clusterAI 2020
ciencia de datos en ingeniería industrial
UTN BA
curso I5521

clase_04: ML Strategy

Presentación: Matías Callara

agenda clase04: ML Strategy

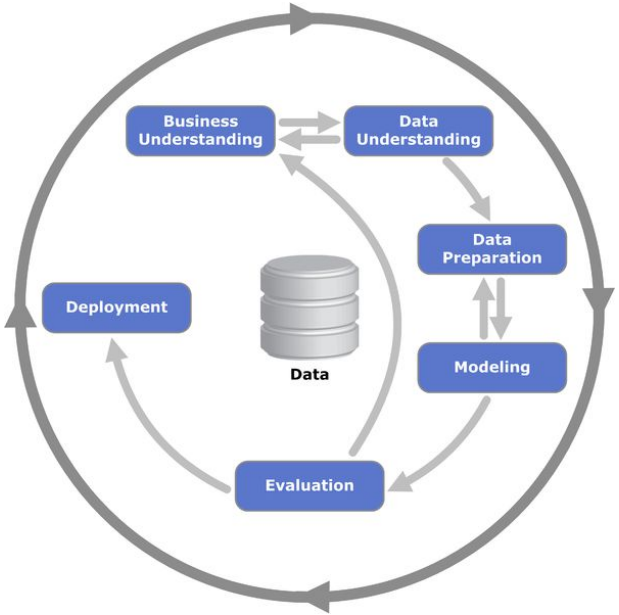
- This class is a summary of Andrew Ng's great class on ML Strategy. He is a much better communicator than me on this topic so I suggest you go and join his course and enjoy a great teacher, teaching material he knows and is passionate about. 🙌

agenda clase04: ML Strategy

- Data Science Project Phases
- Orthogonalization
- Evaluation metric

Solving problems with ML

Data Science Project Phases



Orthogonalization

Reaching the target

Use sliders a & b to reach target T.

- First, try to reach T with point NO and then with point O. Which one was easier?

From Linear Algebra. If x_1, x_2 are orthogonal, I can solve a system of equations Ax = b by solving one equation at a time a_11 x_1 + a_12 x_2 = b1, a_21 x_1 + a_22 x_2 = b2.

Working as a Data Scientist

Get ready to compete!

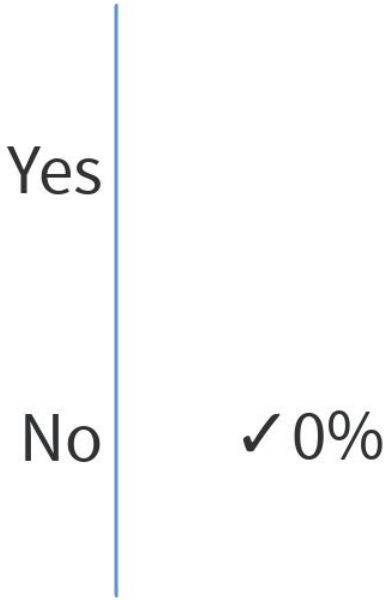
(With a lot of effort) I manage to get very small error on the training set. Am I done?

(With a lot of effort) I manage to get very small error on the training set. Am I done?

Yes

No

(With a lot of effort) I manage to get very small error on the training set. Am I done?



Leaderboard

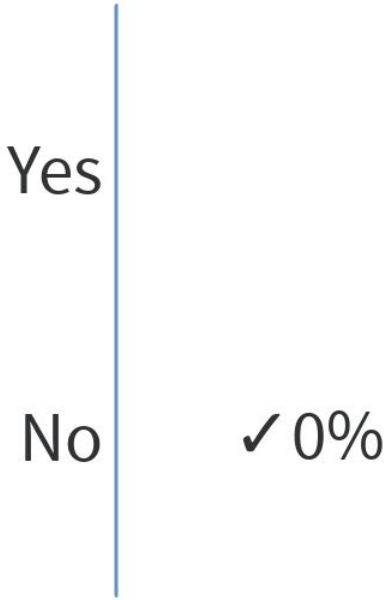
(With a lot of effort) I manage to get very small error on the validation set. Am I done?

(With a lot of effort) I manage to get very small error on the validation set. Am I done?

Yes

No

(With a lot of effort) I manage to get very small error on the validation set. Am I done?



