

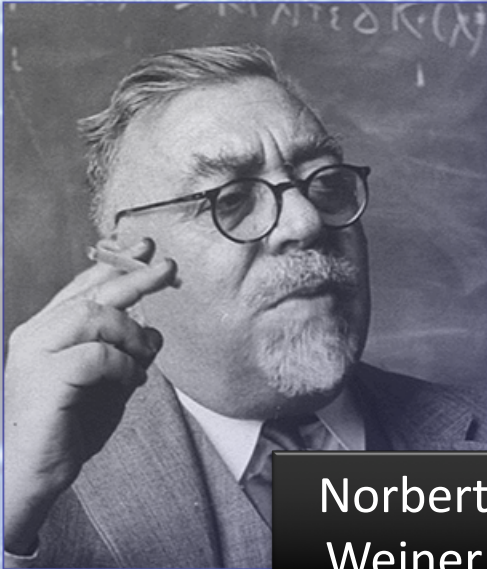
Garry Kasparov

How Machine Learning Upgrades Human Creativity



Alfred Binet

“Chess may hold the key to unlocking the secrets of human cognition.”



Norbert Wiener

Alan Turing



Claude Shannon

Chess game tree complexity: 10^{123}
Possible chess positions: 10^{46}
Atoms in the observable universe: 10^{80}



Stockfish 8 64 [8 CPUs] [9675 kN/s]

+- (-2.26) Depth=24/48 39...Rg7 (6/40)

1. +- (-2.26): 39...b5 40.Rd2 b4 41.d4 bxc3 42.Kxc3 cxd4+ 43.Kc2 Bd6 44.Kb2 Qg5 45.Kb1 Qe5 46.a4...
2. +- (-1.67): 39...a6 40.a3 a5 41.a4 b5 42.axb5 cxb5 43.Rd2 b4 44.Qh5 Rg5 45.Qf7+ Bc7 46.Rd1 bxc...
3. ♠ (-1.56): 39...a5 40.Rd2 Qg7 41.Qg4 Qxg4 42.hxg4 f3 43.d4 cxd4 44.cxd4 Bg3 45.Kd3 Rxg4 46.K...
4. ♠ (-1.20): 39...Rg6 40.Rd2 b5 41.Rd1 Rg2+ 42.Rd2 Rg7 43.Rd1 b4 44.d4 cxd4 45.cxb4 Qg2+ 46.C...
5. ♠ (-1.18): 39...Rg5 40.Rd2 b5 41.Rd1 Rg2+ 42.Rd2 Rg7 43.Rd1 b4 44.d4 cxd4 45.cxb4 Qg2+ 46.C...
6. ♠ (-1.19): 39...Rg7 40.Rd2 b5 41.Rd1 b4 42.d4 cxd4 43.cxb4 Qg2+ 44.Qxg2 Rxg2+ 45.Nd2 Rh2 46...



