FUN WITH FERMI

WELCOME

Lucky people take their interests, turn them into passions, and find their purpose. Such was the case with Enrico Fermi, a physicist that revolutionized his field, earning a Nobel Prize in Physics, and changing how the world understands itself.

He also was famous for his estimations, which is what we will be playing with today. We will be creating a Fermi gym where you can workout your brains crafting estimates for questions that are either difficult or impossible to measure directly. Known as Fermi Problems (or Fermi Questions), they are a lot of fun, so buckle up for this wild ride into estimation!

RESOURCES

- Enrico Fermi Biography (Wikipedia)
- Fermi Problem (Wikipedia)
- Back-of-the-envelope calculations (Wikipedia)
- Dimensional Analysis (Wikipedia)
- University of Maryland Fermi Problems Site

WARM-UP

Just as you should warm up before exercising, let's warm up your brains before jumping in.

As background, Fermi typically did his calculations of such problems in his head, because he wasn't trying to get an exact number. Remember, these are problems that cannot be measured directly, or could only be measured directly with a prohibitive level of effort.

Your goal is to come up with estimations based upon good reasoning and your general knowledge. To increase the challenge, try not to use a calculator.

Present your answer as a best, back-of-the-envelope calculation, and include a confidence interval, as an added level of good analytical communication. Be prepared to defend your reasoning!

QUESTION: How many quarters would it take to make a stack the height of the Big Ben clocktower in London?

GAME ON

We will work through as many questions as possible, pausing between questions, so that you can present your methodology, reasoning, and results.

Question 1. How many bottles of ketchup do people use in the world each year?

Question 2. How many intelligent civilizations are there in the galaxy?

Question 3. How long would it take to watch every video on YouTube?

Question 4. How many dogs are there in the world?

Question 5. How many croissants are made in France every day?

Question 6. How many children are there in the world?

APPLICATION

WHY do we care about Fermi Problems? That's a great question. Brainstorm possible applications for this type of estimation with your team.

For every application your team thinks of that no other team thinks of, you get a point. May the most creative team win!

Have fun after creating and solving your own Fermi problems!

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