Leaderboard

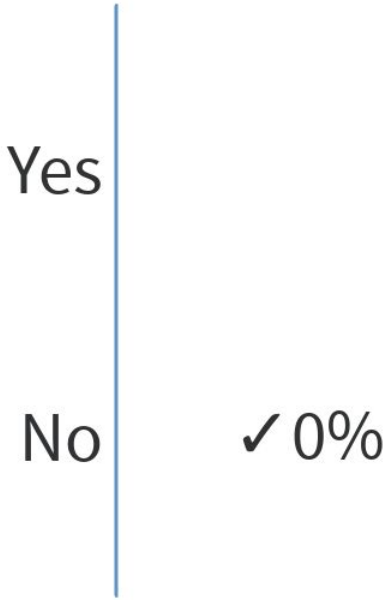
(With a lot of effort) I manage to get very small error on the test set. Am I done?

(With a lot of effort) I manage to get very small error on the test set. Am I done?

Yes

No

(With a lot of effort) I manage to get very small error on the test set. Am I done?



Leaderboard

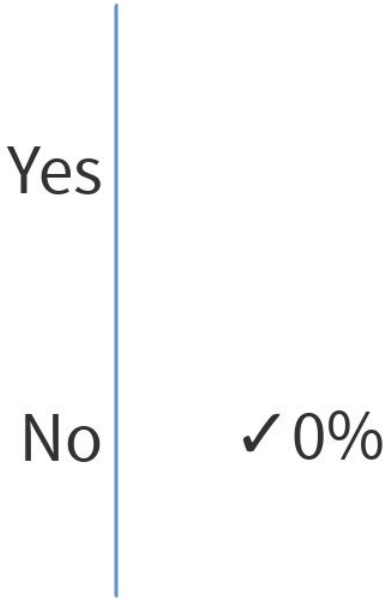
(With a lot of effort) I manage to get very small error in the real world. Am I done?

(With a lot of effort) I manage to get very small error in the real world. Am I done?

Yes

No

(With a lot of effort) I manage to get very small error in the real world. Am I done?



Leaderboard

Assumptions

- Getting better training error
  - More flexible model (underfitted)
  - Optimization procedure
- Getting better dev (validation) error
  - Regularization (overfitted)
  - More training data
- Getting better test error
  - More dev set
- Getting better Real Life error
  - Change dev set
  - Change cost function

Assumptions

We need to do well in:

- Train
  - More flexible model (underfitted)
  - Optimization procedure
- Dev
  - Regularization (overfitted)
  - More training data
- Test
  - More dev set
- Real Life
  - Change dev set
  - Change cost function

Evaluation: Evaluation Metric

Evaluation vs Loss function

Example:
Binary Classification:
- Loss function: Cross Entropy
- Evaluation Metric: F1

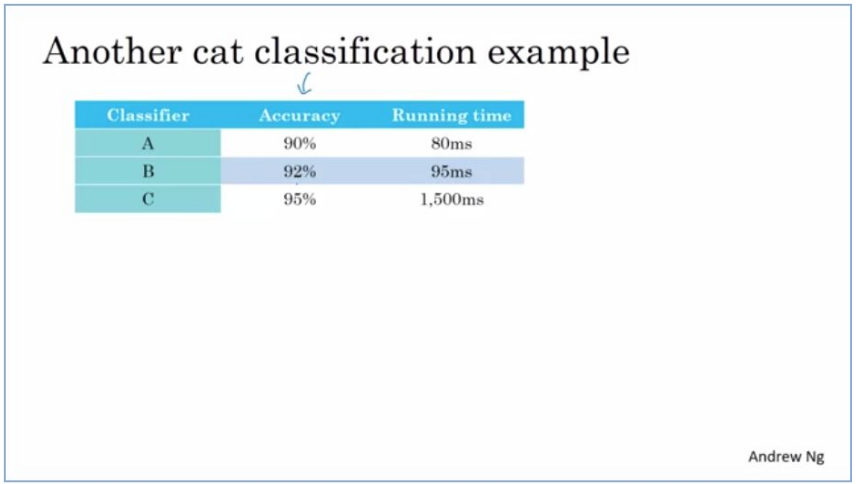
Single Evaluation Metric

Having a single real number evaluation metric will help you compare the performance of difference models.

Combining different metrics

Satisficing and Optimizing Metrics

In the problem understanding phase we need to identify which are objectives we need to optimize for and which are conditions that we need to satisfy.



Let's get (a bit) philosophical

The way we learn, do, learn, do, learn, do ... (DS as a tool)

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Let's get (a bit) philosophical

In Mathematics, we try to come up with abstractions (structures, patterns) that will help us deal with complex concepts, apply them to other situations (context) or compare them with other perspective (abstractions) of the same phenomena.

Compare $Ax = b$ vs $a_{11} x_1 + a_{12} x_2 = b1$, $a_{21} x_1 + a_{22} x_2 = b2$.

How does this relate to ML?

For a next session...

- Relación entre funciones y vectores.
- Funciones como vectores infinitos.
- Matrices como funciones lineales.
- Operadores como “funciones” para funciones.

- Least squares