Pipeline Visual Report

This document consolidates the pipeline outputs with key graphs and short interpretations.

# Sampling variation summary

Performance derivative peaks:

* CNN: peak 0.0029 at 20%
* DT: peak 0.0011 at 10%
* LR: peak 0.0076 at 10%
* RF: peak -0.0015 at 10%
* TabNet: peak -0.0031 at 40%

Explainability derivative peaks:

* CNN: peak 0.0006 at 10%
* DT: peak 0.0007 at 10%
* LR: peak 0.0003 at 10%
* RF: peak -0.0003 at 10%
* TabNet: peak -0.0026 at 10%

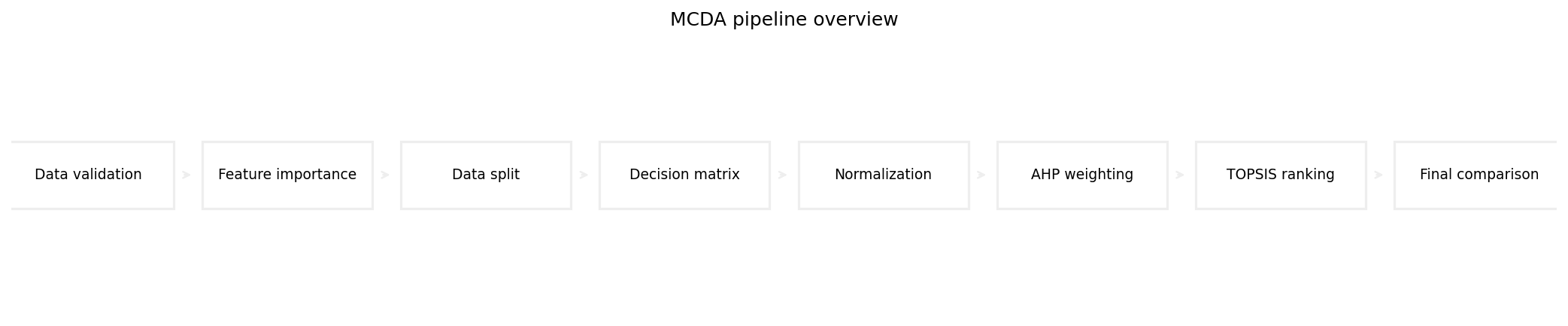
Threshold variation range: 100 to 30 (step 10) for resources, performance, and explainability.

# Pipeline overview

High-level flow of the MCDA pipeline and where each visualization fits.

09\_pipeline\_overview.png

Pipeline flow diagram for MCDA steps.

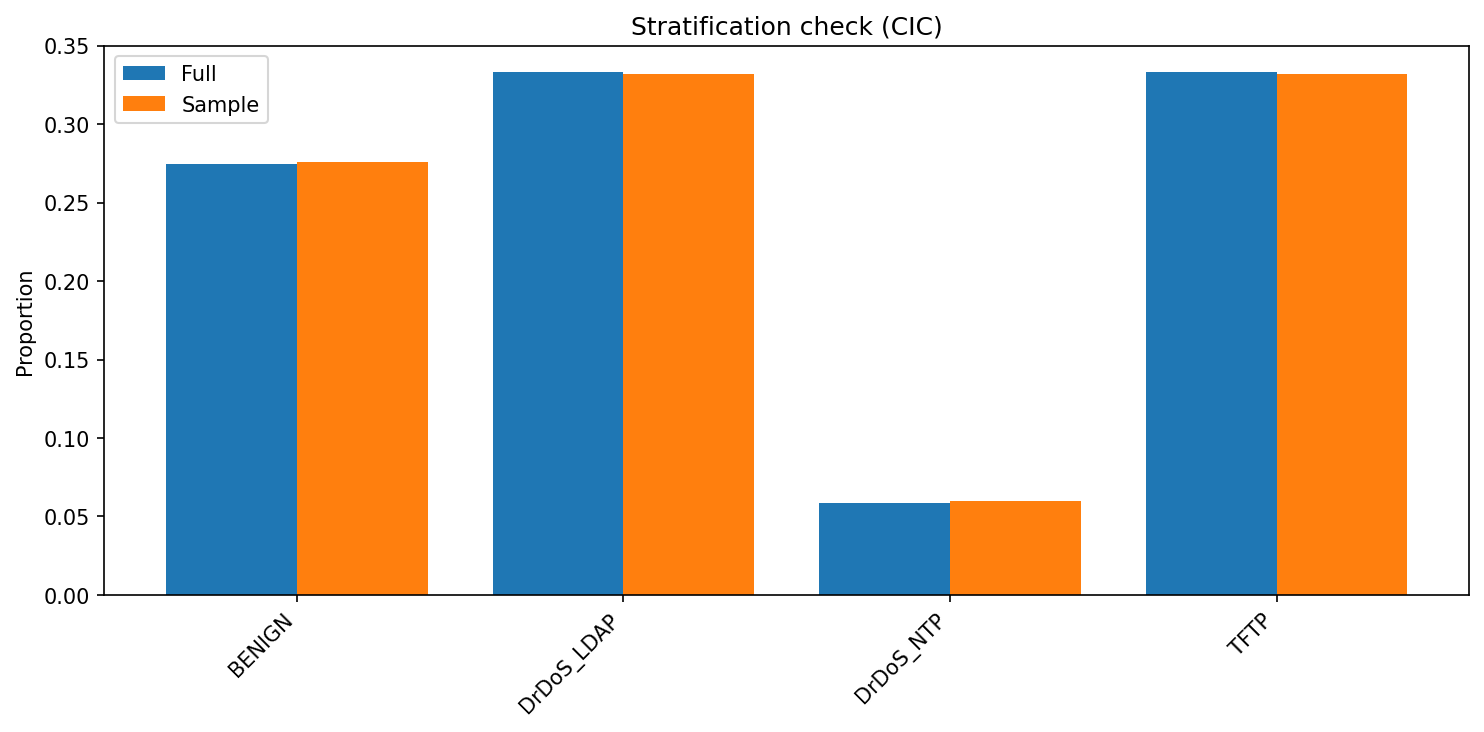


# Stratification checks

Compares label proportions before and after sampling to verify stratification.

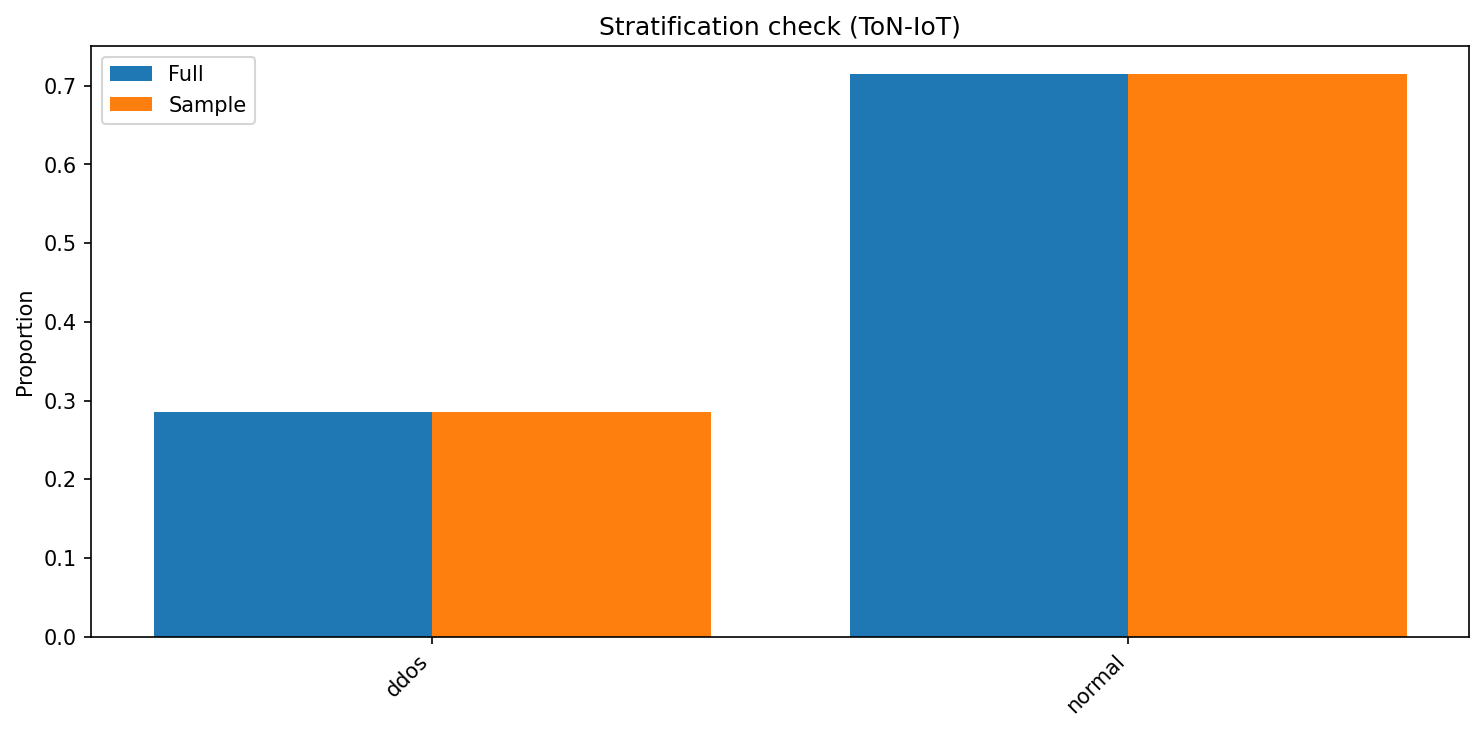
cic\_stratification.png

Bar chart comparing full vs sampled label proportions.



ton\_stratification.png

Bar chart comparing full vs sampled label proportions.

