Deep Learning in Games

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@singhblom
What is Machine Learning?
What is Artificial Intelligence?
or ...

SEED // Introduction
Guess the function!
$f(2) = 4$
\[ f(8) = 16 \]
$f(x) = 2x$
How does the machine guess?
It learns from the data.
It learns from the data.

(That’s why we call it machine learning!)
Guess a straight line!
Guess a straight line!

\[ f(x) = 9.5 - 0.3x \]
Guess a straight line!

$$f(x) = 9.5 - 0.3x$$
Guess a straight line!

\[ f(x) = 0.3 + 0.6x \]
Guess a straight line!

\[ f(x) = 0.3 + 0.6x \]
Guess a straight line!

\[ f(x) = 0.3 + 0.6x \]

\[ f(x) = 9.5 - 0.3x \]
1. Data – $f(x) = y$ pairs.
2. A way to tell the machine how bad a guess is.
3. Some idea of what kind of function the machine is allowed to guess – straight line? Curve? Something stranger?

That is all there is to it!
Guess a straight line!
Guess a straight line!
What is Deep Learning?
What are Artificial Neural Networks?
f
0 0 0 0 0 0 0
1 1 1 1 1 1 1
2 2 2 2 2 2 0
3 3 3 3 3 3 3
4 4 4 4 4 4 4
5 5 5 5 5 5 5
6 6 6 6 6 6 6
7 7 7 7 7 7 7
8 8 8 8 8 8 8
9 9 9 9 9 9 9
f( ) = 8
\[ f(\ ) = 8 \]
\[ f(5) = 5 \]
\[ f(\text{image}) = 0 \]
\[ f(6) = 6 \]
$f(\cdot)$
f( ) = cat
"I saw it in a theater once and it was great. It was very... I don't know, a little dark. I like the psychological effects and the way it portrays the characters."

\[ f \left( \text{"Have you seen Suicide Squad?"} \right) = \right. \]
\[ f(\ ) = "A person flying a kite on a beach" \]
$f \left( \begin{array} {c} \text{audio} \end{array} \right) = \text{"A coffee, please."}$
\[ f \left( \text{"A coffee, please."} \right) = \text{waveform} \]
\[ f(\text{horse}) = \text{zebra} \]
Agents in Games
$f(\text{SEED // Agents in Games}) = \text{Joystick}$
SEED // Deep learning

Image of diagrams related to deep learning and AlphaGo.
Animation
Audio-Driven Facial Animation by Joint End-to-End Learning of Pose and Emotion, Karras et al., 2017, NVIDIA
Learn all the things!
SEED // All the things!

\[ f(\quad) = \quad \]
SEED // All the things!
$f(\text{All the things!}) = \text{diagram}$
Frame by frame detection (no tracking)
SEED // All the things!
$f(\text{cat}) = \text{cat}$

"I saw it in a theater once and it was great. It was very... I don't know, a little dark. I like the psychological effects and the way it portrays the characters."

$f(\text{"Have you seen Suicide Squad?"}) = \text{"I saw it in a theater once and it was great. It was very... I don't know, a little dark. I like the psychological effects and the way it portrays the characters."}

$f(\text{"A coffee, please."}) = \text{"A coffee, please."}$

$f(\text{"A coffee, please."}) = \text{"A coffee, please."}$

$f(8) = 8$
Instead of programming – showing

Same method for every problem

Greatest paradigm change in computing since transistors

It’s all just function guessing – or – A new paradigm for computing
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