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INTELLIGENCE IN ACTION: AI-DRIVEN NETWORKS

Checkpoint 2

Projeto em Informática 2024/2025

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1. WORK DONE

WORK DONE ML

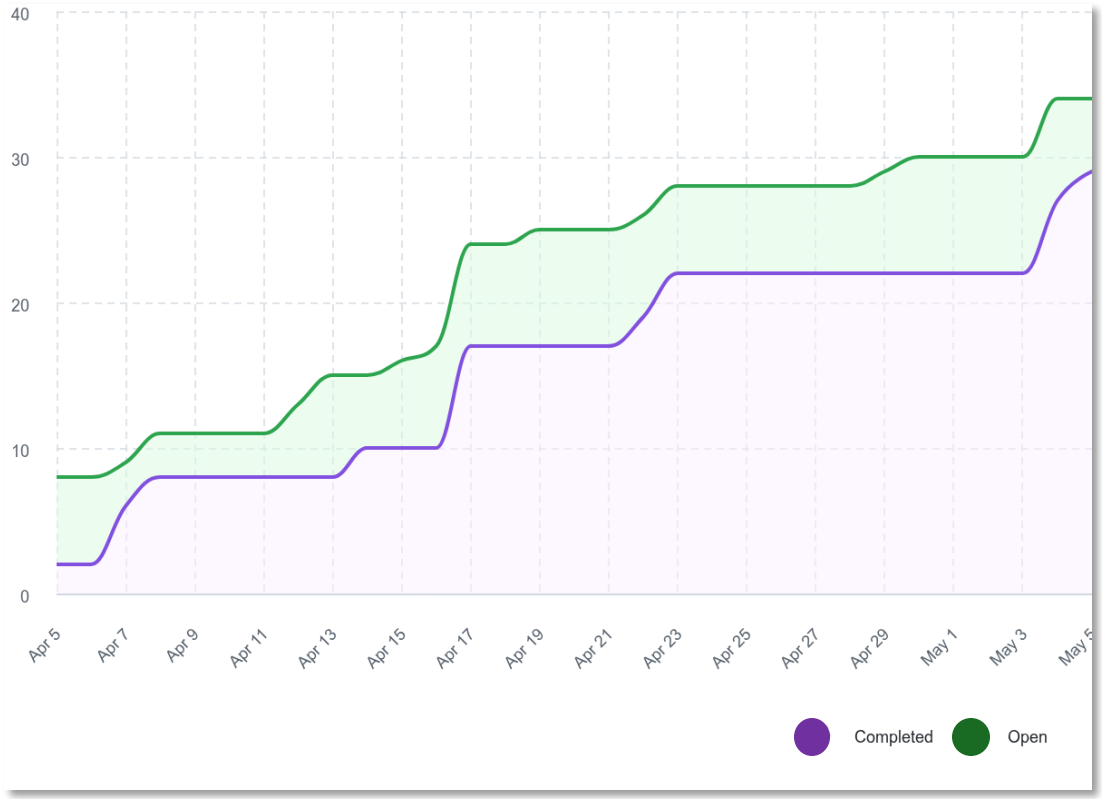
- Massively increased the pipeline speed so we have more readily available data.
- Developed the binary classification component statically.
  - Preprocessed the data.
  - Trained multiple model types systematically and ranked them.
    - **Random Forest, Gradient Boosting, MLP (Neural Networks), XGBoost.**
  - Produces the model file (Pickle) useful for model deployment.
    - The best model is the one with the highest F1-Score
  - Applies balancing strategies (SMOTE and Undersampling).

WORK DONE ML

- Developed the attack classification component statically.
  - Same achievements.
  - Works only with attack sample data.

- Integrated the binary classification component into pipeline.

- Developed the model deployment component statically.
  - The model can receive flows and it predicts whether its an attack.



2. PROBLEMS

ML Problems

- Takes much time to get enough data to train the models.
- Even when we would have enough data for binary classification, we still would have insufficient knowledge to tell the attack types apart.
- The differentiation of the Label feature is not a deterministic process and it 'broke' the model fitting upon deployment.

3. STRATEGIES

ML STRATEGIES

- Systematic training but only when a new batch of data is ready.
- Dynamically train various types of models and keep the best one (by f1-score).
- Dynamically deploy the best model to accommodate data drift.