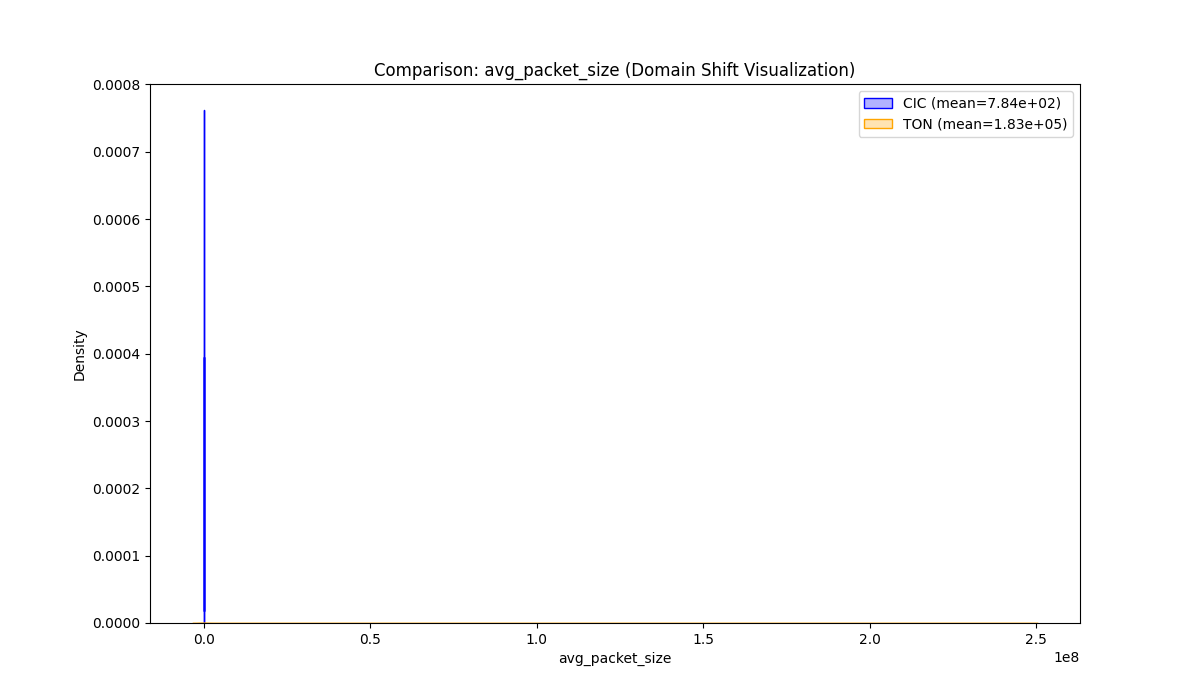


# Feature distributions

Shows post-transformation feature distributions used by the models.

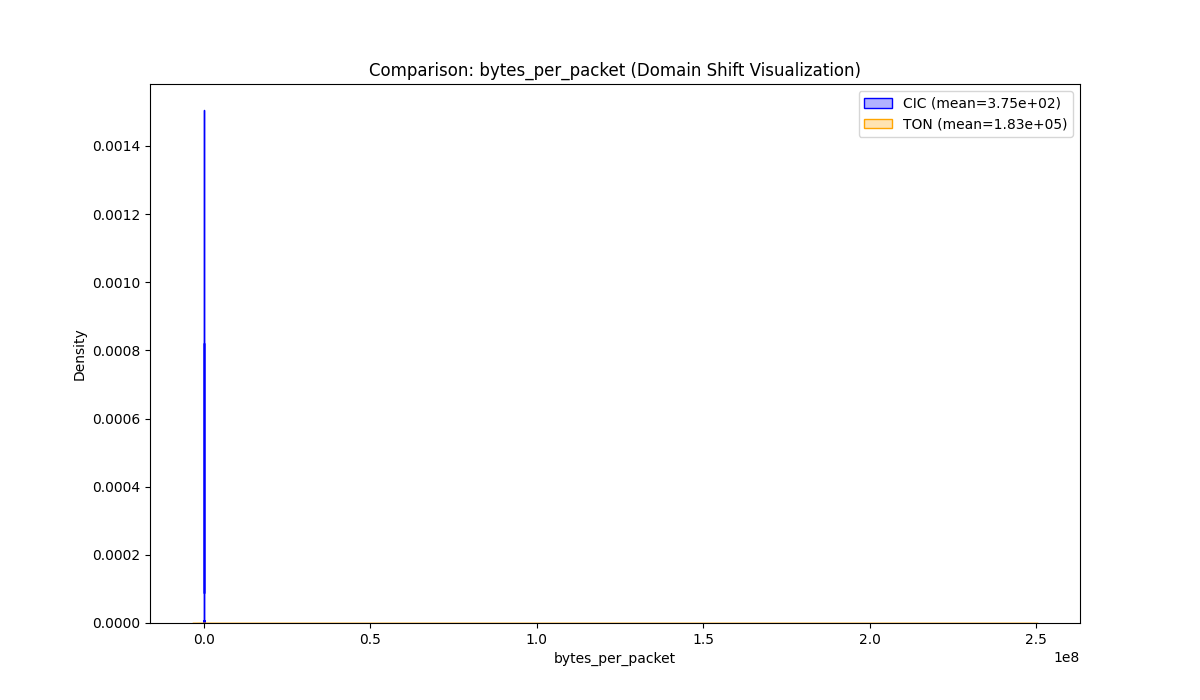
compare\_avg\_packet\_size.png

Chart generated by the pipeline.



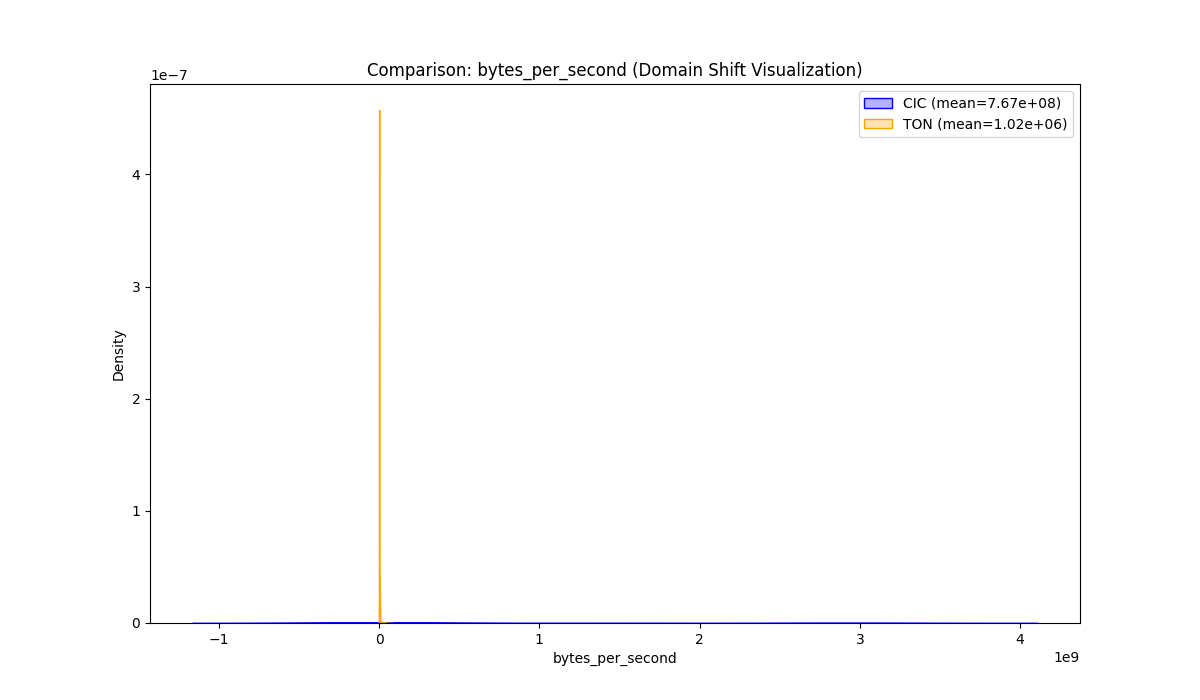
compare\_bytes\_per\_packet.png

Chart generated by the pipeline.



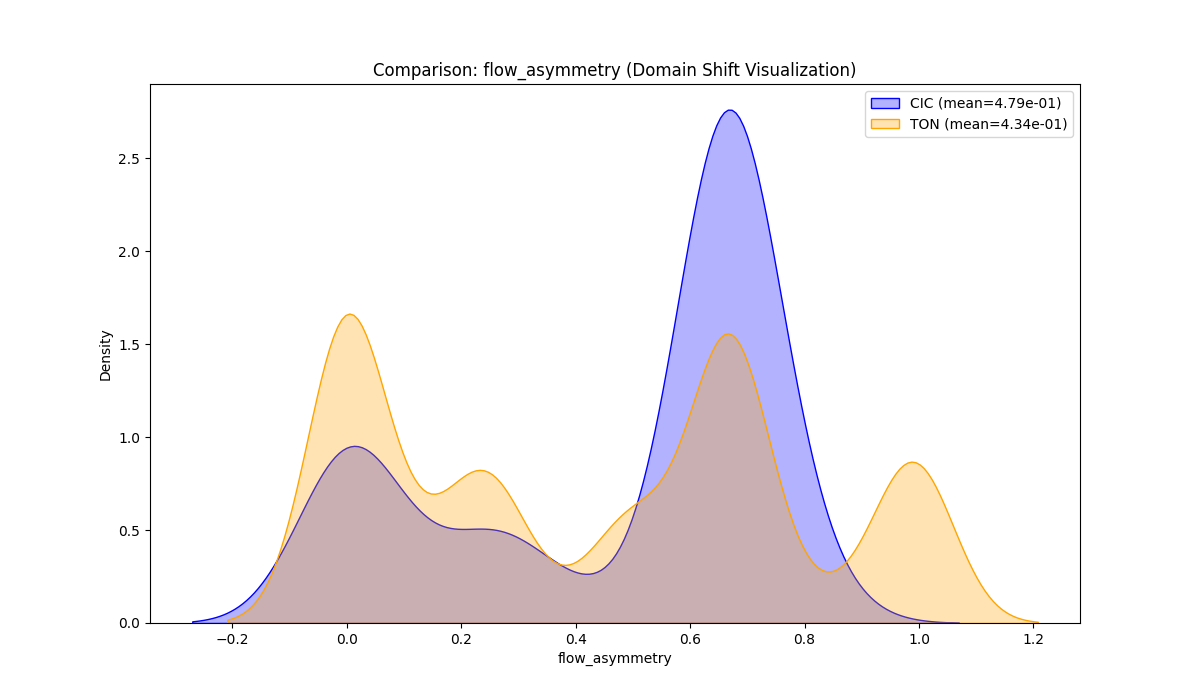
compare\_bytes\_per\_second.png

Chart generated by the pipeline.