1985



1997



DEEP.BLUE

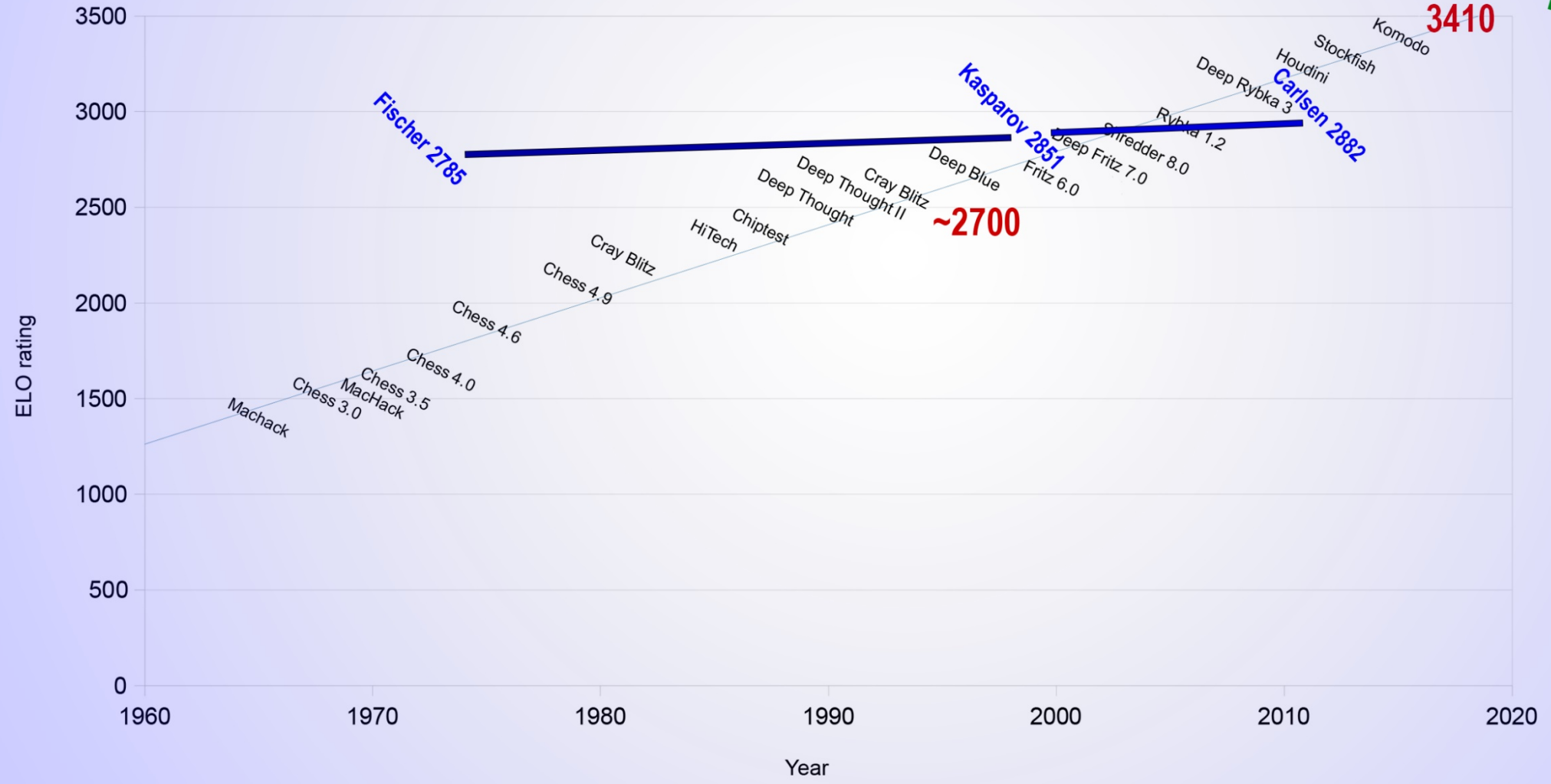


“Advanced Chess” Human + Machine

Human intuition
and experience
+
Machine speed
and analysis
+
Superior process



Historical chess engines' estimated ELO ratings



AlphaZero

~3600

Dec 2017

3410



Development Manager, Autopilot

Tesla ★★★★★ 1,030 reviews - Palo Alto, CA

Role:

Contributing to the development of Autopilot simulation through managing engineers, artists and subcontractors engaged in the creation of photo realistic 3D scenes that can accurately model the driving experience in a wide range of locales and conditions. Working directly with simulation, computer vision, control and test engineers to ensure that the scenes created are high quality and can enable the faithful reproduction of autopilot behavior in simulation.

Graphics Software Engineer, Autopilot

Tesla ★★★★★ 1,030 reviews - Palo Alto, CA

Role:

Contributing to the development of Autopilot simulation through the creation of photo realistic 3D scenes that can accurately model the driving experience in a wide range of locales and conditions. Working directly with technical artists and graphics rendering engineers and more widely with simulation, computer vision, control and test engineers to ensure that the scenes created are high quality and can enable the faithful reproduction of autopilot behavior in simulation.

