

Statistics for Data Science -1

Lecture 5.6: Applications

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Learning objectives

1. Understand basic principles of counting.
2. Concept of factorials.
3. Understand differences between counting with order (permutation) and counting without regard to order (combination).
4. Use permutations and combinations to answer real life applications.

Applications: Permutations or combinations

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- ▶ Important to distinguish between situations involving combinations and situations involving permutations.

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- ▶ Permutation- “order matters”. Combination - “order does not matter”

Example: Finishing a race

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Order is not important- Hence we need combination. Answer is ${}^8C_3 = 56$ ways.

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Example: Selecting a team

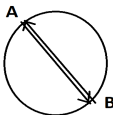
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 2. How many different ways can we choose a captain and vice captain? Order important- -hence, permutation Answer: ${}^{40}P_2 = 1560$ ways

Example: Drawing lines in a circle

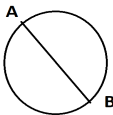
- ▶ Given n points on a circle, how many lines can be drawn connecting these points?

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- ▶ Given n points on a circle, how many lines can be drawn connecting these points?
- ▶ Solution:
 1. If the segment has a direction line segment AB is different from BA . Order is important. Hence, total number of ways is ${}^n P_2$



2. If segment has no direction. Line segment AB . Order is not important. Hence, total number of ways is ${}^n C_2$.



Section summary

- ▶ Need to distinguish between permutation and combination.
- ▶ Examples of situations where permutation is applied, combination is applied.