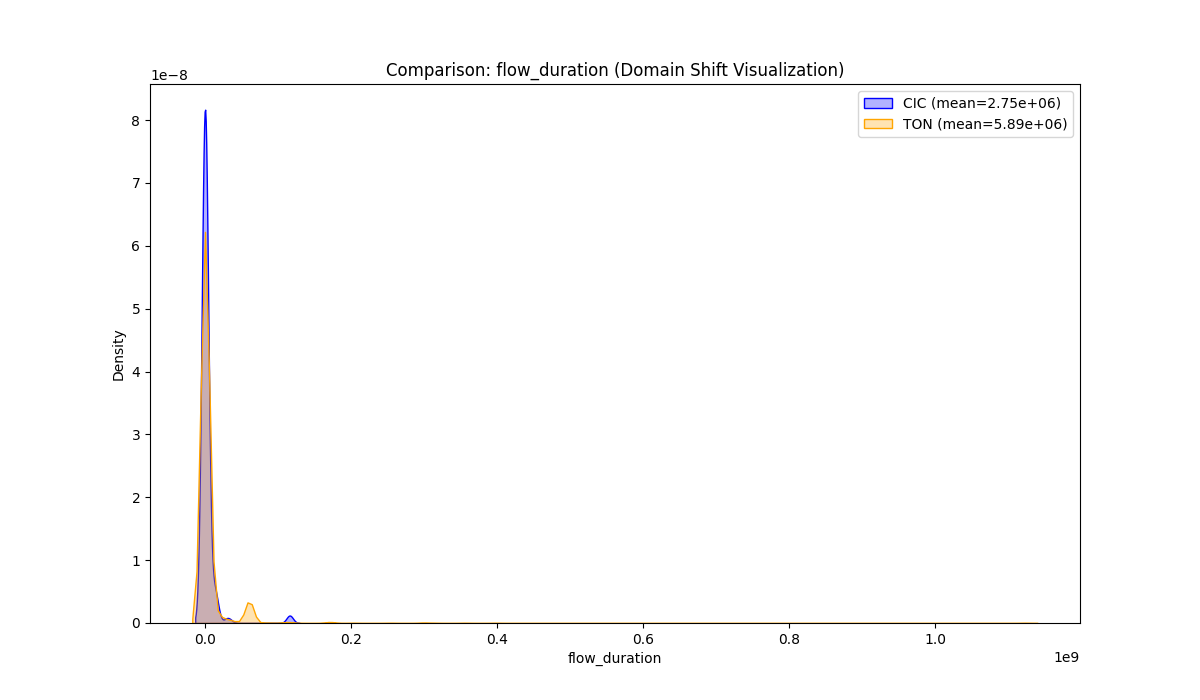
compare\_flow\_asymmetry.png

Chart generated by the pipeline.



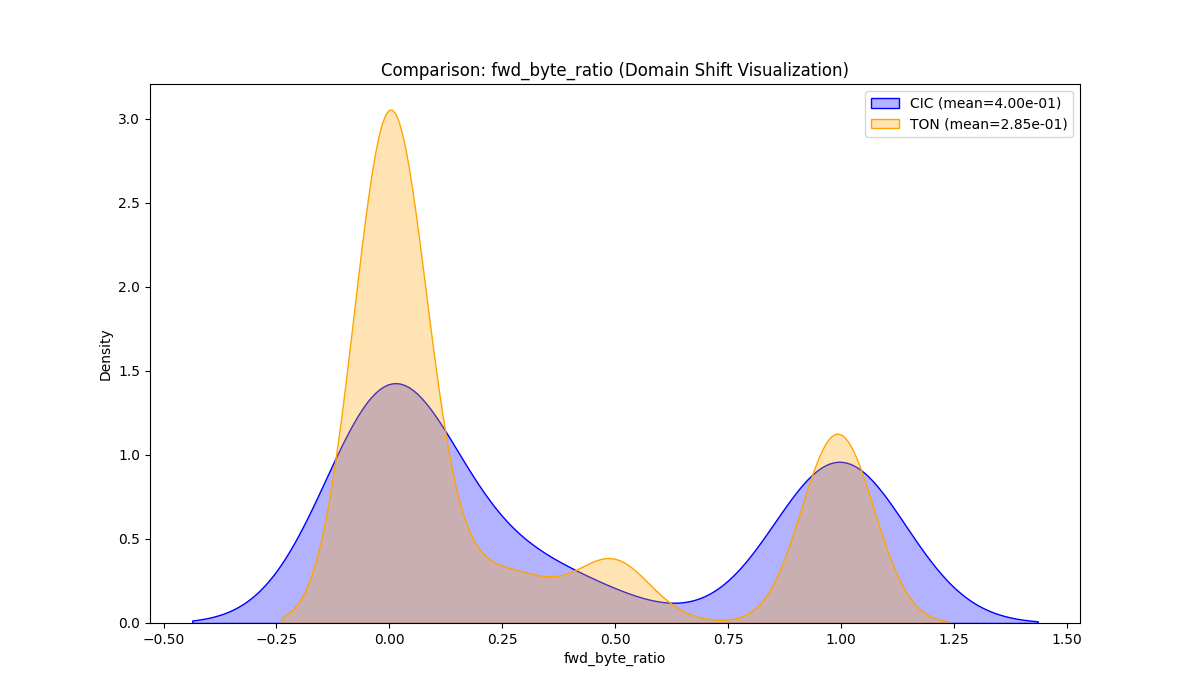
compare\_flow\_duration.png

Chart generated by the pipeline.



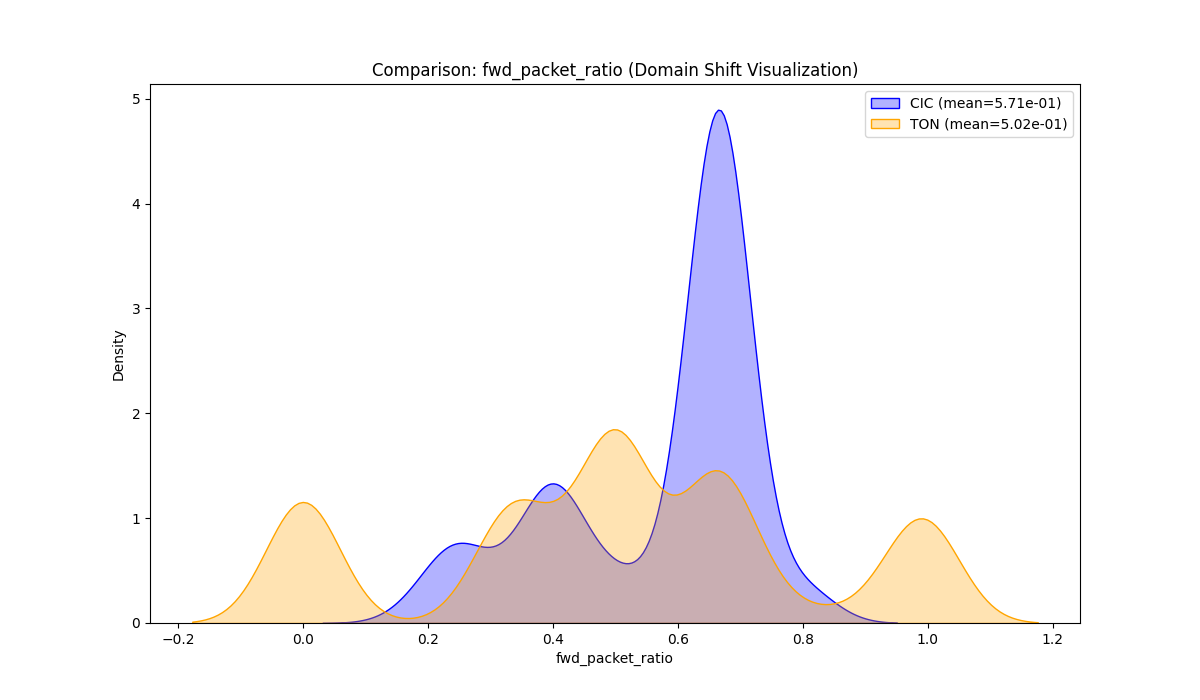
compare\_fwd\_byte\_ratio.png

Chart generated by the pipeline.



