to this technology is needed for students who are still in school. Writing this article aims to get an overview of students' understanding of the concepts of combinatorial and kaggle so that students can apply questions about combinatorial to kaggle.

Keyword : Combinatorial, Kaggle, Enumeration, Data Science

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1. INTRODUCTION

Combinatorial is a branch of mathematics concerning special objects. Combinatorial aspects include counting objects that meet certain criteria, determining whether criteria are met, analyzing or searching for objects that meet criteria, determining the "largest", "smallest", or "optimal" object, and determining the structure of an object. Combinatorial allows students to have the basic ability to count objects to solve a problem. Without us realizing it, there are lots of combinatorials that we can meet around us, such as in dice games, making vehicle plates and much more. Currently, informatics has developed very rapidly. Informatics itself is an engineering discipline that deals with the problem of transformation or processing of symbolic facts using computers through logical processes. In informatics, the most related thing is programming language or computer language. This research was conducted to find out that the kaggle site or platform can work on combinatorial questions.

One of the core subjects of Mathematics is that students are expected to have the ability to understand concepts, explain the interrelationships between concepts and apply concepts accurately, efficiently and precisely in solving problems. There are many students who, after learning mathematics, are unable to understand even the simplest parts, many concepts are misunderstood so that mathematics is considered a difficult science. Understanding the concept is the most important part in learning mathematics, one of which is in combinatorial material, increasing the understanding of combinatorial concepts needs to be pursued for the success of students in learning. Combinatorial is a branch of mathematics for calculating the number of possible arrangements of objects without having to enumerate all possible arrangements. Kaggle is a site or platform that holds competitions in the field of Data Science, kaggle is also a common (practically) Science learning resource. For this reason, an early introduction to this technology is needed for students who are still in school. Writing this article aims to

get an overview of students' understanding of the concepts of combinatorial and kaggle so that students can apply questions about combinatorial to kaggle.

2. RESEARCH METHOD/MATERIAL AND METHOD/LETERATURE REVIEW

There are 2 research methods in this research, namely:

1. Literature review, to understand theoretically about combinatorial, and kaggle data obtained from journals and articles from the internet.
2. The simulation is carried out using questions and is completed by kaggle.

This study aims to find out that kaggle can work on a case regarding combinatorial problems. This research also adds insight into combinatorial, and adds insight in the field of information technology by solving a math problem using kanggle. This research method is useful for honing students' skills in using kaggle.

A. Combinatorial

Combinatorial is a branch of mathematics that is useful for counting the number of possible arrangements of objects without having to enumerate all possible arrangements.

Example: A password is 6 to 8 characters long. Characters can be letters or numbers. How many possible passwords can be created.

- Abcdef
- Aaade
- a123f
- erhtgahn
- Yutrsik

B. Basic Principles of Counting

1. The principle of sum (rule of sum)

If a set A is divided into subsets A1, A2, ..., An, then the number of elements in set A will be equal to the sum of all the elements in each subset A1, A2, ..., An. Indirectly, on the principle of addition, each subset of A1, A2, ..., An does not overlap (disconnect from each other). For sets that overlap each other, the addition principle no longer applies, and this must be solved by the inclusion-exclusion principle. For example:
Experiment 1 : p result
Experiment 2 : q results
then, Experiment 1 or experiment 2: p + q results

Example :

1. If there is only 1 class leader (male or female). The number of boys in the class is 25 and the number of girls is 15. How many ways can the class president be chosen? Completion: 25 + 15 = 40 ways.
2. A student wants to buy a motorcycle. He was faced with choosing one type of three motorcycle brands, Honda 3 choices, 2 choices for Suzuki, and 2 choices for Yamaha. Thus, the student has a choice of 3 + 2 + 2 = 7 choices.

