I intended to write this as my final report for LTI colloquium, but it is kind of too short.

Elephant and AI

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I used to fancy an image of “The old Man and The Sea”--- leaping out of the sea level, a giant sailfish, that represents the holly algorithm of “intelligence”. This image, however, has gradually faded away after 9 years of graduate study.

All that remains in my mind is an image of “Blind Men and An Elephant” -- blind men can clearly describe different parts of an elephant, but cannot describe what the elephant as a whole looks like. This is a good metaphor for the current stage of AI research -- all the good elements have been discovered, what’s missing is how to put them together.

After decades of study, human have discovered all the elements of AI: dimensionality reduction, clustering, indexing, distributed computing, bias-variance trade-off, reinforcement learning, data mining, system architecture, programming language, information theory, logical programming -- but they just do not know the right order to put them together. For example, should we do dimensionality reduction before, during, or after feature engineering? How reinforcement learning and inference interact with each other? Even though individual components are useful in different applications, they won’t release their full potential until we put them together in the correct way.

The knowledge about the relationships among components can only be learned from individual real world applications. While a toy problem may be solved by one or two components, a real problem is so demanding that we are forced to put more components together in the correct way. For instance, question-answering alone would require a lot of infrastructures put together.

Another obstacle for putting things together is purely engineering. A lot of effort and discipline is needed before we can put so many things together without the system falling apart. The sheer amount of work prevents a professor (maybe with a few students) to finish this task. What’s necessary is a team of strong engineers, who can solve mirids of challenging technical problems, and put elements together. This actually come back to the previous point -- unless we are working on a real problem, which generates revenue, we will not be getting a strong engineering team, because it is so expensive and not one want to invest in it.

To sum it up, we need the following two ingredients to create an intelligent system:
1) a few challenging real world applications
2) a strong engineering team