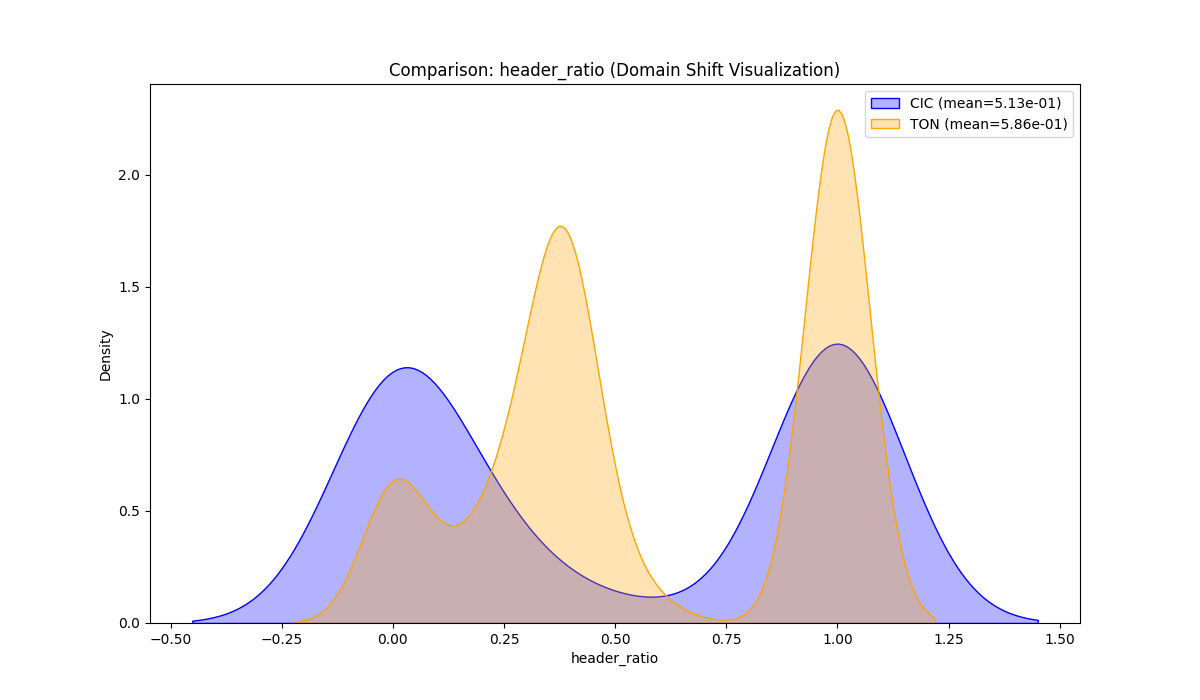
compare\_fwd\_packet\_ratio.png

Chart generated by the pipeline.



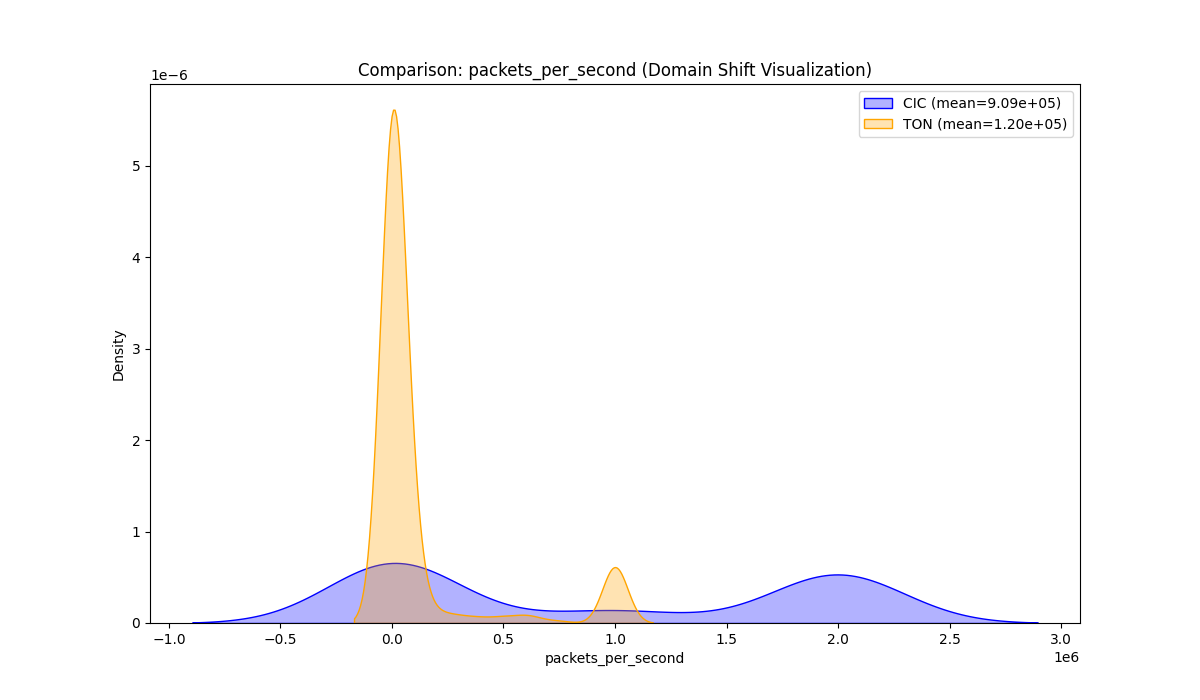
compare\_header\_ratio.png

Chart generated by the pipeline.



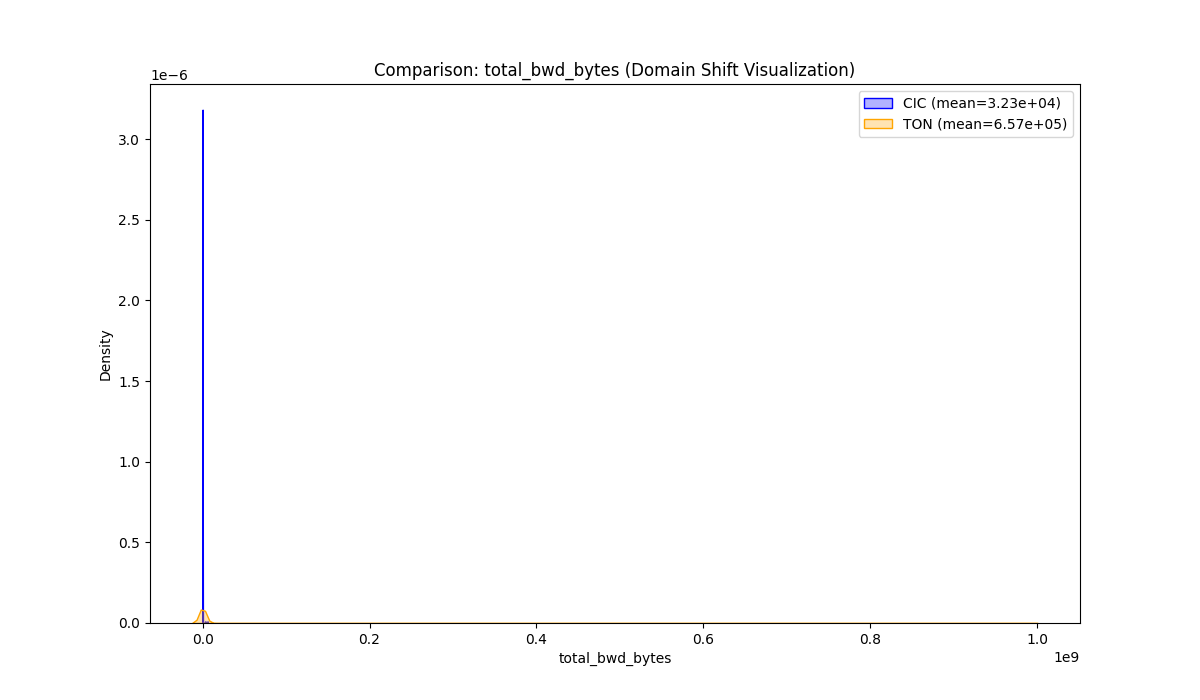
compare\_packets\_per\_second.png

Chart generated by the pipeline.



compare\_total\_bwd\_bytes.png

Chart generated by the pipeline.



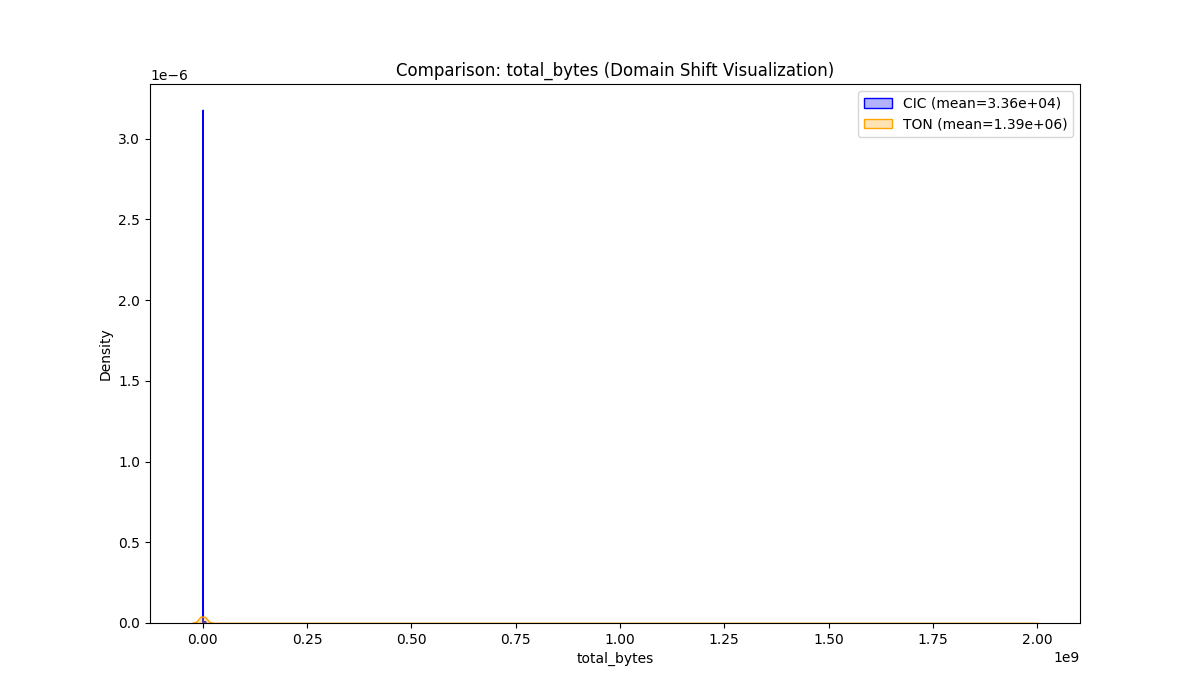
compare\_total\_bwd\_packets.png

Chart generated by the pipeline.



