Improving the Provision of Electricity Network Services through Machine Learning – the Case of Light Disco in Brazil

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Previsão de probabilidades de falhas e estimação de sinistros em estruturas, equipamentos e circuitos das redes de distribuição subterrâneas
6th biggest in Brazil

3,9 million + costumers units
(~ 12 million people)

~ 3,500 km of underground network

The Greatest in Latin America

31 Municipalities

5,524 Vaults

7,330 Underground Transformes

4,168 Switchs

2,627 Network Protectors
CRISP-DM METHODOLOGY

CRISP-DM process diagram (Wikimedia Commons, 2012).
MACHINE LEARNING/STATISTICAL MODELS

01. STRUCTURE INSPECTIONS (VAULTS & MANHOLES)
02. MEDIUM VOLTAGE CIRCUITS
03. LOW VOLTAGE CIRCUITS
04. EQUIPMENT
RESULTS SO FAR

INSPECTION IN STRUCTURES MODEL

• **Precision**: How many predicted defects are real defects in (%)?

• **Recall**: Considering all real defects, how many are predicted defects (%)?

**Defect precision evolution**

- Initial Model: 58%
- Three Months Later: 77%
- Six Months Later: 81%
- Current Model: 86%

**Defects recall evolution**

- Initial Model: 58%
- Three Months Later: 72%
- Six Months Later: 78%
- Current Model: 79%
CURRENTY VAULTS INSPECTION MODEL

Currently

Inspection Teams → Inspection Reports → Manual Typing → Internal Network → Decision Making

About 42% defects are found during inspections

With the model

Inspection Teams → Maintenance Management System → Automatic Prediction → Decision Making

86% ASSERTIVENESS in the Current Model

This R&D Contribution
Localização de CTs prioritárias

Histórico dos modelos

Modelo de Defeitos

Modelo de Falhas

- Modelo inicial
- 3 meses atrás
- Modelo atual

- Precisão
- Recall
CONCLUSIONS

• Data Science techniques are likely to improve results in maintenance: Predictive Maintenance.

• DSO and economic regulators have to understand it to maximize benefits.
NEXT CHALLENGES

• Is it enough to convince the regulator?

• From prediction to decision making: what should be taken in account?

• How to do a smooth transition?

• How to deal with the bid data that is to come?
Thank you!

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