# AI from Scratch

Suraj Narayanan Sasikumar

Hessian AI Labs

January 26, 2020

# Overview


1. Motivation for learning AI
2. Machine Intelligence
3. Course Outline
4. Reference

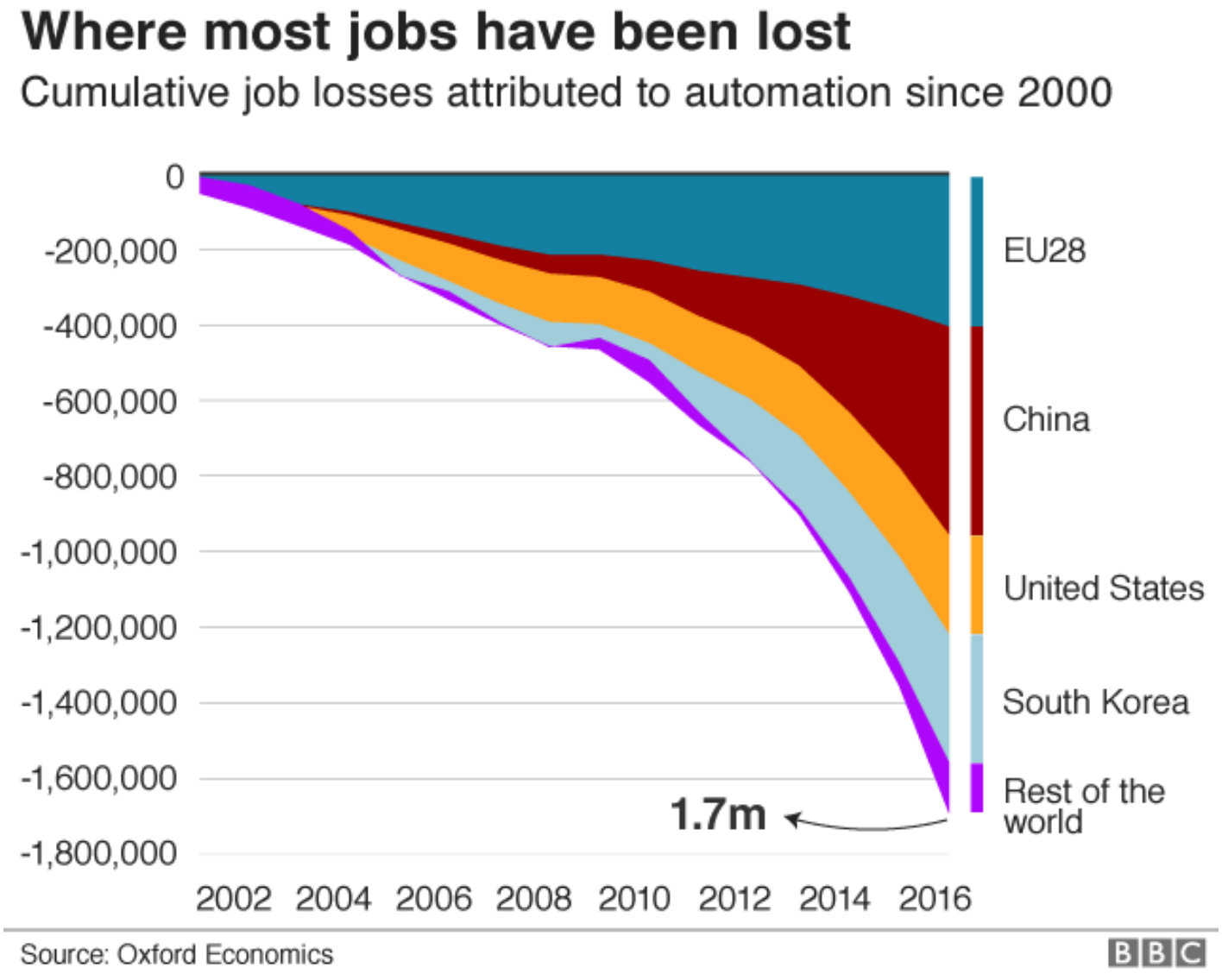
# Table of Contents


1. Motivation for learning AI
2. Machine Intelligence
3. Course Outline
4. Reference

# Why should you learn AI?

- Automation of jobs is happening at an exponential rate.
- Lucrative Career.
- Core component for Fourth Industrial Revolution.
- Huge social impact potential.