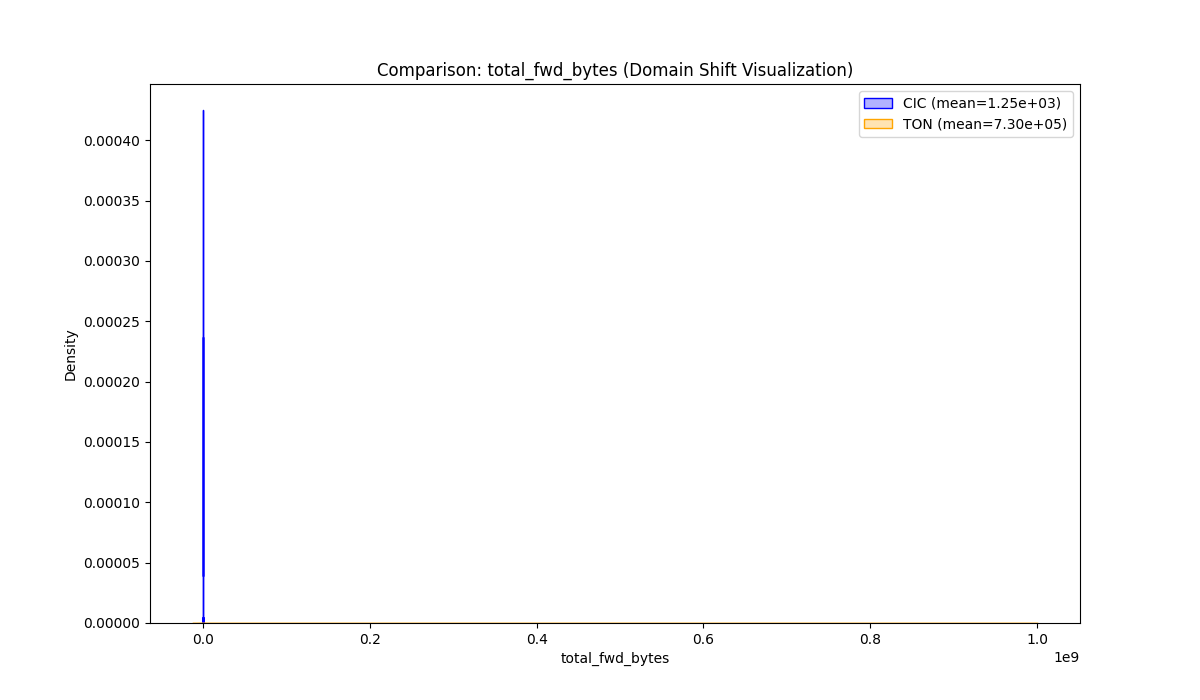
compare\_total\_bytes.png

Chart generated by the pipeline.



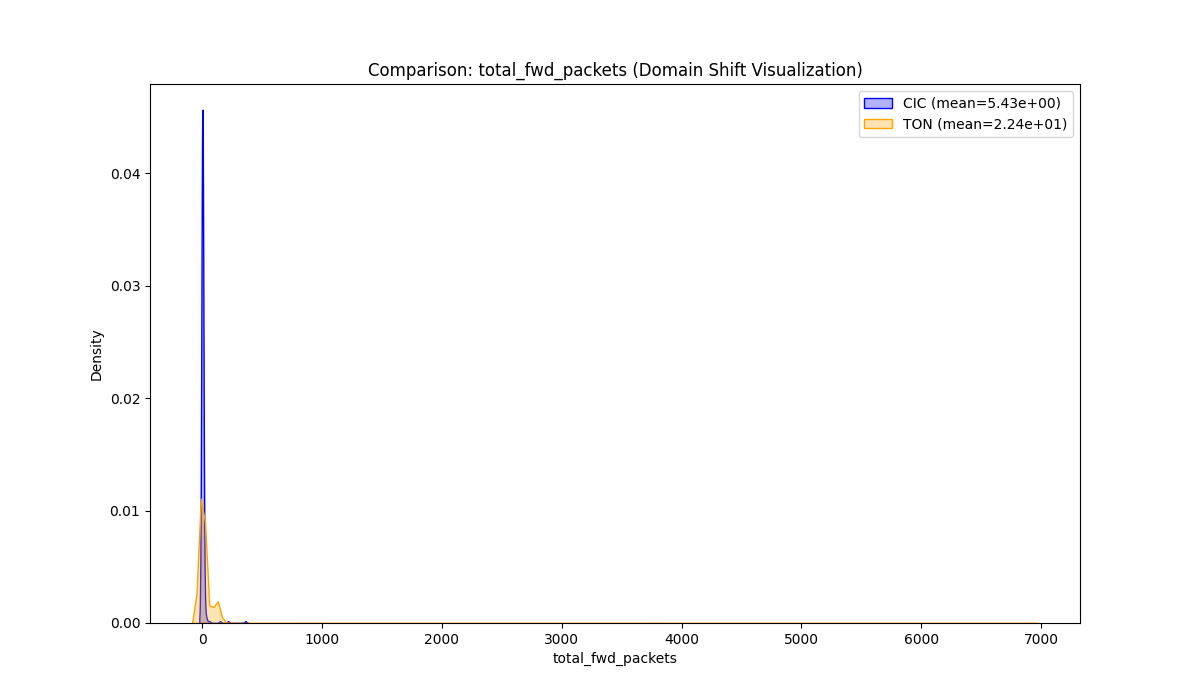
compare\_total\_fwd\_bytes.png

Chart generated by the pipeline.



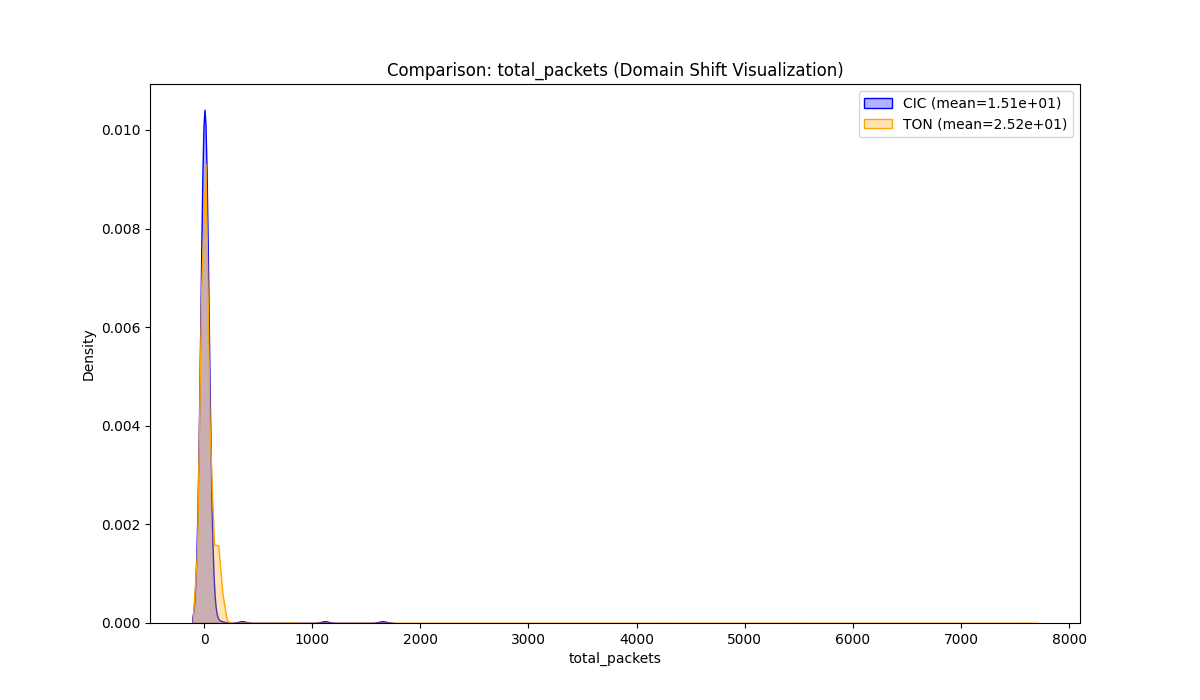
compare\_total\_fwd\_packets.png

Chart generated by the pipeline.



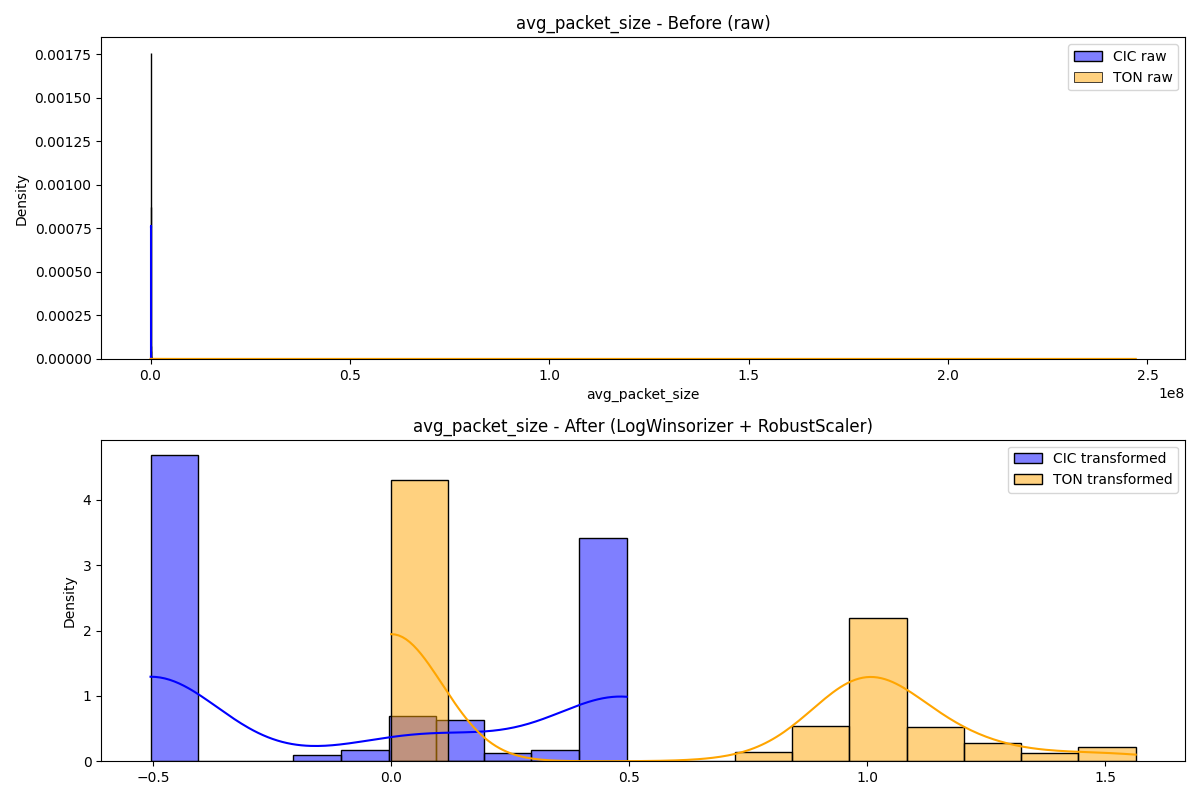
compare\_total\_packets.png

Chart generated by the pipeline.



