Paper: AGI from the perspectives of categorical logic and algebraic geometry

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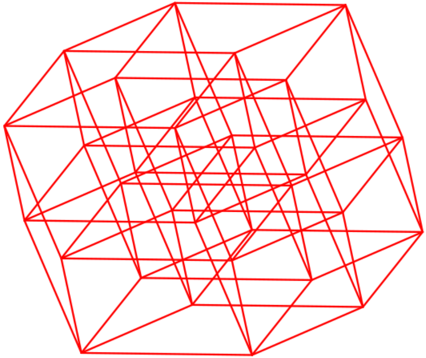
Part I

How does “No Free Lunch” guide us to accelerate AGI?

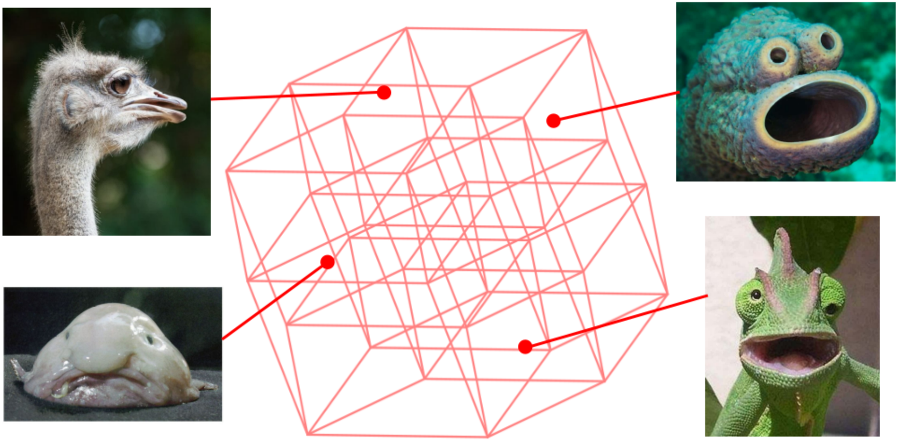
The hypothesis space

In deep learning, our hypothesis space = neural networks = parameter space = weight space = $\mathbb{R}^n$ or $[0, 1]^n$.
It looks like this:



Imagine a loss function as sitting above this space; We seek to minimize it by gradient descent.

The hypothesis space has plenty of “dumb structures”



- Nature has produced more dumb animals than intelligent ones

Part II

Basics of categorical logic

Curry-Howard isomorphism

- “Floating” regions and points as models

Part III

Fibrations in particular

Definition of a **fiber bundle**

A **fiber bundle** is a tuple $\xi = (E, p, B, F)$ such that:

(i) E = **total space**

(ii) B = **base space**

(iii) F = a topological space called the **fiber** of ξ

(iv) $\begin{matrix} E \\ \downarrow p \\ B \end{matrix}$ is a continuous surjective map, called the **projection**

(v) for each point $b \in B$, the inverse image $p^{-1}(b) = F_b$, called the **fiber over** b, is homeomorphic to F

(vi) B has an opening covering $\{U_a\}_{a \in A}$ such that for each $a \in A$, there is a homeomorphism: $\psi_a : U_a \times F \to p^{-1}(U_a)$.

If F is a discrete space, then the structure $F \hookrightarrow E \xrightarrow{p} B$ is called a **covering** of B.

The condition (vi) is just a re-phrase of (v) in the form of open sets, similar to the "gluing" together of charts in differential manifolds. So the essential condition is (v).

The "boring" cross product

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is equivalent to $A \times A \times A$.

References

Thanks for watching ☺️