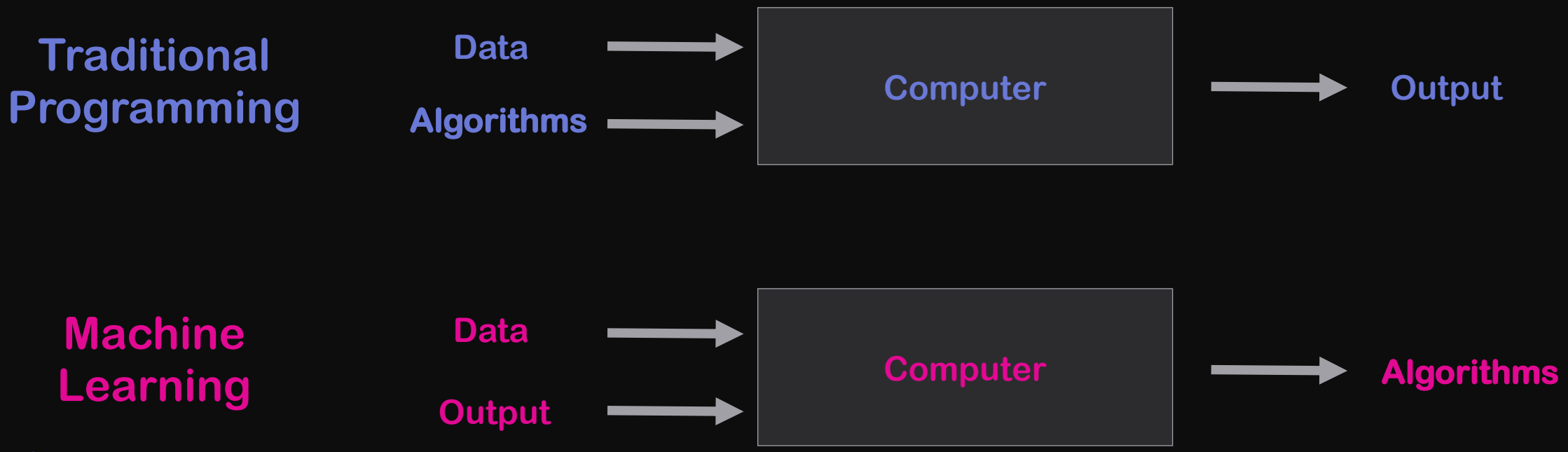
What is Machine Learning?

Machine Learning is the foundation of AI. It provides methodologies and algorithms that learn from inputs, experience and desired outcomes. ML returns a model(s) that make decisions and take actions.



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AI = Machine Learning

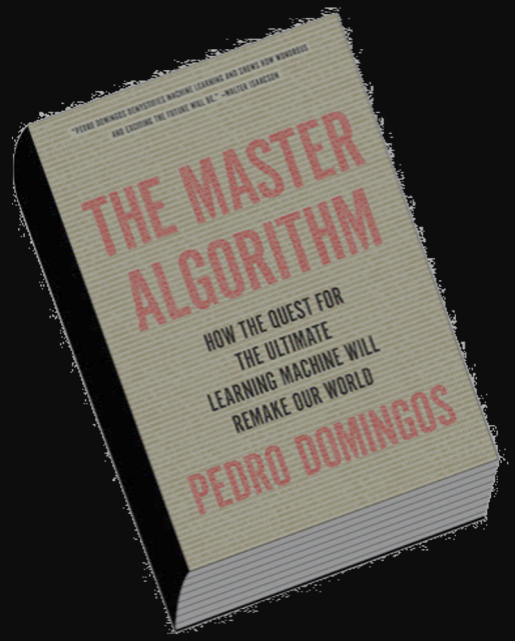
Technology that learns from experience (historical data) to predict future events.

- Predictions compute at scale in near real time
- Data-driven over intuition-based
- Outcomes can be the opposite of intuition
- Those deviations that can bring the rewards
- Otherwise, people are already doing them

Learning Algorithm "Tribes"?

Each tribe's master algorithm for prediction is good for some type of problems but not for others.