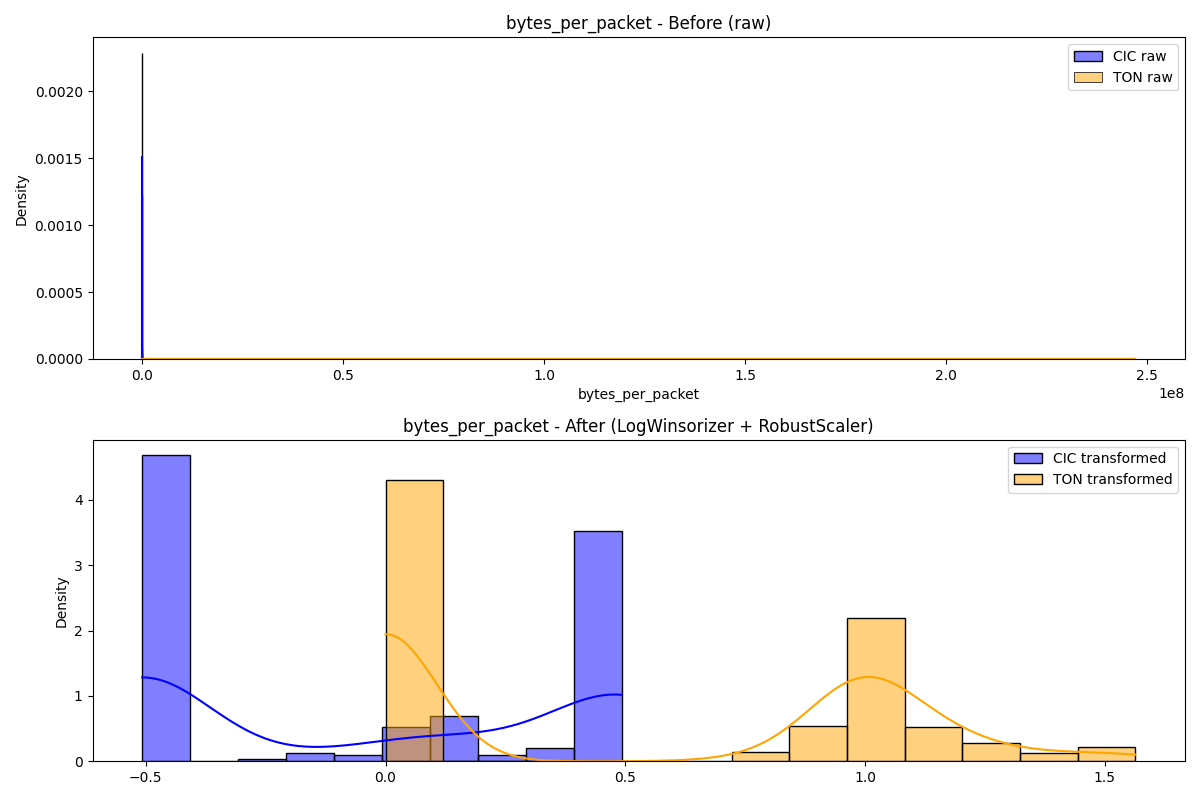
before\_after\_avg\_packet\_size.png

Chart generated by the pipeline.



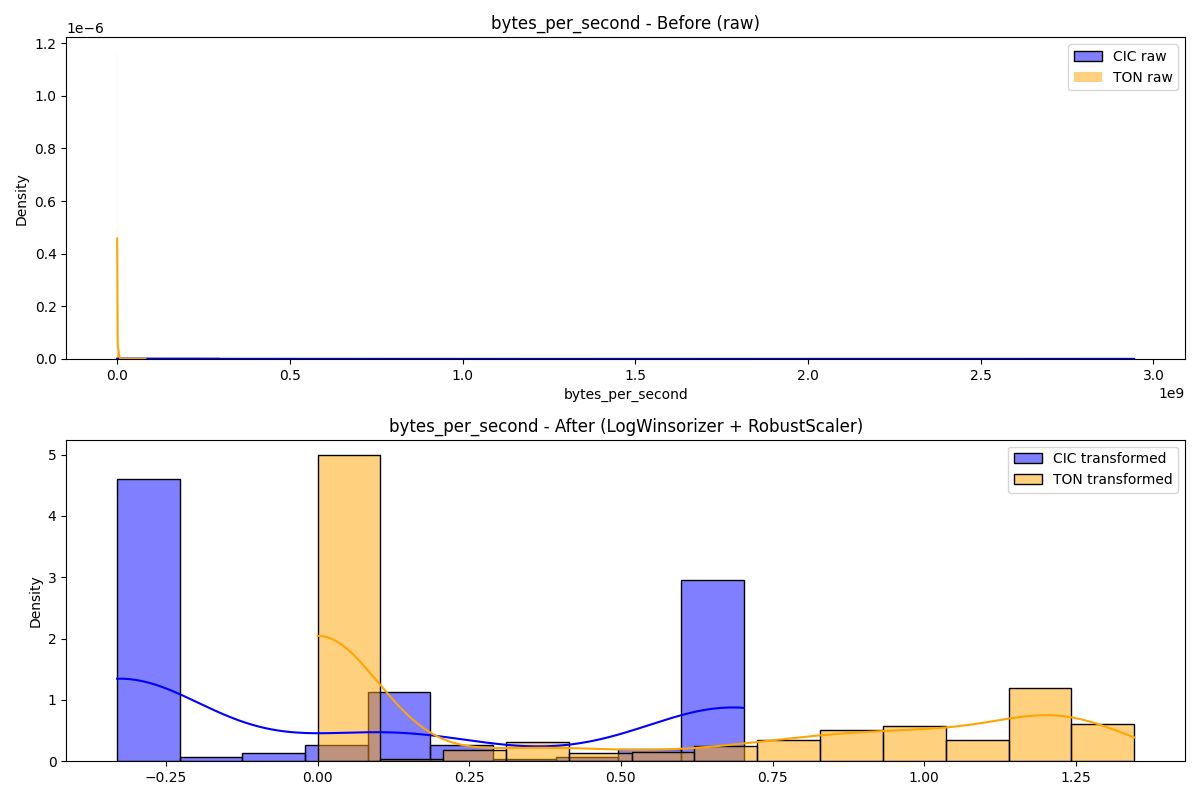
before\_after\_bytes\_per\_packet.png

Chart generated by the pipeline.



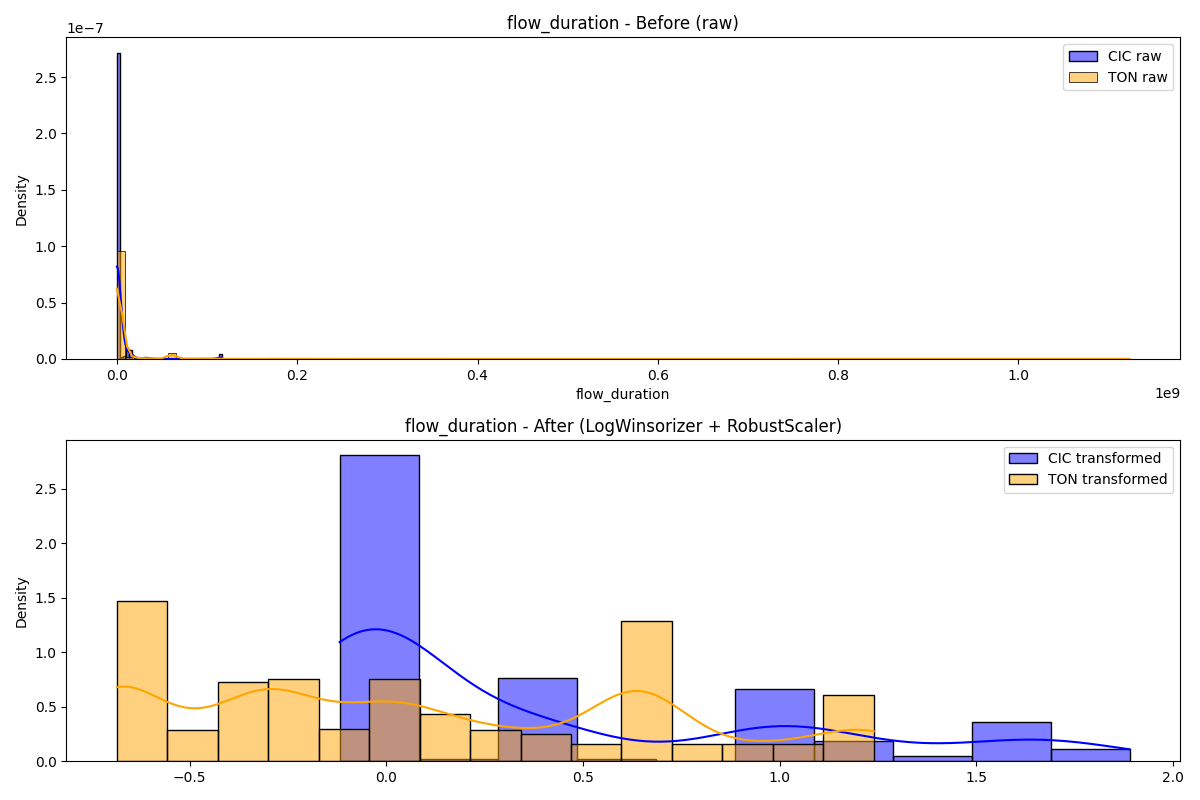
before\_after\_bytes\_per\_second.png

Chart generated by the pipeline.