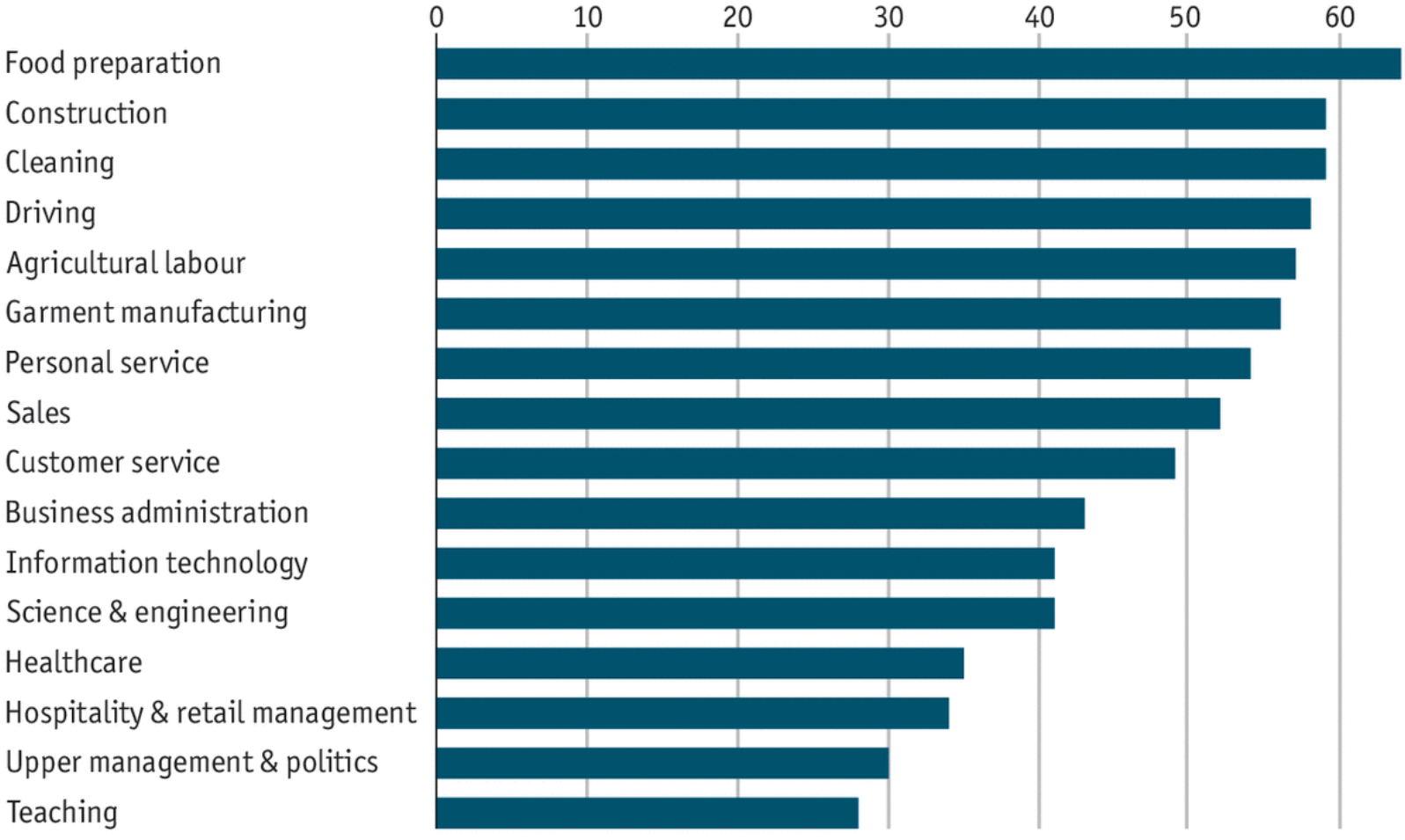
# Job automation



# Job automation

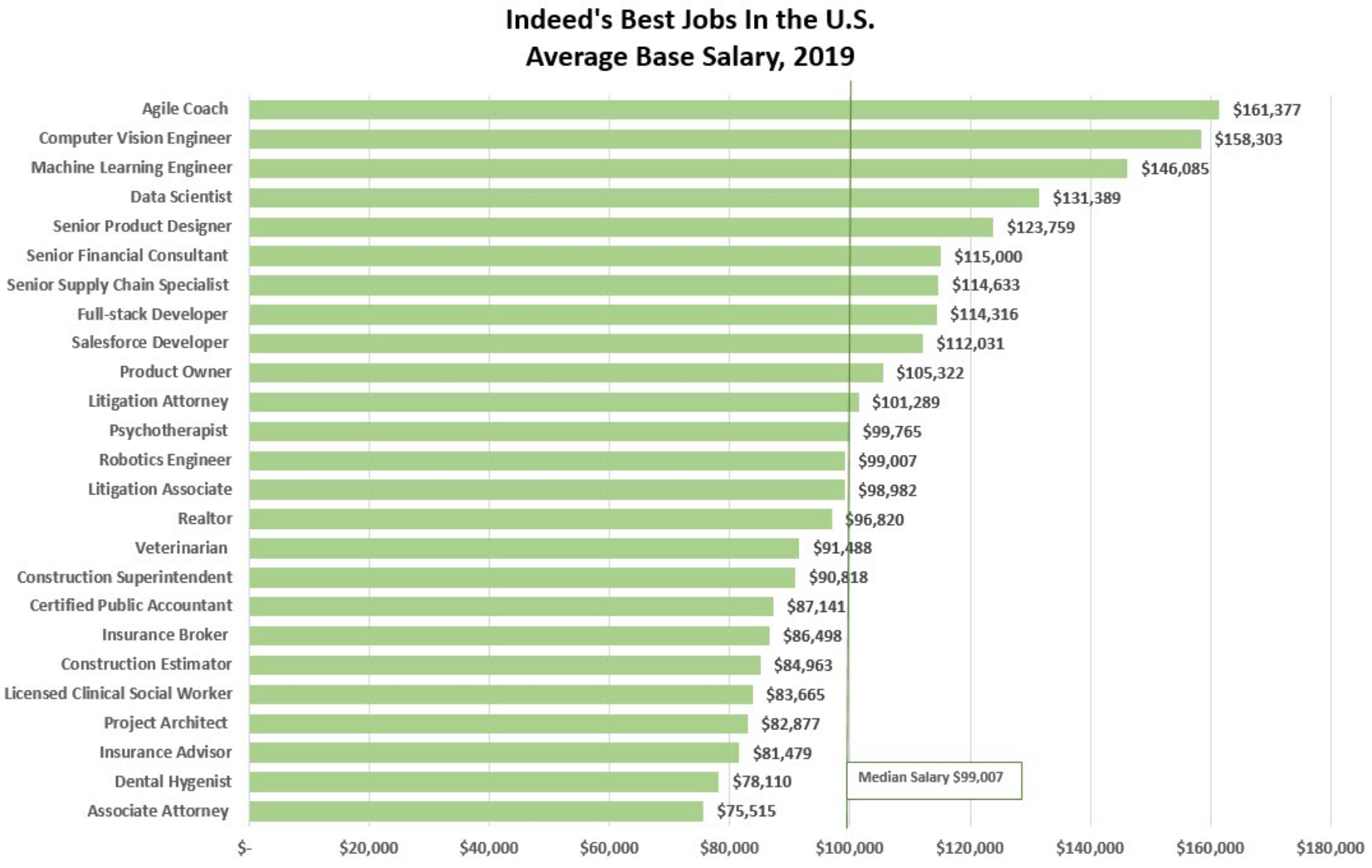
## Automated for the people

Automation risk by job type, %

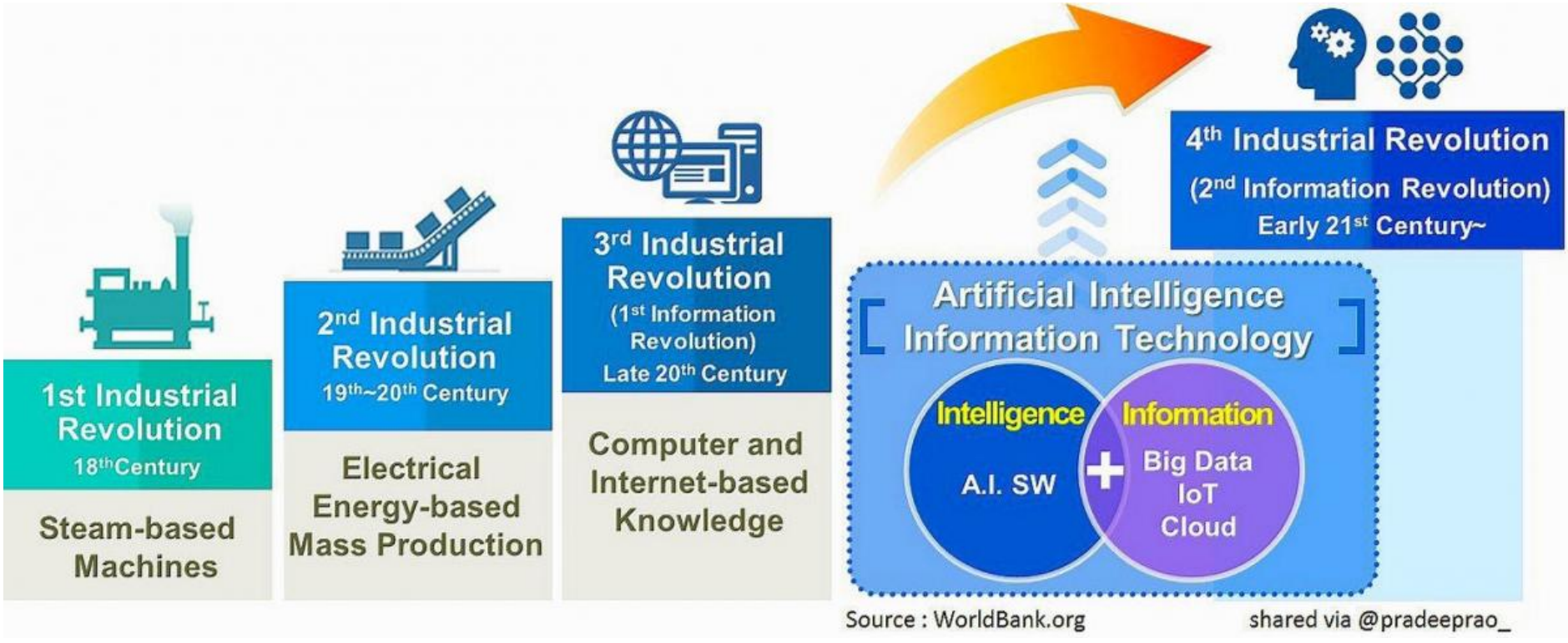



Source: OECD

# Big Bucks


Indeed's Best Jobs In the U.S.
Average Base Salary, 2019
Agile Coach $161,377
Computer Vision Engineer $158,303
Machine Learning Engineer $146,085
Data Scientist $131,389
Senior Product Designer $123,759
Senior Financial Consultant $115,000
Senior Supply Chain Specialist $114,633
Full-stack Developer $114,316
Salesforce Developer $112,031
Product Owner $105,322
Litigation Attorney $101,289
Psychotherapist $99,765
Robotics Engineer $99,007
Litigation Associate $98,982
Realtor $96,820
Veterinarian $91,488
Construction Superintendent $90,818
Certified Public Accountant $87,141
Insurance Broker $86,498
Construction Estimator $84,963
Licensed Clinical Social Worker $83,665
Project Architect $82,877
Insurance Advisor $81,479
Dental Hygenist $78,110
Associate Attorney $75,515
