Introduction to

Artificial Intelligence

What do you need to know?

- Context
  - goal of ML/AI?
- ML Methodology
  - algorithms, ... practice
- Maths & Stats
- Python M.L. libraries

Context : Goal & AI

→ Explore Impossible

Create "Artificial" Intelligence

→ Reality:

Automated "Actions"

Versions of AI

Weak AI → Solving closed problems

NARROW

acts as-if human on problems which, in humans, require intelligence.

Eg. Bouncer → key card lever --spring

Lang., Reflecha...

Strong AI → Solving open problems

GENERAL

acts as-if human on problems which, in humans, require intelligence.

Kinds & Problems

FAILURE

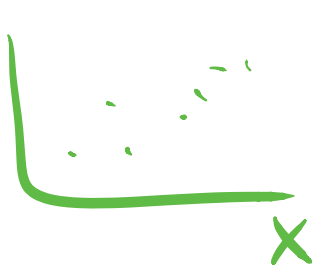
↳ open problem - "general"

- ⊛ Don't Know:
  - Conceptual Framework, Eg. "Heat"
  - Relevant Variables Eg. temp.
  - ∴ No Experiments Eg. No thermometer
  - ∴ No Data / Data is impossible to collect "
    → Eg. from future

ANY of it

↳ closed problem - "Narrow"

- ⊛ Concepts known
  → ∴ Relevance established
  ∴ Data Collected



Techniques for Open Problem

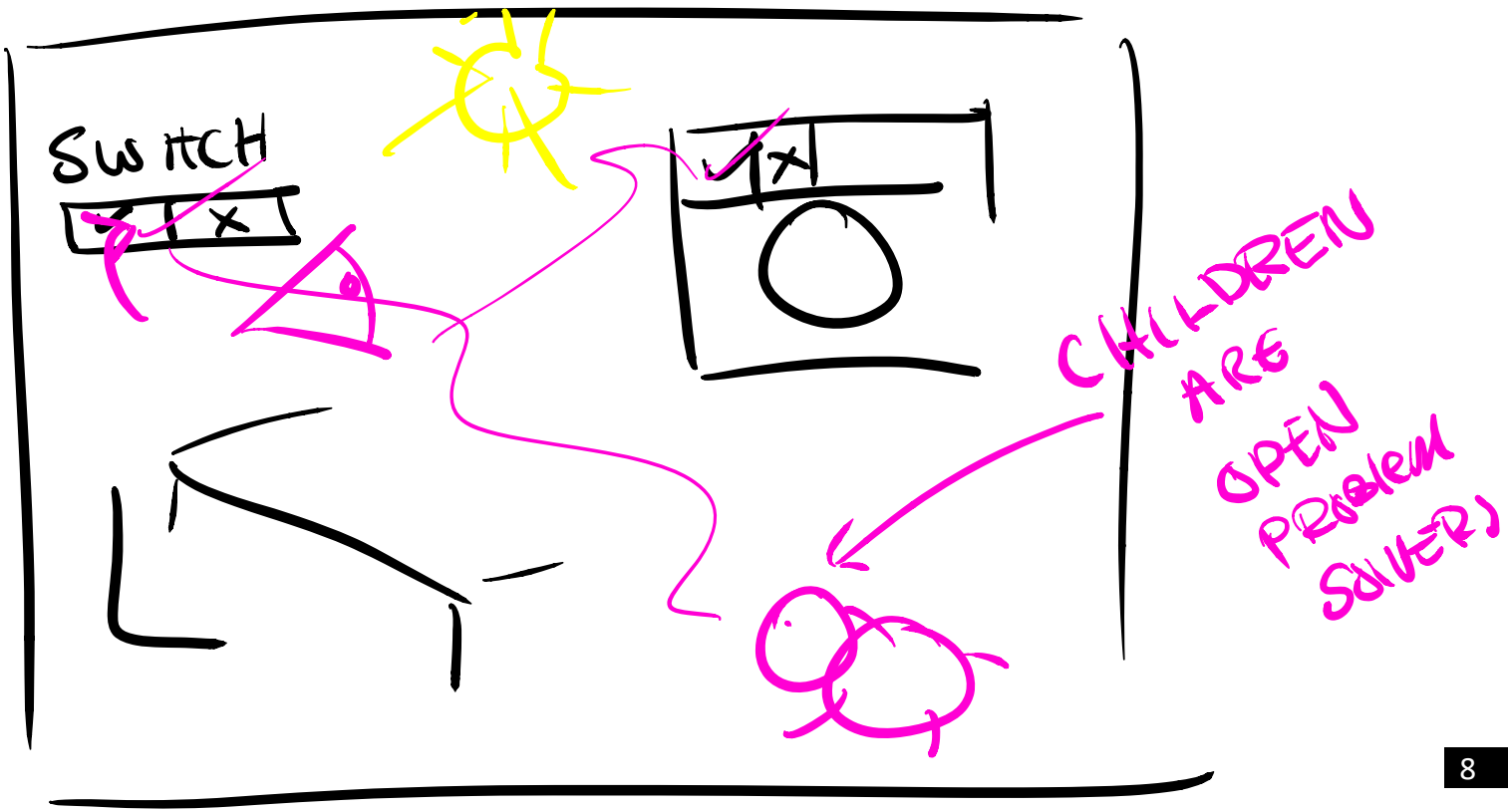
≠ " " Closed Problems.

