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Why Do We Search for Symmetry?

Summarizing talks from 'Closer To Truth' YouTube channel



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Symmetry is a fundamental concept in mathematics that has been used for centuries to describe the beauty and order in the world around us. But symmetry is more than just a matter of aesthetics. It also plays a crucial role in organizing and understanding complex systems.

But what is it? Say, for example:

- In Geometry, symmetry is such transformation which preserves the shape and distances of points within.
- In Physics, symmetry is such transformation which preserves applicability of laws of Physics.

In recent years, there has been a growing interest in the use of symmetry in artificial intelligence especially in Deep learning algorithms. Here are summary jottings of talks given by some of the authorities in this field.

Lee Smolin

- Symmetry of translation is only approximate, like other symmetries.
- As world is always evolving so the underlying assumptions are changing
- At high level we may see the symmetry but going deep, its not there.
- Its emergent property not the fundamental one.

Frank Wilczek

- Best guide to invent new laws is symmetry

- Distinct but not different.
- There must be some fundamental symmetry at the start but has got spoiled now, due to mixture with non-symmetric fields.

Leonard Susskind

- Universe what it is, neither beautiful nor not-beautiful. We decide that. We impose that.
- Physics symmetries are approximate, accidental but can be useful.
- Simple does not mean true.
- Symmetry is not the fundamental nature of the universe.
- We are still away from the final laws.

Lisa Randall

- Physicist are looking for simplicity (unifying principles) and not beauty.
- Organize theories and systems according to symmetries.
- Super-symmetry is still theoretical and not experimental evidence

Jenann Ismael

- We see lot of symmetry in nature because nature ‘copies’. So gets, ‘regularity’.
- We need symmetry-breaking to have some differentiation, else everything will look the same.
- Need Regularity + Randomness.

Robert B. Laughlin

- When you find regularities (symmetry), you need not do all experiments, but just the needed ones.
- Symmetry does not cause things but is consequence of things.
- Simplicity comes from self-organization, gives rise to Symmetry, but its not fundamental.
- Broken symmetry just means phase transition

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Same interface for private/public models
(* need API keys ...)