2. The Principle of Multiplication (rule of product)

Suppose a procedure can be broken down into two assignments. The first assignment can be done in n1 ways, and the second task can be done in n2 ways after the first task is done. Thus, there are (n1 x n2) ways to do the procedure. Indirectly, in multiplication principle, there can be overlap (not mutually exclusive).
Rules, For example:
Experiment 1: p results Experiment 2: q results
then, Experiment 1 and experiment 2: p x q results

Example :
The number of male students in class 2.F is 31 people while the number of women is only 4 people. To elect 1 male and 1 female representative. In how many ways can the 2 representatives be chosen?
Solution: 31 x 4 = 124 ways.

C. Principles of Inclusion and Exclusion

Suppose A and B are arbitrary sets, Addition |A|+|B| calculate the number of elements in A that are not in B and the number of elements in A that are not in A and the number of elements in A ∩ B.
Therefore, subtracting the number of elements contained in A ∩ B from |A|+|B| makes the number of elements A ϵ B counted exactly once, Thus|A u B|= |A|+|B|-|A ∩ B|
The generalization of this for a combination of a number of sets is called the principle of inclusion and exclusion.

Example: In a class there are 29 students who like discrete mathematics, 17 students like linear algebra and 11 of them like both. How many students are in the class?

Resolution:
Example:
A = student who likes discrete mathematics
B = student who likes linear algebra
According to existing data:
|A|=29 ; |B|=17 ; |A ∩ B|= 11
|A u B|= |A|+|B|-|A ∩ B|= 29 + 17 – 11 = 35

D. Combinations

A special form of permutation is combination. If the order of occurrence is taken into account in permutations, then in combinations, the order of occurrence is ignored.

Combined Interpretation

C(n, r) is the number of subsets consisting of r elements that can be formed from a set of n elements.

Example :
Let A = {1, 2, 3}Sum of a subset with 2 elements:
{1, 2} = {2, 1}
{1, 3} = {3, 1}
{2, 3} = {3, 2}

E. Discrete Opportunity

The probability that an event E occurs, which is a subset of the sample space S in which each event has the same chance of occurring is given by P(E) = |E|/|S|
In this definition, both E and S are sets, thus the sign |-| represents the cardinality or the number of members of the set.
Probability values range from 0 (related to events that will never occur) to 1 (for events that will definitely occur). Discrete odds have the following properties:

1. 0 £ p(xi) £ 1, that is, the probability value is a non-negative number and is always less than or equal to 1.
2. S p (xi) = 1, that is, the total probability of all sample points in the sample space S is 1.

Example :

- On throwing the dice, S = {1, 2, 3, 4, 5, 6}. The probability of each number appearing is the same, which is 1/6
- A coin that has sides A and sides B is tossed up 4 (four) times.
  What is the total probability that side A will appear 3 (three) times?
  The appearance of side A 3 (three) times is C (4, 3) = 4
  The total number of experimental results is 2x2x2x2 = 16,
  so the probability of side A appearing 3 times is 4/16 = ¼

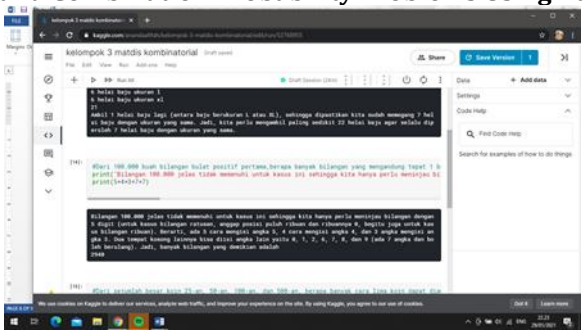
F. Kaggle

Kaggle, a subsidiary of Google LLC, is an online community of data scientists and machine learning practitioners. Kaggle enables users to discover and publish data sets, explore and build models in a web-based data science environment, work with data scientists and other machine learning engineers, and enter competitions to solve data science challenges.