Eg. Open Problem:

- Direct Causal Access to Env.
- Adapt learning process by Env.

2.. Counterfactual reasoning
-- Simulating "partial" Environment

Eg. a Child Exploring Room.



Open Problem: What can I do?

Buttons

Lights - on/off

Oven - Temp

Chair

Control Grid → Devices → "Cards"

The Goal of AI

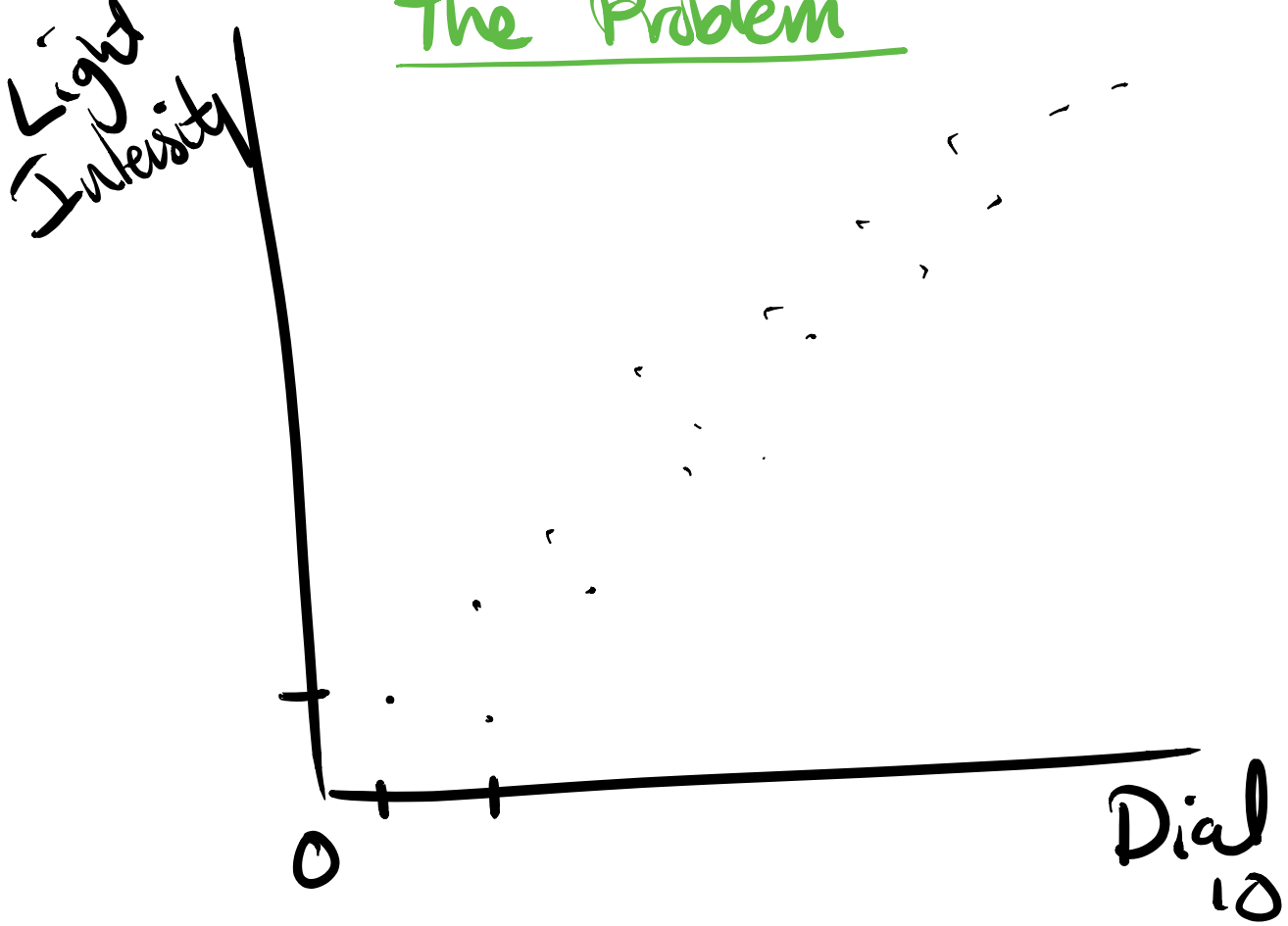
- Techniques when simple ones fail

What is Machine learning?