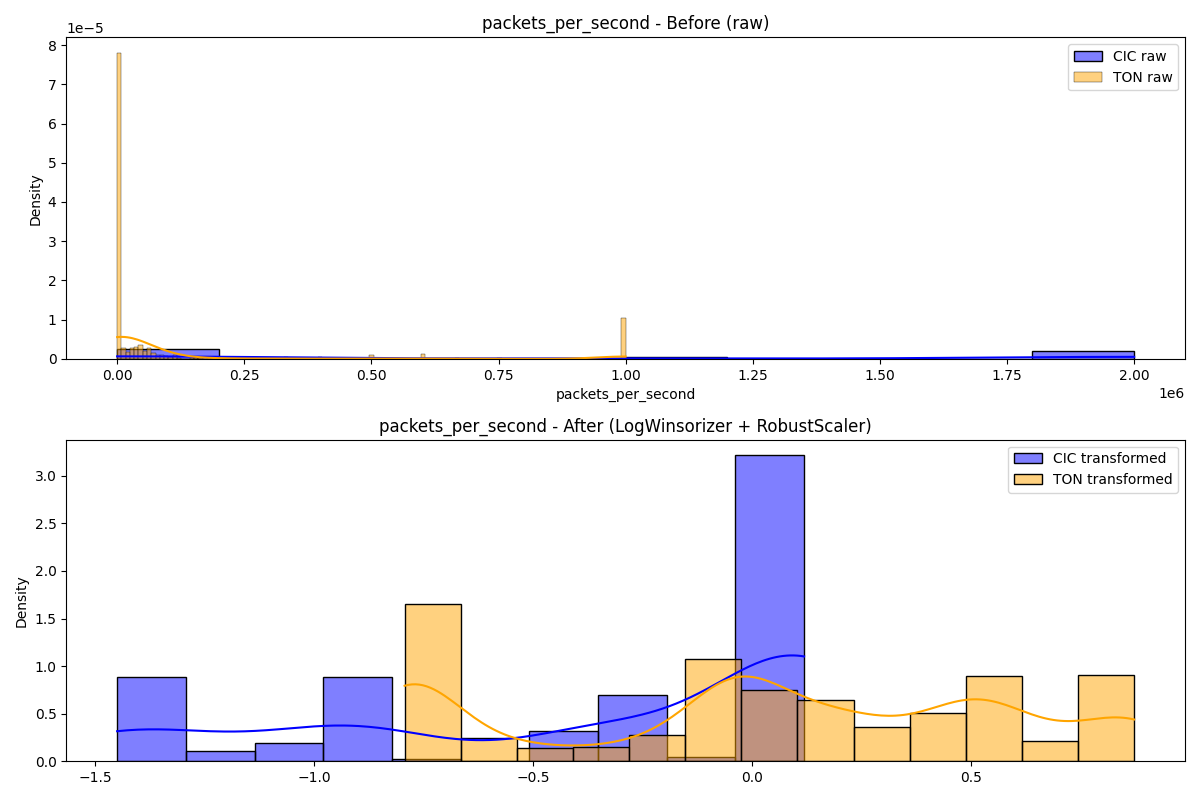
before\_after\_flow\_duration.png

Chart generated by the pipeline.



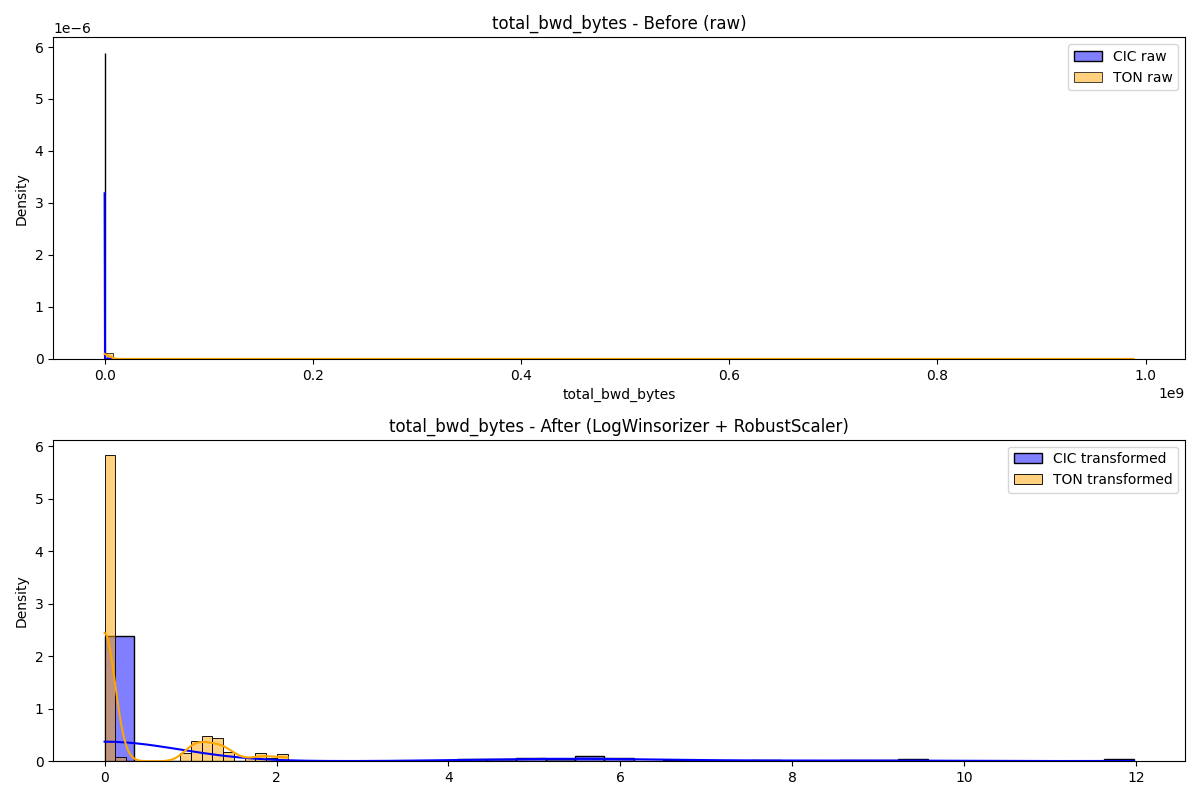
before\_after\_packets\_per\_second.png

Chart generated by the pipeline.



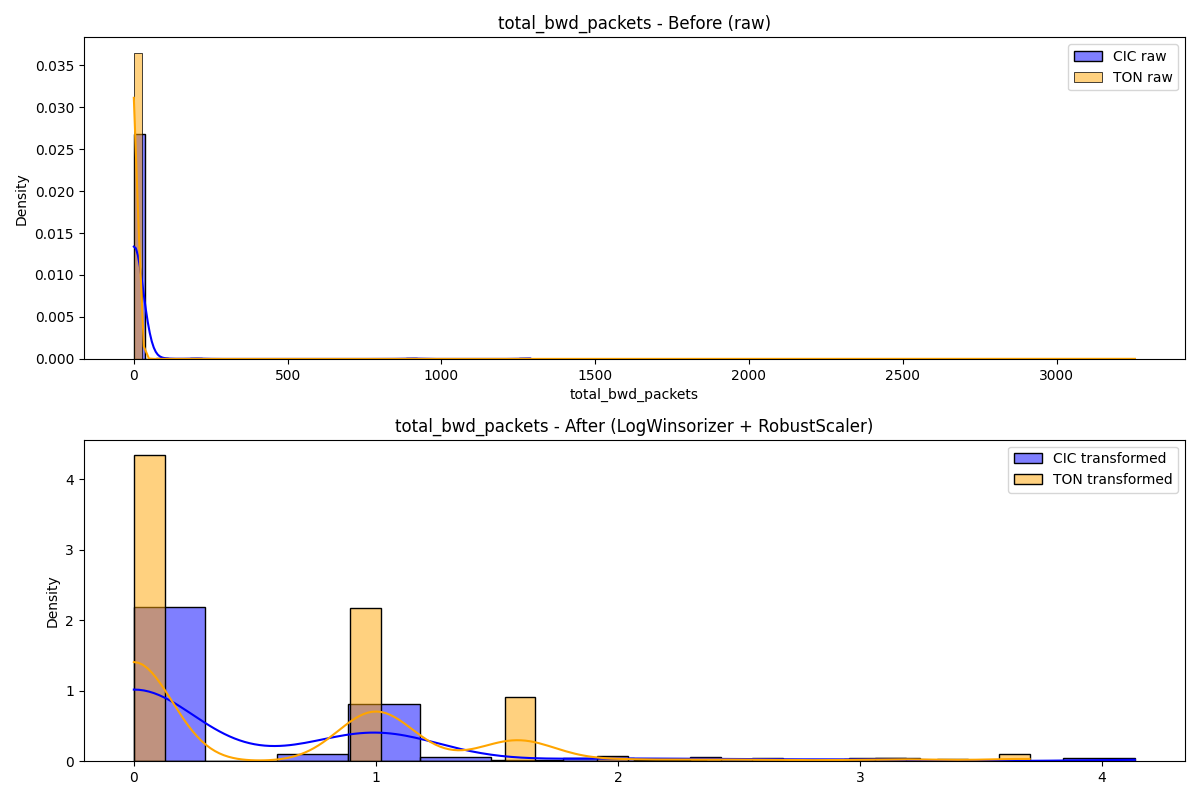
before\_after\_total\_bwd\_bytes.png

Chart generated by the pipeline.