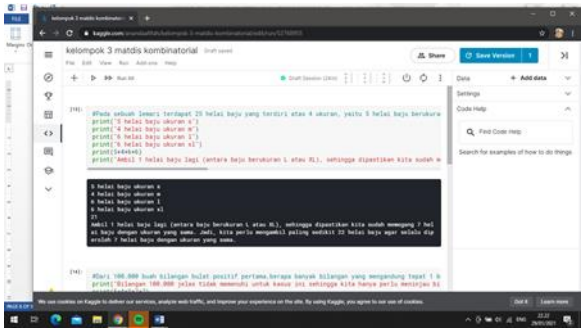
Kaggle started its business in 2010 offering machine learning competitions and now also offers a public data platform, a cloud-based workbench for data science, and Artificial Intelligence education. Its main personnel are Anthony Goldbloom and Jeremy Howard. Nicholas Gruen was the founding chairman replaced by Max Levchin. Equity was raised in 2011 to a company value of $25 million. On March 8, 2017, Google announced that they were acquiring Kaggle.

3. RESULTS AND DISCUSSION

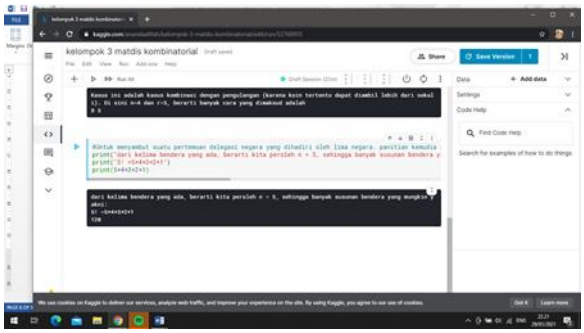
A. Solving Permutation and Combination Probability Problems Using Kaggle



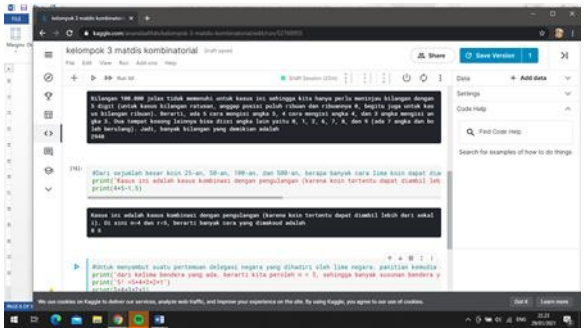
(a)



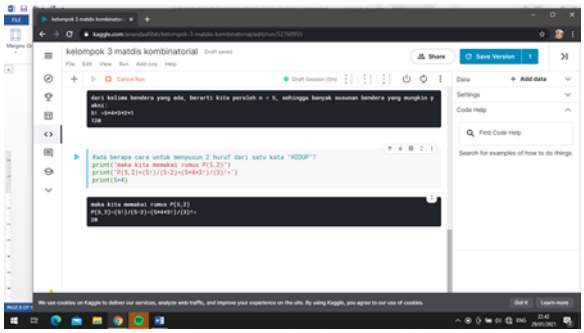
(b)



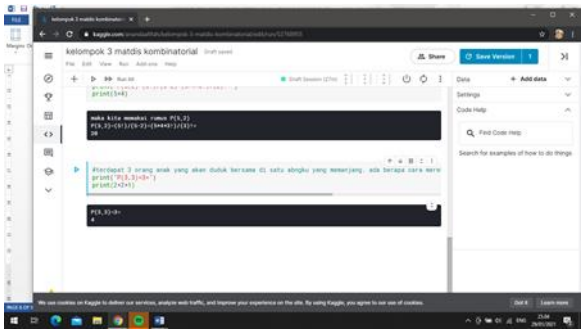
(c)



(d)



(e)



(f)

Figure 1. Solving Permutation and Combination Probability Problems Using Kaggle, (a) (b) (c) (d) (e) (f)

4. CONCLUSION

Combinatorial is a branch of mathematics concerning special objects. The combinatorial aspects include calculating objects that meet certain criteria, determining whether criteria are met, analyzing or searching for objects that meet the criteria, determining the "largest", "smallest" or "optimal" objects. There are 2 calculations, namely, the addition and multiplication principles, the inclusion and exclusion principles, permutations, combinations, and discrete opportunities. Kaggle is Kaggle is a site/platform that holds competitions in the field of Data Science. This site is also a source of learning General Data Science (in practice).

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