ML STRATEGIES

- Train 2 models, binary classification (attack or benign) and attack classification.
- Deploy said models and get inferences.
- Save important inferences (attacks) for displaying on Chronograf.
- Remove TensorFlow and Keras from our plans.

4. PLAN

ML PLAN

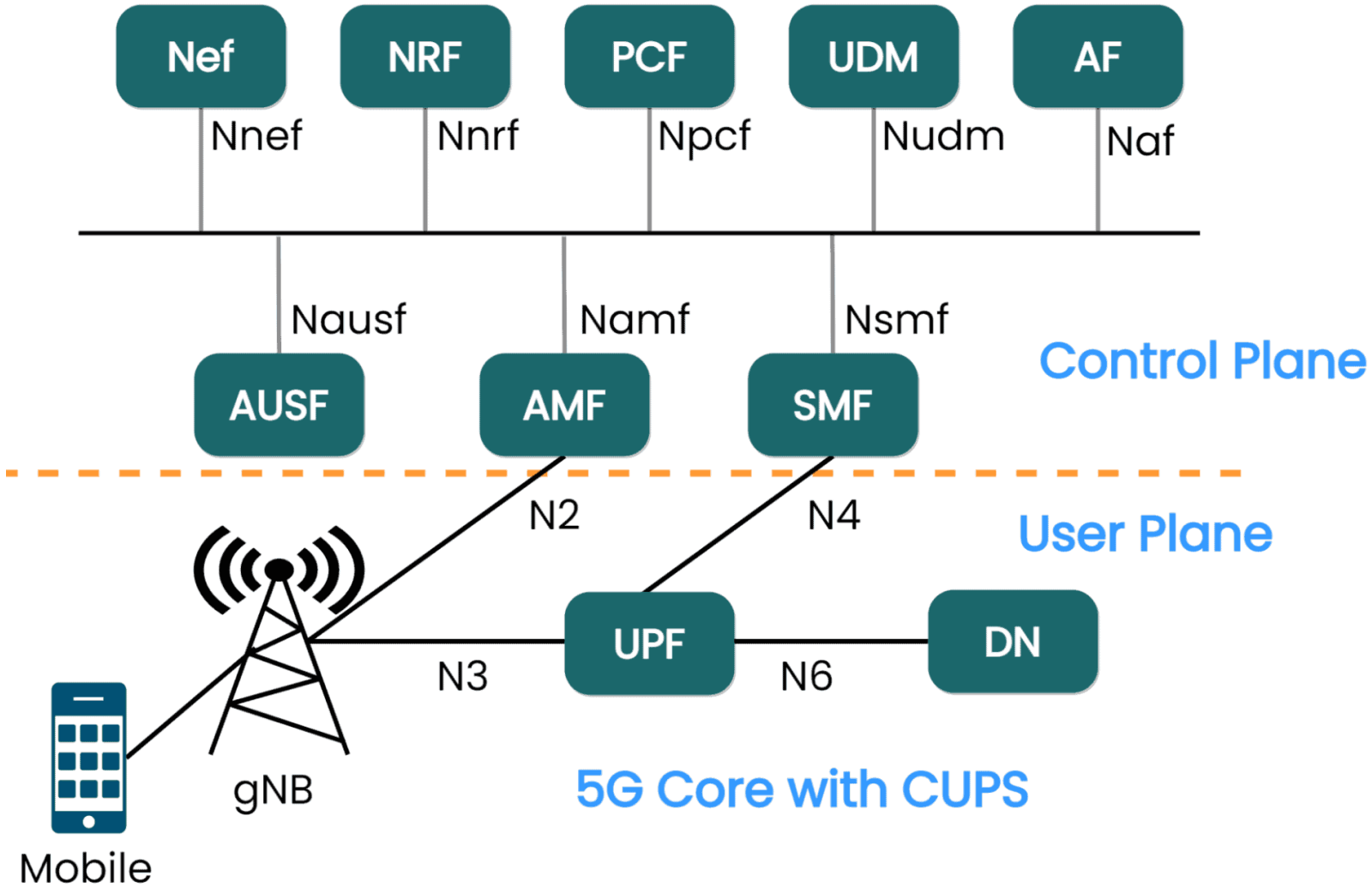
- Complete the model(s) deployment and Integrate them in the pipeline.

- Assess whether it's feasible to have a good attack categorizing model. (Will we ever have enough data?)

- Assess whether to cold start the system or prepopulate the ML databases with sample data.

5. 5G Core Integration

5G Integration



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THANK YOU