- **Symbolists**: View learning as the inverse of deduction.
- **Connectionists**: Reverse engineer the brain.
- **Evolutionaries**: Simulate evolution on the computer.
- **Bayesians**: Learning is a form of probabilistic inference.
- **Analogizers**: Extrapolate from similarity judgments.



What we really want is a single algorithm combining the key features of all of them, The Master Algorithm.

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Machine Learning Approaches

Supervised: Learn from data labeled by desired outcome

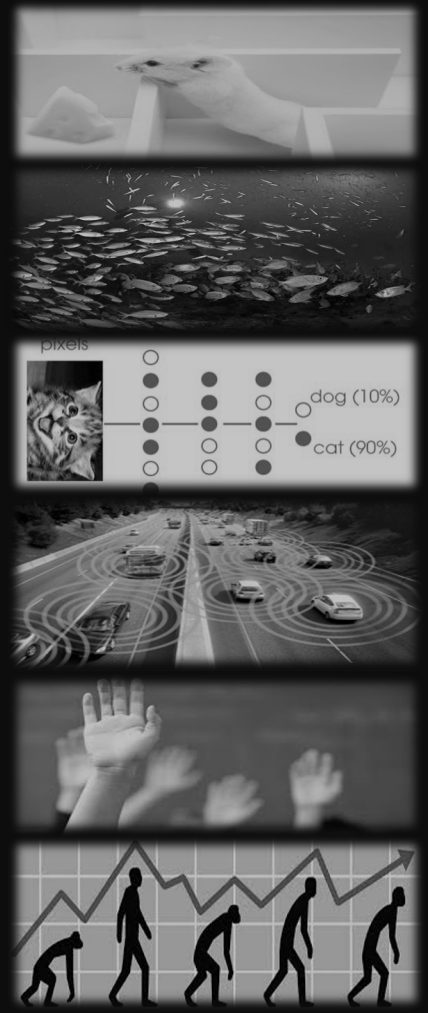
Unsupervised: Learn to cluster & summarize similar inputs

