

# **A billion or so parameters.**

**The risks and opportunities of deriving knowledge from deep machine learning models.**

Brad Flaugh

October 18, 2022

We have now accumulated sufficient evidence to see that whatever language the central nervous system is using, it is characterized by less logical and arithmetical depth than what we are normally used to.

– John von Neumann [1]

Children can learn to use computers in a masterful way, and ... learning to use computers can change the way they learn everything else.

– Seymour A. Papert [2]

# Preface

This book is a work in progress, I hope it helps demystify the world of deep learning as I understand it.

Humans won't be able to control superintelligent AI, talk about that here[3]

Talk about Bostrom and GPAI here, and Erdi's answer to that. [4] [5]

Talk about the alignment problem and Ethical freakouts about AI. Talk about the big 3 from [6] [7]

Funding and startups, everybody is doing it, I'm trying to make sense of it

*Brad Flaughner*

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**HISTORY: THE SLOW MARCH AWAY FROM  
ALGORITHMS TOWARDS LAYERED STATISTICAL  
REPRESENTATIONS**

# Ages of Understanding

# 1

## 1.1 (1500-Today) Algorithms: Codified Human Understanding

AI is a shitty term

We tried a lot of things, teaching computers explicit grammar and explicit rules

IMO, this was not AI, this was codified human understanding.

In code, that understanding might look like this....

TODO talk about this book [8]

[bradflaughter.com](https://bradflaughter.com).<sup>1</sup>

1.1 (1500-Today) Algorithms:  
Codified Human Understanding . . . . . 2

1.2 (1980-Today) Machine Learning:  
Data-Derived Insights . 2

## 1.2 (1980-Today) Machine Learning: Data-Derived Insights

Hardware got amazing, we gave up teaching the way we teach ourselves and let the data do the work

We leveraged huge statistical models to regress our way to success

We used building blocks of regression and neurons to train huge models

These models are statistical and deterministic, but ultimately chaotic black boxes..

TODO talk about these books [9] [10] [11] [12]

[8]: Douthat (2022), *Can We Resist the Age of the Algorithm?*

1: Snarky sidenote!



**Figure 1.1:** The Mona Lisa.  
[https://commons.wikimedia.org/wiki/File:Mona\\_Lisa,\\_by\\_Leonardo\\_da\\_Vinci,\\_from\\_C2RMF-retouched.jpg](https://commons.wikimedia.org/wiki/File:Mona_Lisa,_by_Leonardo_da_Vinci,_from_C2RMF-retouched.jpg)



## 2.1 Numerical Data

This is some text and a link to Hey if you want to site something on the side use[3]

## 2.2 Words

## 2.3 Sounds

## 2.4 Images

## 2.5 Video

## 2.6 Mixed Datasets

```
cd myproject
docker run tensorflow
#profit!
```

[tex.stackexchange.org](https://tex.stackexchange.org) for help.

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## 3.1 Unsupervised

## 3.2 Supervised

## 3.3 Reinforcement

## 3.4 Domain Transfer

are you predicting the right thing? Are you really predicting how valuable the company is or just whether it'll be the next meme stock?

## 3.5 Notes on Ethics

Representation, "fixing the training set" [6], or the Impossibility of Fairness from a model.

TODO talk about these books [13] [14] [7] [6]

```
cd myproject
docker run tensorflow
#profit!
```

[tex.stackexchange.org](https://tex.stackexchange.org) for help.

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[6]: Christian (2020), *The Alignment Problem: Machine Learning and Human Values*

**THE CHAOTIC PREDICTION MACHINE:  
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PARAMETERS**

## 4.1 Recommenders

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## 4.2 Facial Recognition

4.2 Facial Recognition . . . . . 6

## 4.3 Sentiment

4.3 Sentiment . . . . . 6

## 4.4 Hate Speech

4.4 Hate Speech . . . . . 6

## 4.5 The Ethics of Classification

4.5 The Ethics of Classification . 6

Online Advertising, Justice, Job Applications, Creditworthiness, Getting Insurance (Weapons of Math Destruction), Civic Life, /sideciteOneil2017 ; The Default Male, Invisible Women effects snow clearing schedules and drug discovery

```
cd myproject
docker run tensorflow
#profit!
```

[tex.stackexchange.org](https://tex.stackexchange.org) for help.

## 5.1 Style Transfer

## 5.2 Translation

## 5.3 Text Generation

GPT-3, BERT and Bloom

## 5.4 Image Generation and Stable Diffusion

Link some cool shit here, Draw Owl!

## 5.5 The Ethics of Transforming

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# Ensembles and Mathematical Chaos

# 6

## 6.1 Interacting Layers of Statistical Understanding

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## 6.2 Useful Chaos

6.2 Useful Chaos . . . . . 8

# APPENDIX



## Poetry Test

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Let's say we want to build an ensemble model to analyze poetry, put a haiku into craiyon's online shit, then we categorize the resulting photo.  
[3]

[3]: Andreu et al. (2021), *Humans won't be able to control a superintelligent AI, according to a study*



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- [13] Cathy O'Neil. *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*. New York, NY, USA: Crown, Sept. 2017 (cited on page 4).
- [14] Caroline Criado Perez. *Invisible Women: Data Bias in a World Designed for Men*. New York, NY, USA: Abrams Press, Mar. 2019 (cited on page 4).

# Notation

The next list describes several symbols that will be later used within the body of the document.

$c$       Speed of light in a vacuum inertial frame

$h$       Planck constant

# Alphabetical Index

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