Introduction and Random Thoughts on AI

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Today and Tomorrow

- NN for regression (supervised)

- NN for classification (")

- PCA/NLPCA, and more (unsupervised)

- Satellite remote sensing

- Accelerating numerical models

- Performance assessment/verification

- Fuzzy logic (great pictures)

- Genetic algorithms

- Illustration of SNNS

This Talk

What is AI?

- The branch of computer science that deals with writing computer programs that can solve problems creatively.

- The hope to imitate or duplicate intelligence in computers and robots.

- The study of how to create a computer that can "think" like a human being.

- The subfield of computer science concerned with the concepts and methods of symbolic inference by computer and symbolic knowledge representation for use in making inferences.

- An attempt to model aspects of human thought on computers.

- Trying to solve by computers any problem that a human can solve faster.

- Problem solving without physics. (my definition)

AI Definition, Continued ...

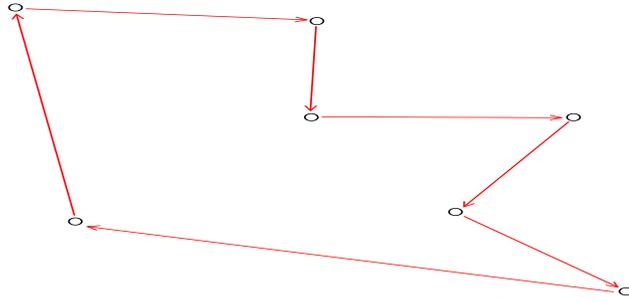Clearly, concocted by people out of touch with reality.

Solving = Searching

"Artificial Intelligence"	3,150,000
AI AND search	2,170,000
AI AND grass	23,400
AI AND cream	20,300
AI AND vegetable	8,910
AI AND violin	7,780
AI AND pinky	1,290
AI AND scissor	832

AI AND applications $\rightarrow$ AMS/AI 2nd/1,240,000.

Traveling Salesman/person

What's the shortest route between N cities?

Only way: Consider all routes, then take shortest.

But there are (N-1)! routes.

Sterling's formula:

$$(N-1)! \sim \sqrt{2\pi N} \exp^{N \log N - N},$$

Most calculators can't even compute 64! .

AI attempts to make the search more practical.

The catch: Only a local minimum.

AI Includes:

Field	Basic Idea
Decision Trees	Sequence of if-then statements
Neural Networks	Interconnected simple processors
Fuzzy Logic	Membership functions
Statistics	Distributions

Some emphasize the search.
Others (e.g., statistics) emphasize a model.

Some better for "industrial" (zero-error),
Others better for statistical (error).

E.g., learning some function vs. inferring it from data.

Similarities:
complexity of a NN $\leftrightarrow$ complexity of a decision tree

Differences:
former inferred from data, latter provided a priori

Intelligence

Specifically, intelligence of a model.

- Compute amount of information the model contains.
- Compute amount of information a Turing machine contains.

Then,

Intelligence = Entropy (Turing) - Entropy (model)

Problematic, almost philosophical.
E.g. Occam's Razor.

Lots of interesting and open problems.

Single Lesson

Do not ponder on what AI is, or whether NNs are the same as statistics, or whether they are superior, etc..
Instead, utilize all that's been developed in all.

Miscellaneous

Instructors: Summarize with one short sentence (or word).

Committee: Lobby at 6:30PM, tonight.

Students: If in job market + stat+AI+meteo background, then see me.