Deep: Learn a hierarchy of simple to complex concepts

Reinforced: Learn by interacting with an environment

Active: Learn by asking questions to increase confidence

Evolutionary: Learn to optimize using introduced randomness



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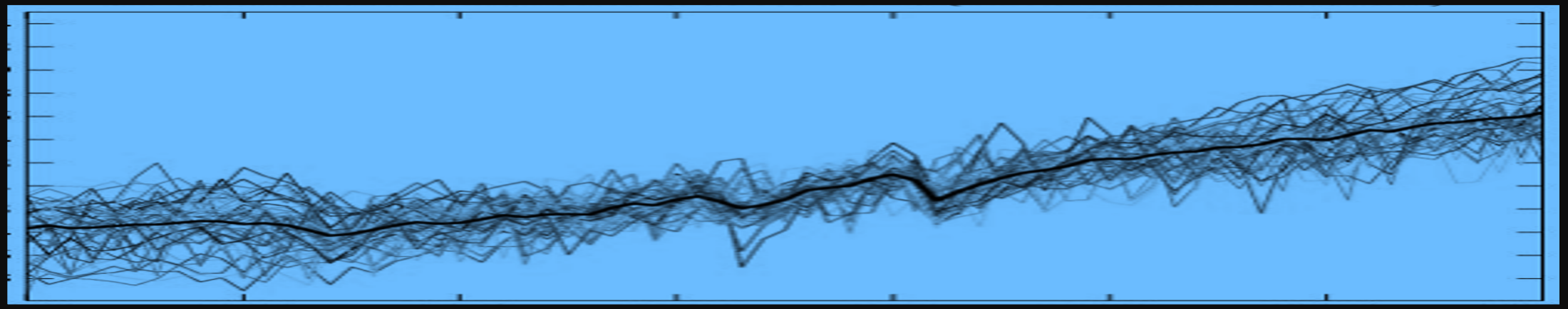
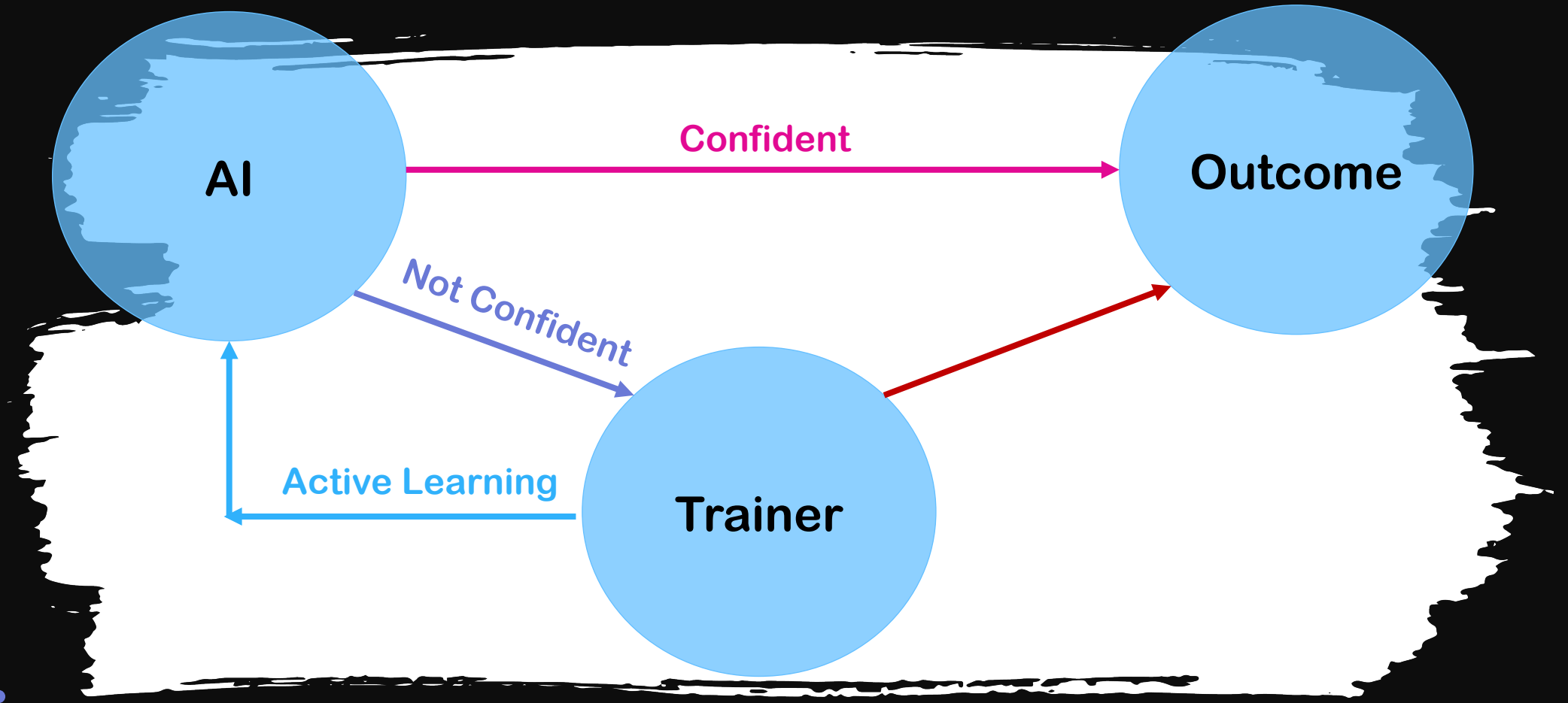
Ensemble Learning

- Divides and conquers problems by bringing more algorithms to the table
- Combine multiple models to solve a problem each with their own perspective
- Improve model performance by voting through another model or chair
- Reduces the likelihood of a poor model choice giving poor or biased results
- Can offset inadequate data that is not fully representative



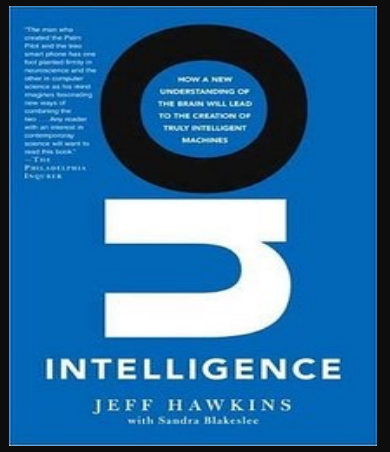
Active Learning

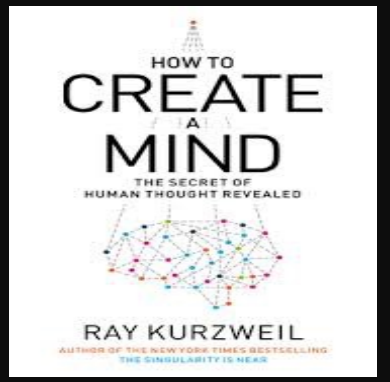


What Other Theories are Emerging?