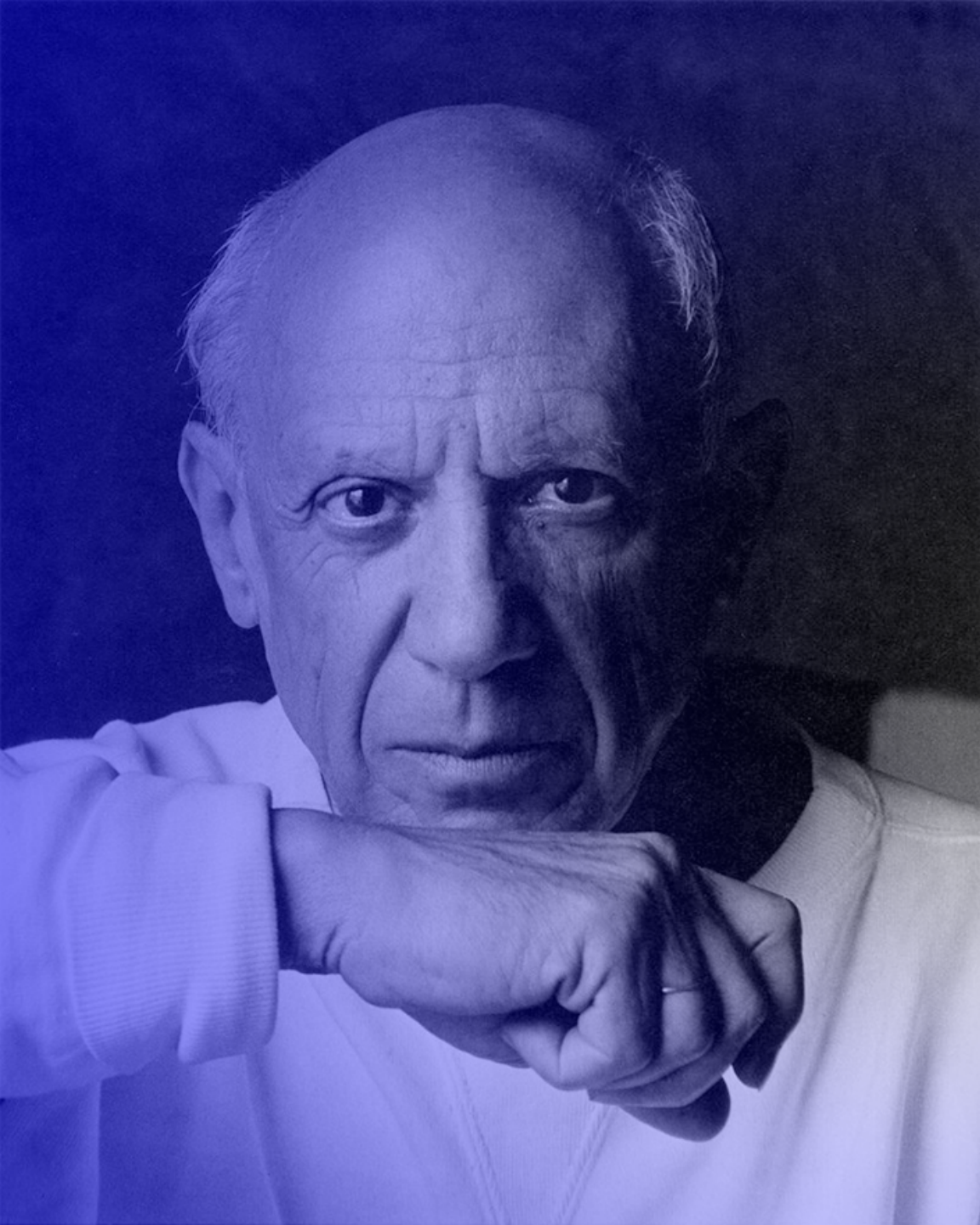
Environment Artist, Autopilot

Tesla ★★★★★ 1,030 reviews - Palo Alto, CA

Role:

Contributing to the development of Autopilot simulation through the creation of photo realistic 3D scenes that can accurately model the driving experience in a wide range of locales and conditions. Working directly with technical artists and graphics rendering engineers and more widely with simulation, computer vision, control and test engineers to ensure that the scenes created are high quality and can enable the faithful reproduction of autopilot behavior in simulation.