Agents

- Action : step by step
- Plan: decide all steps first

chain1 llm (prompt)
Seq (chain1 & chain2)
response = chain1.run("...")
Prompt Template
"Tell me about" from
"Food" "India"
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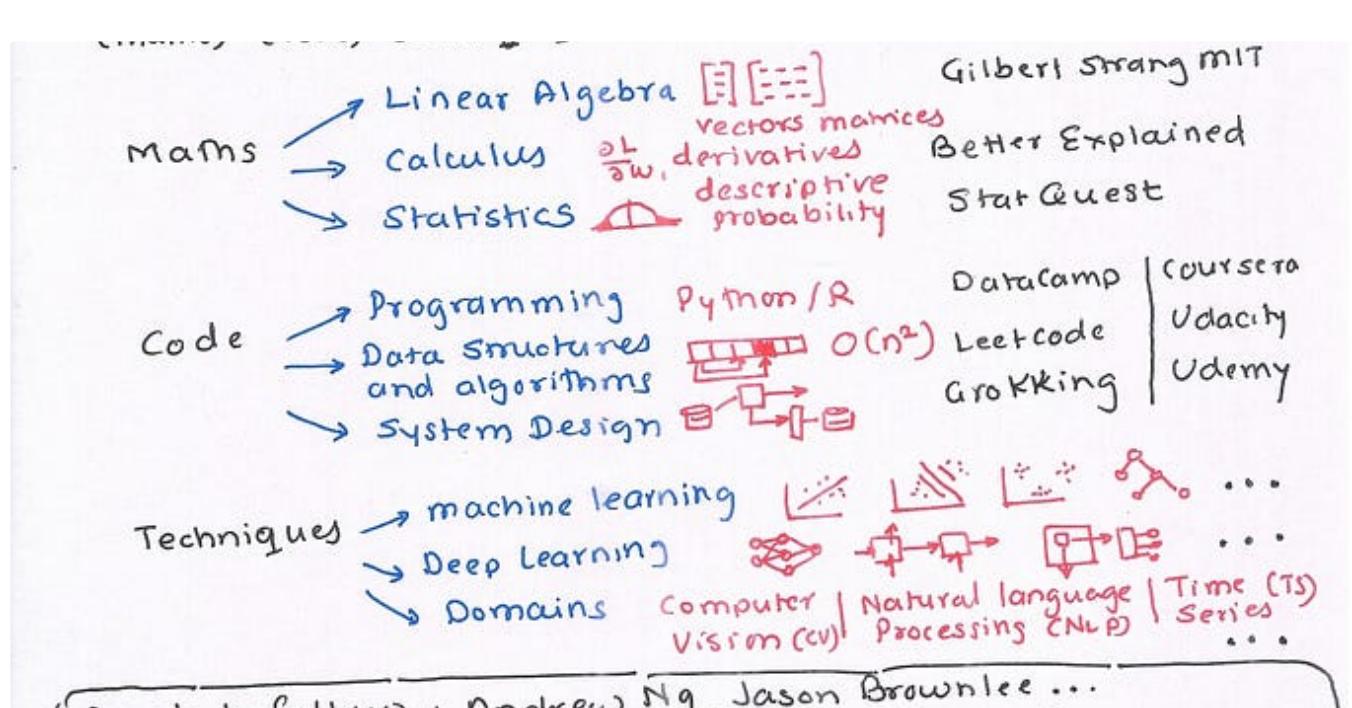
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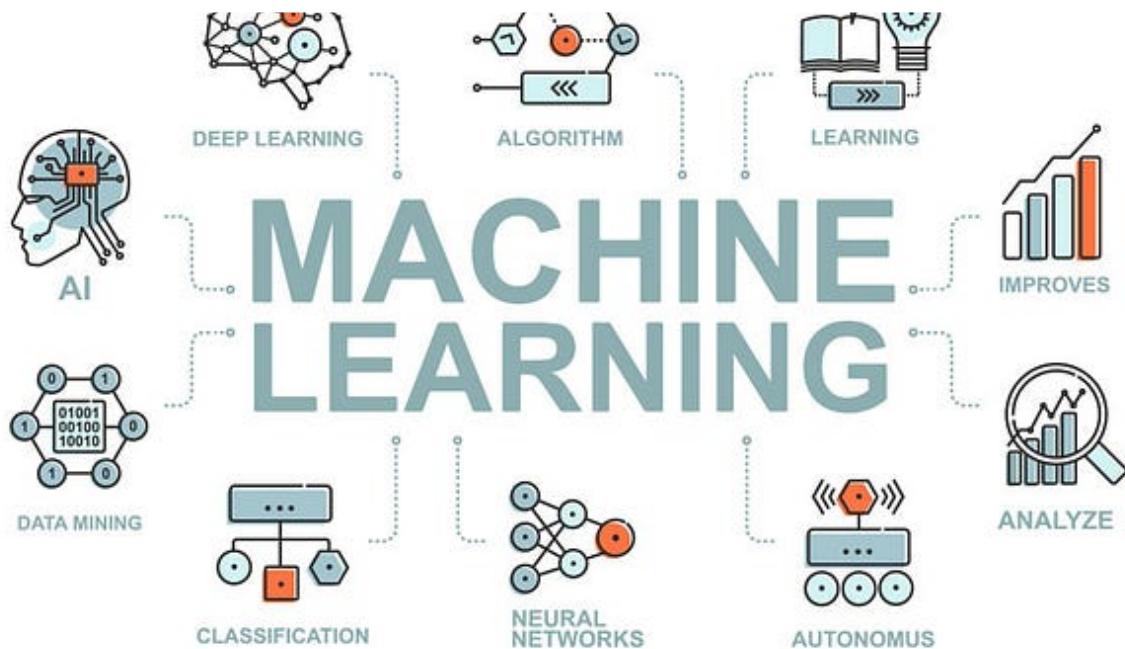
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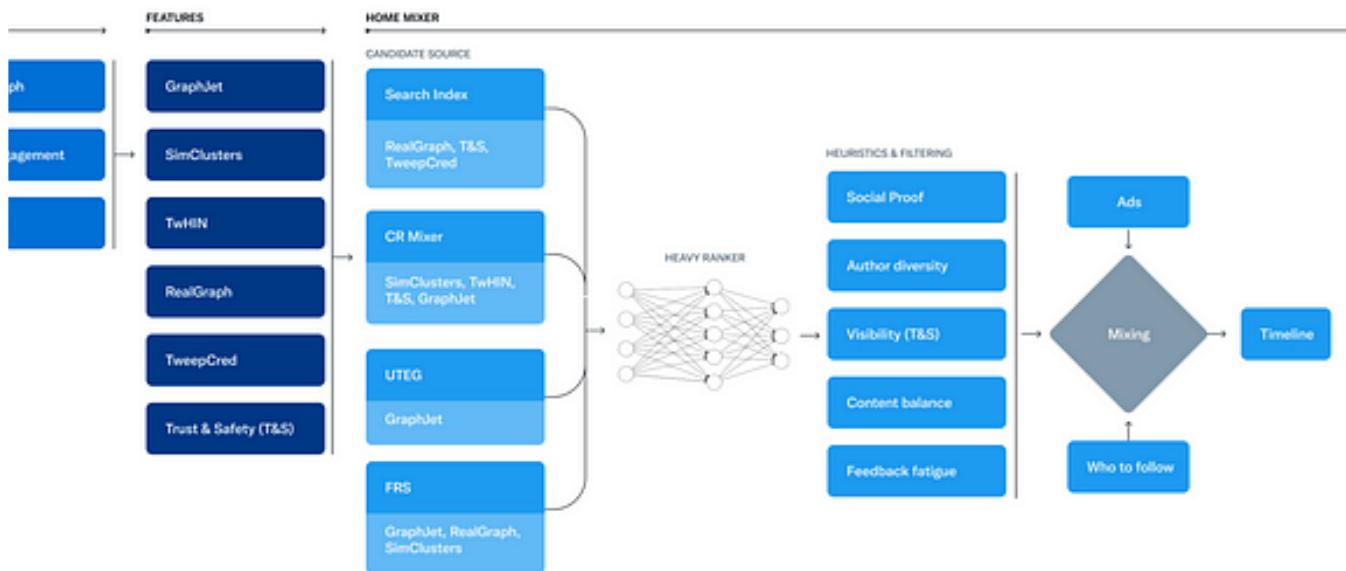
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