90-second presentation about my research area

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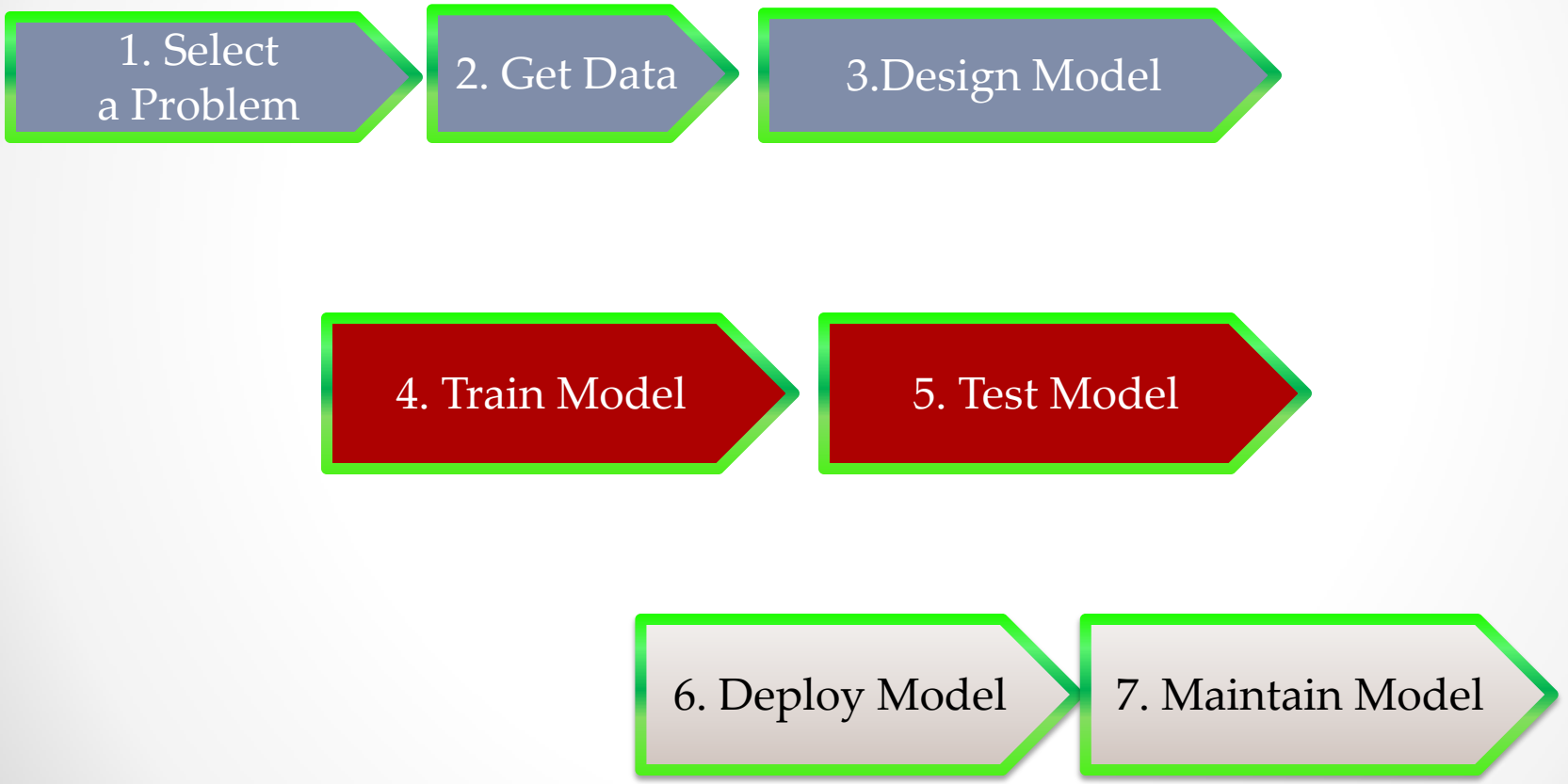
Q: How people carefully do AI ?

A: People carefully do all 7 steps



Q: Can we in magic way can solve everything?