Read this!

- Computers can process information 5 million times faster than a brain, but have difficulty mirroring basic human skills such as catching a ball. Researchers are exploring prediction & memory to close the gap.
- The brain constantly predicts, whether it be a few milliseconds or years into the future, to make decisions and take action.
- We rely extensively on our memory of performing similar tasks in the past and improve with practice.
- Thinking is a form of pattern-matching; associating new decision / action information with stored information.





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Modeling - Simple

1. **Preparation**
   - Identify key attribute(s) to be predicted (e.g. response)
   - Identify attributes which can be used as predictors
   - Create training and control samples
2. **Model training**
   - Identify most important variables
   - Iterate to identify optimal parameters
   - Evaluate model against control sample
3. **Prediction**
   - Create targeting list using cut-off criteria
   - Profile & score targeting universe
   - Achieve highest possible response rates
4. **Response analysis**
   - Feedback actual response metrics
   - Revaluate associative attributes and predictors
   - Iteratively tune model to increase response

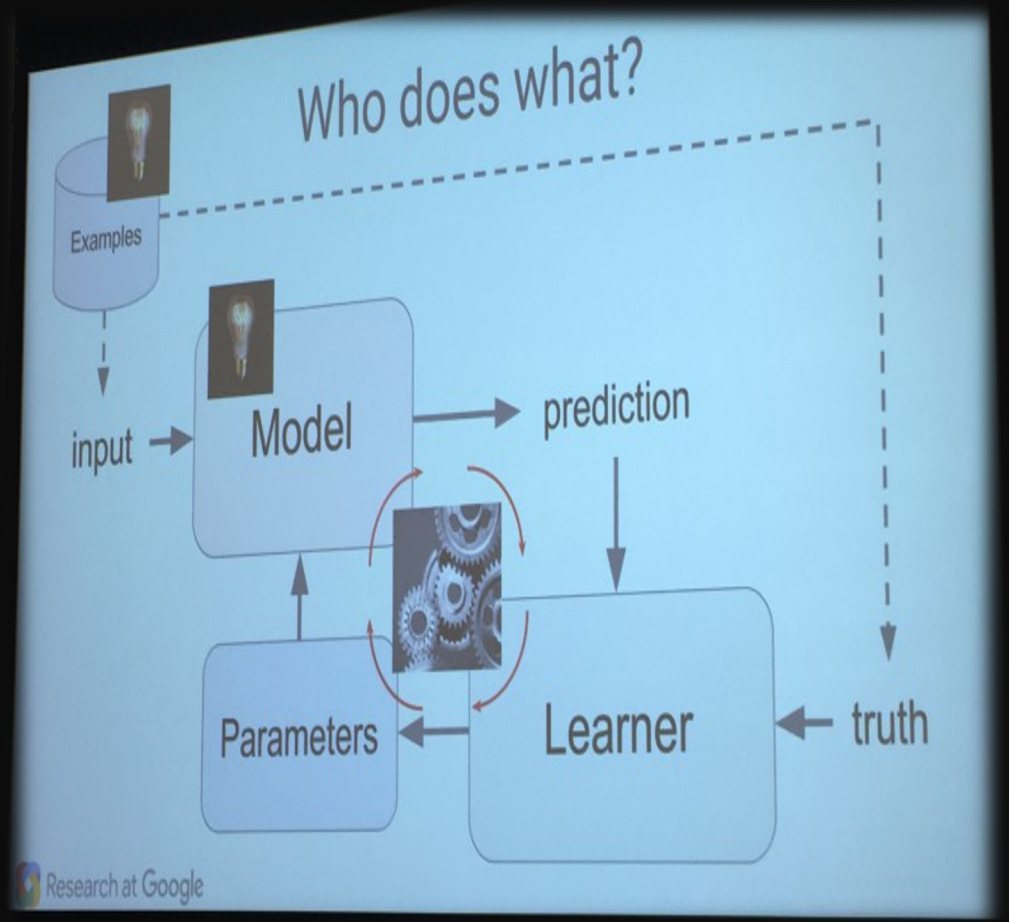
Prediction

Learners predict outcomes…

...and optimize to minimize

the difference between

predictions and actual outcomes…



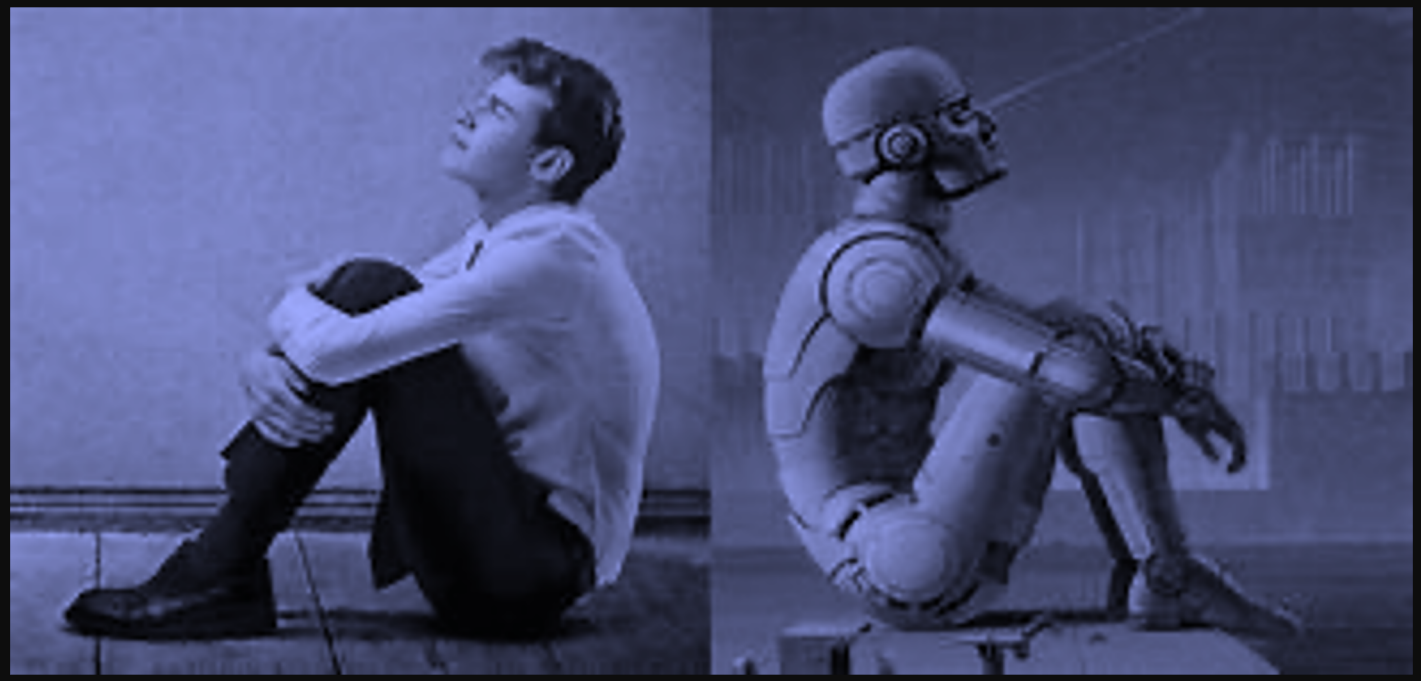
Accuracy

- Predictions don’t have to be very accurate to score big value.
- Value emerges from just a small prognostic nudge in the right direction.
- An insurance company saves almost $50 million annually by decreasing its loss ratio by half a percentage point.

Bias & Error

- “Once AI can be trained without bias it should be able to provide more rational responses than its human counterparts.”

(Alasaarela, 2017)



Training Data

“Today, the cost of acquiring training data is significantly reducing with platforms like scale.api and Amazon Mechanical Turk matching human annotators to startups at cost efficient prices.”

(Vijay Remakrishnan,)

Thank You

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