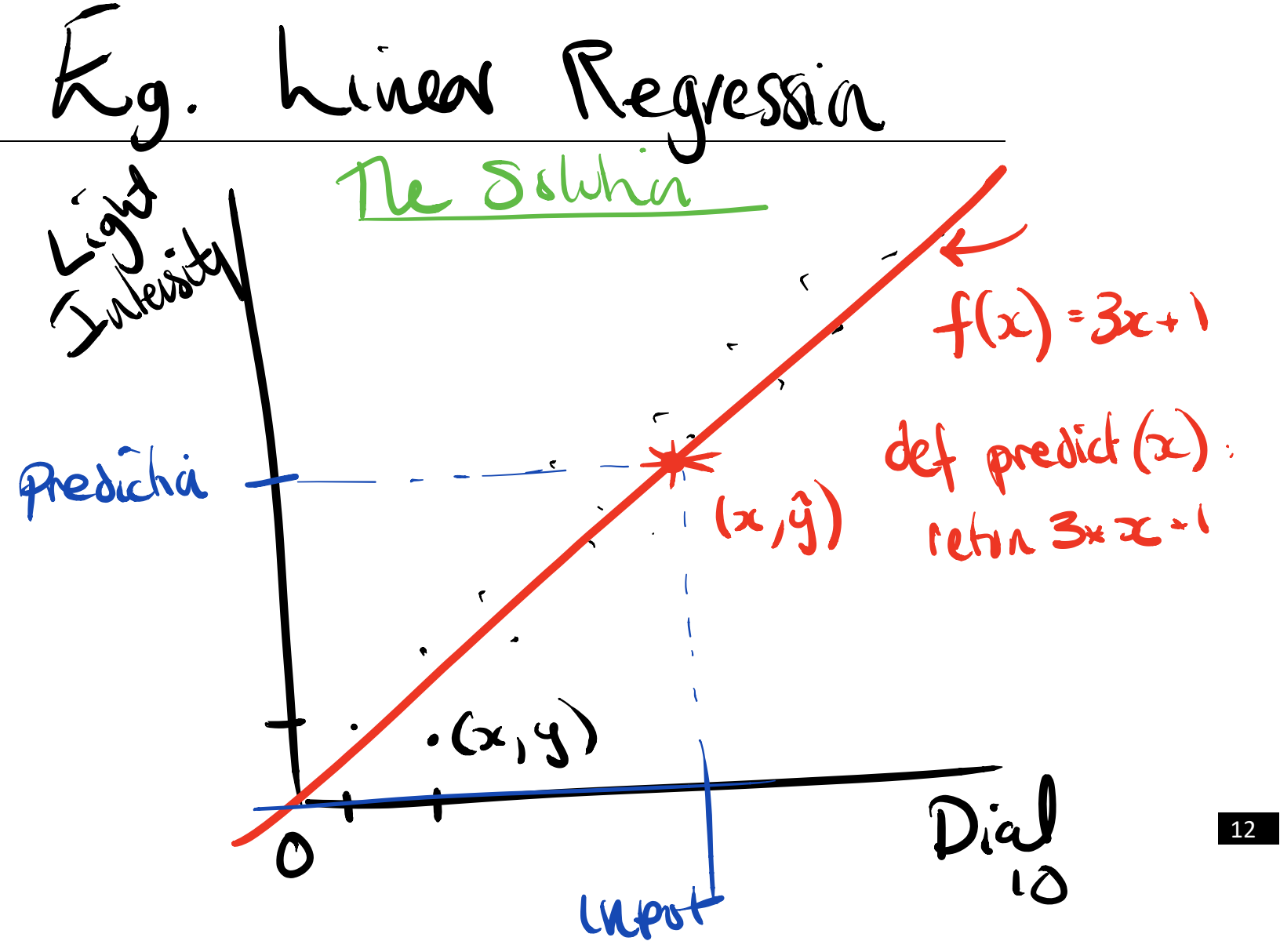
- Systems for statistically approximating "answers" to closed problems & automating their solution

Eg. Linear Regression

The Problem



Eg. Linear Regression



Goal

Aim: find $f(x)$

st. $f(\text{input}) = \text{prediction}$

st. prediction close to y

Problem

x	y
Rating	Age
7	18
8	18
7.5	19

$\hat{y} = f(x)$

$|\hat{y} - y|$ is small

$\{f_1, \dots f_\infty\}$

- $2 * 7 + 4$
- $\frac{1}{5}(7+3)^2 - 2$ ← silly?

Approaches

1) tell machine $f(x)$
   - → Eg. linear Regression
2) Machine infers $f(x)$
   - → (almost) certainly wrong
   - → Eg. Neural Network.

Python

- Datasets (x, y)
- Simulatia & Transformate
- Automated Alg.
- Stats / Quality

NumPy ①

Sklearn. ②

... Statsmodel, numpy ...