A: AI tries

We construct: $\hat{F}: X \to Y$ to approximate real dependency $F: X, Z \to Y$

We select $\hat{F}$ from models $w_1, w_2, \ldots$

We pick $\hat{F}$ via using scoring criteria l for already solved examples

We prefer simplest model in terms of smallest value P(w)

$$s(w) = \frac{1}{N}\sum_{i=1}^{N} l(y_i, \hat{F}\ (x_i; w) + \lambda P(w)$$

The most important thing is minimize the score function

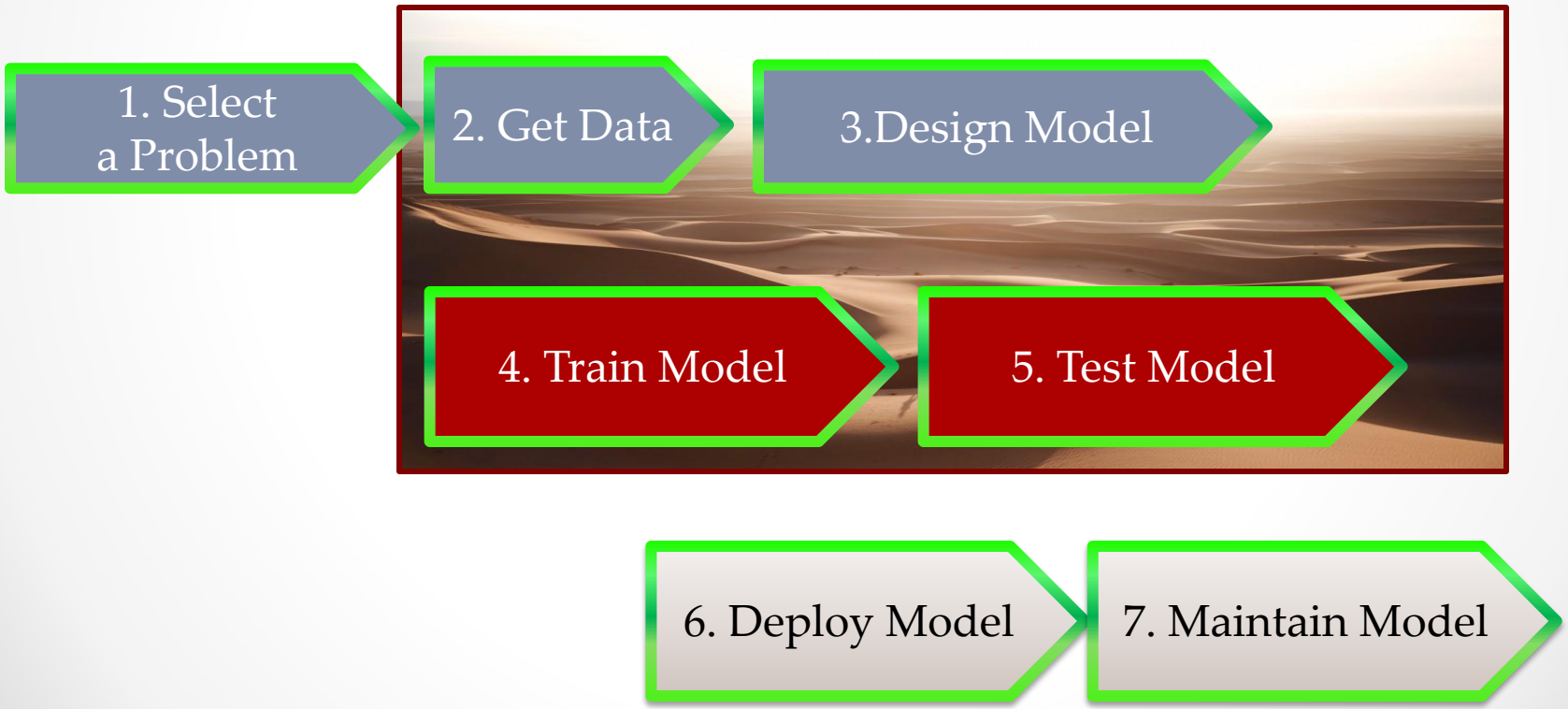
$$w^* = argmin_w s(w)$$

search strategy, training, math optimization, minimization – it's all the same names

Federated Learning

Let's mitigate problem with limiting amount of data…

And look into category of problems when for all people from this planet 7B people, most of which with mobile phones can participate in training (in principle)…



Federated Learning in Action

We learned from data available in Mobile devices

1. Really there are no control over data stored in mobile phone
2. Billions of mobile phone users
3. Even if you will ask people to collect more data they will not listen to you

Federated Learning – Heterogeneity

1. Devices memory, compute power
2. Data distributions
3. Devices availability

Federated Learning – Data Processing and Compute

1. In Federated Learning settings clients process the data

2. Data, as a source for training, exists in a lot of places

3. Data access also happens in some randomized way

4. Computation is launched in a distributed way

5. Communication is a part of logic and algorithms developed in the field, not part of infrastructure