Median Salary $99,007
$-
$20,000
$40,000
$60,000
$80,000
$100,000
$120,000
$140,000
$160,000
$180,000

# Fourth Industrial Revolution



# Social Impact

# Table of Contents


1 Motivation for learning AI

2 Machine Intelligence

3 Course Outline

4 Reference

# Why are computers not intelligent by default?

- A computer can be loosely thought of as a glorified calculator.
- The Specification Problem. A computer can only understand and execute steps that are specified formally.
- Most tasks that we humans perform with ease is hard to formalize.
- Control the entire operation of a nuclear power plant: Easy
- Fold Clothes: Very Hard (Video)

# Defining Machine Intelligence

*"Intelligence measures an agent's ability to achieve goals in a wide range of environments."*

- Legg and Hutter 2007

# Abilities needed to Manifest Machine Intelligence

Ability to,

- acquire data about the environment.
- extract knowledge from the acquired data.
- transform the knowledge into a goal-relevant representation.
- take actions that achieve the goal.

# Abilities needed to Manifest Machine Intelligence

Ability to,

- acquire data about the environment. Data Mining, wrangling, etc.
- extract knowledge from the acquired data. Machine Learning
- transform knowledge into a goal-relevant representation. Deep Learning
- take actions that achieve the goal. Reinforcement Learning

# Table of Contents


1. Motivation for learning AI
2. Machine Intelligence
3. Course Outline
4. Reference

# Course Outline

1. Mathematical Background
   - Numbers, Sets, and Linear Algebra
   - Probability, Statistics, and Information Theory
   - Basic Calculus
2. Machine Learning
3. Deep Learning
4. Reinforcement Learning

# Table of Contents


1. Motivation for learning AI
2. Machine Intelligence
3. Course Outline
4. Reference

# References


- Universal Intelligence: A Definition of Machine Intelligence (Legg and Hutter, 2007): https://arxiv.org/abs/0712.3329
- REWORK: AI for social good white paper: http://reworkco.domain.com/AISocialGoodWP2019.pdf