**“Computers are
useless, they can
only give you
answers!”**

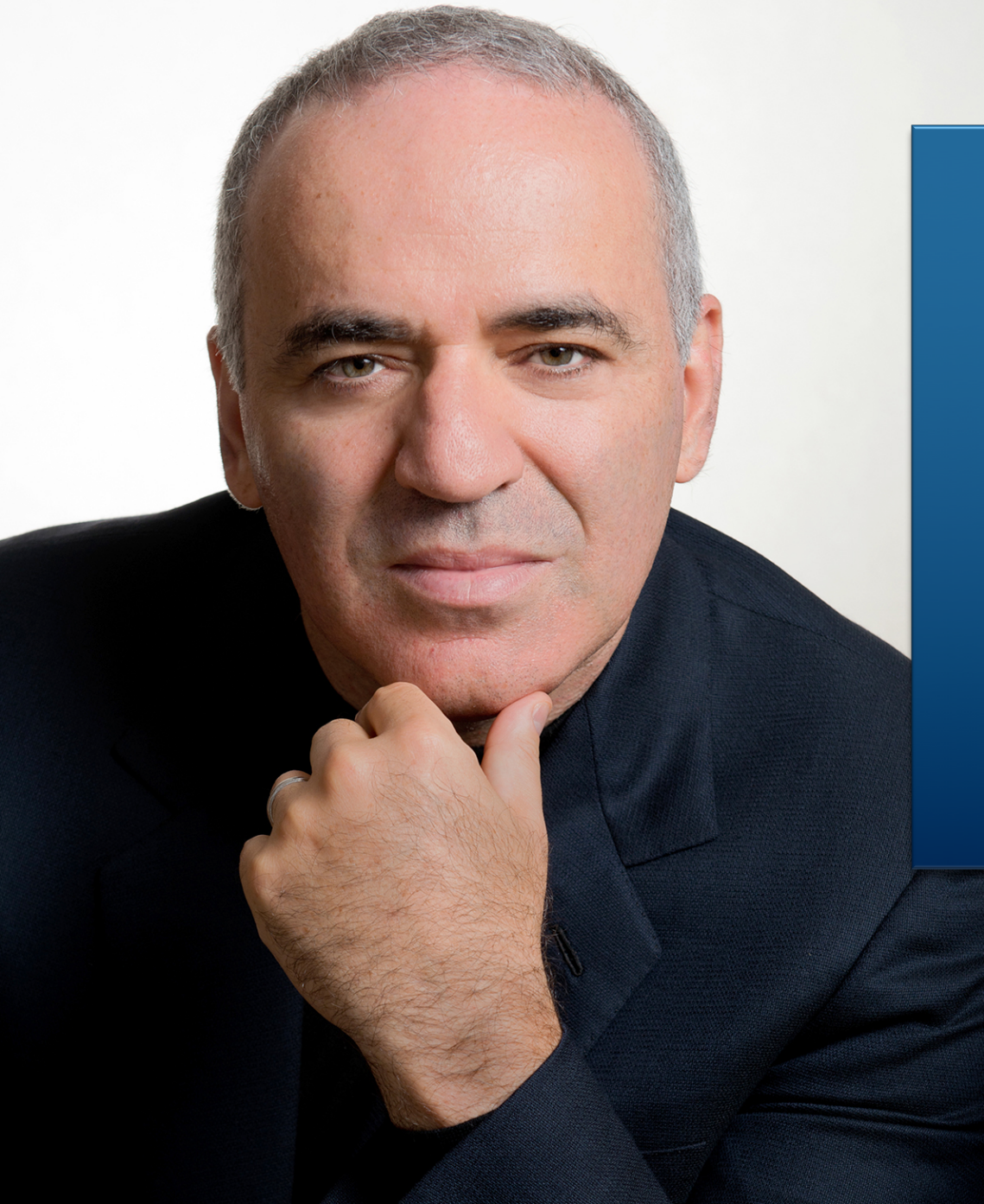
**Pablo
Picasso**

1. Machines don't have to be perfect, only better.
2. AI: **Augmented** Intelligence. **We** get smarter.
3. AI will do things differently, not like humans.
4. Humans always define the problems.
5. Virtual data and machine-generated data will increase.
6. AI will do more rote work, freeing us to be more creative and strategic—more human.

We aren't being replaced,
we're being promoted!



**NEVER TELL
ME THE ODDS!**



Garry Kasparov

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