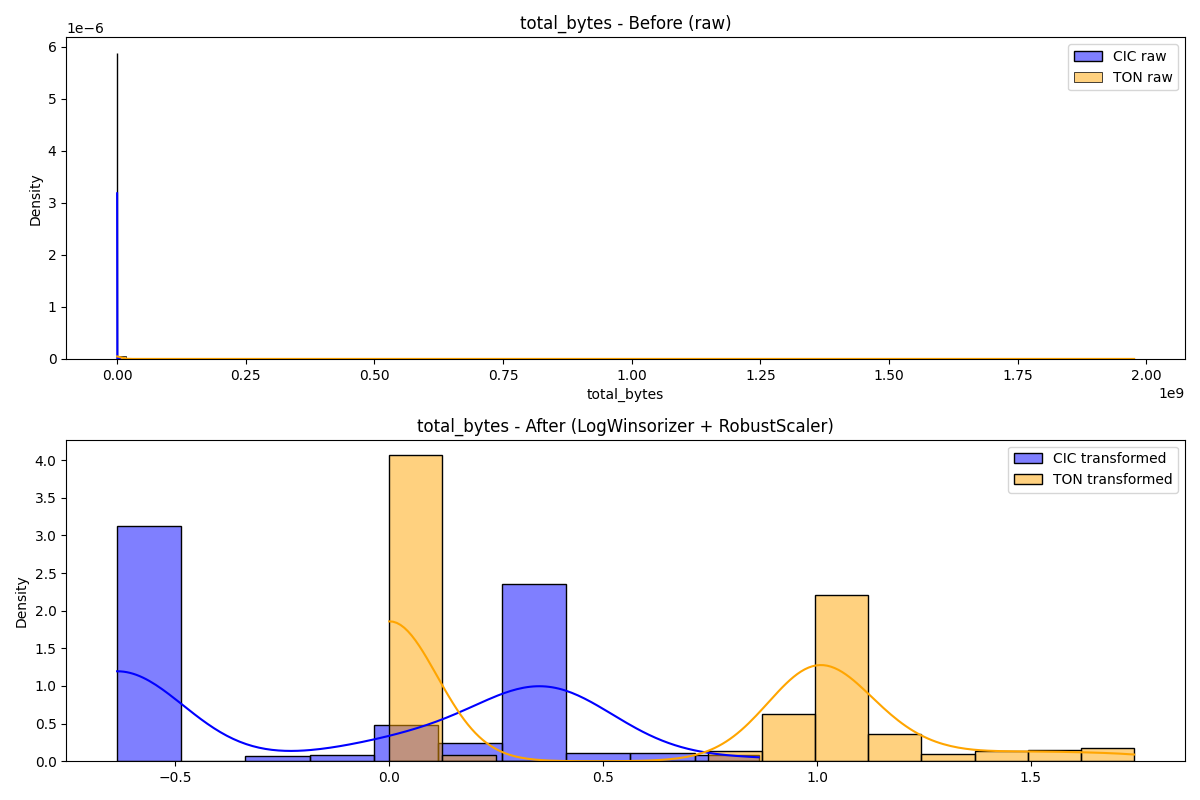
before\_after\_total\_bwd\_packets.png

Chart generated by the pipeline.



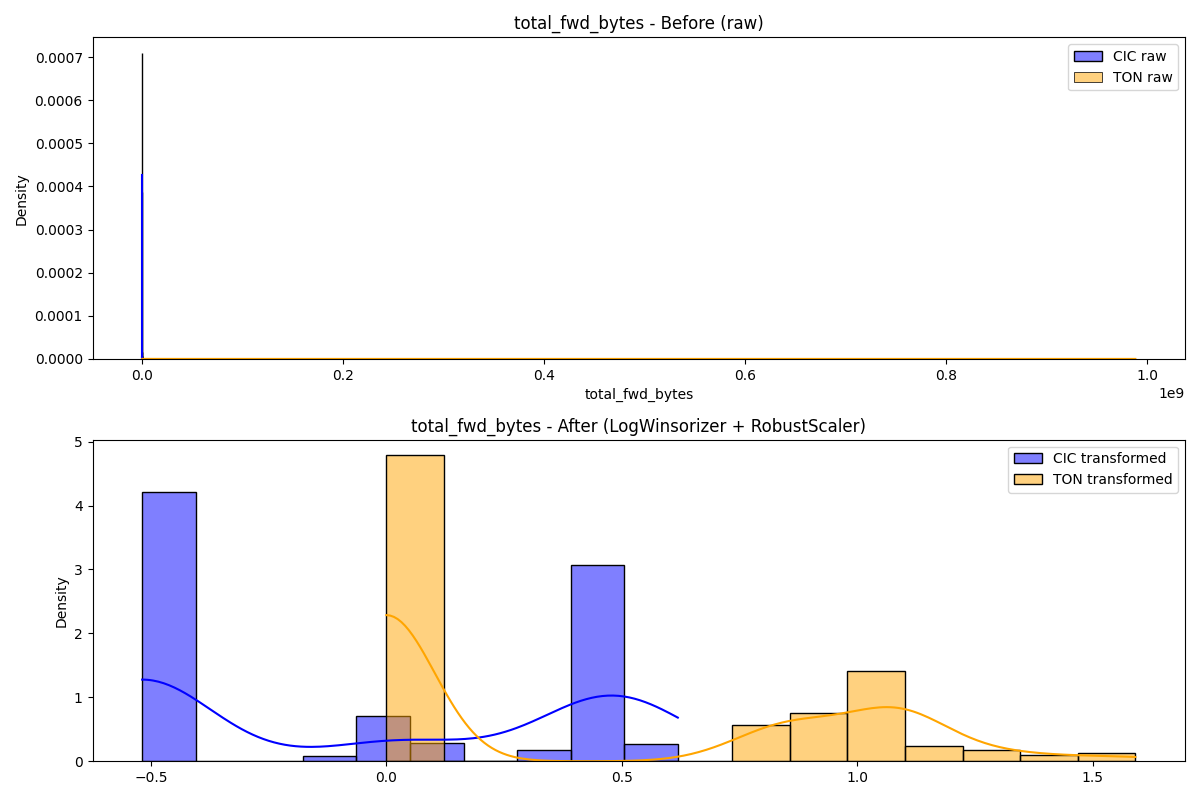
before\_after\_total\_bytes.png

Chart generated by the pipeline.



before\_after\_total\_fwd\_bytes.png

Chart generated by the pipeline.



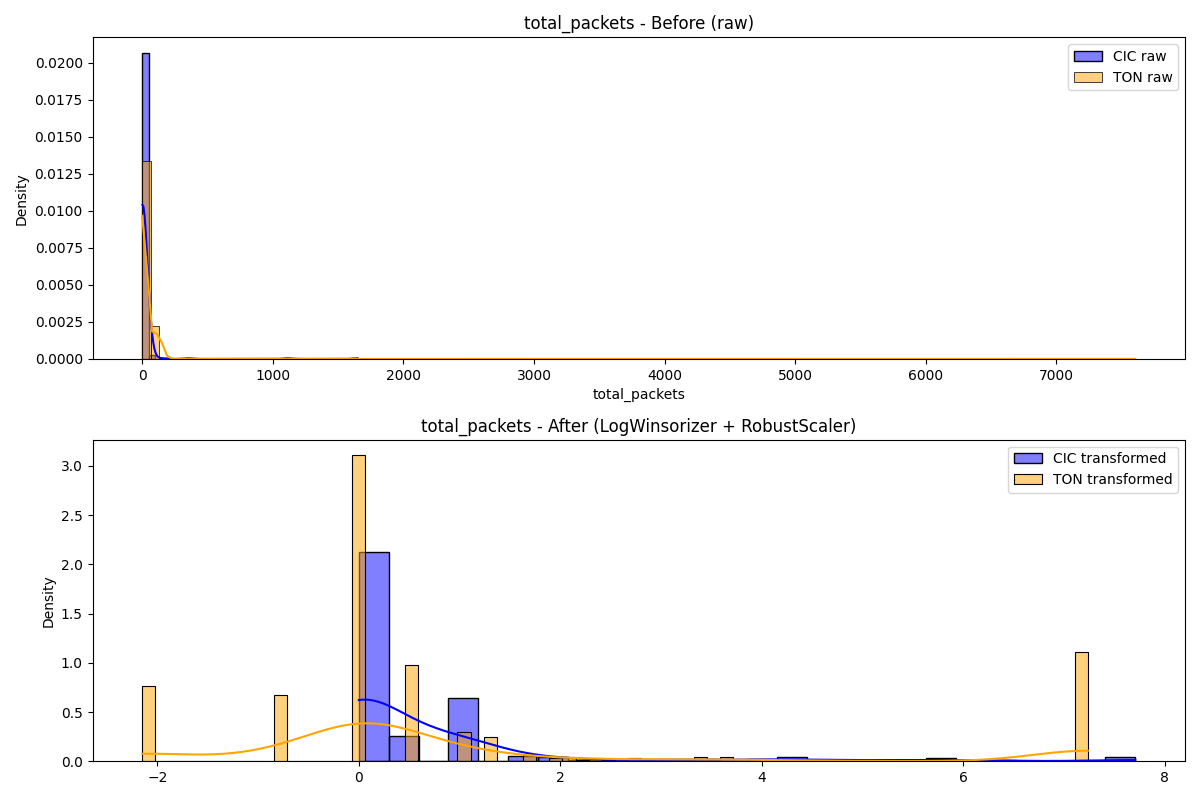
before\_after\_total\_fwd\_packets.png

Chart generated by the pipeline.



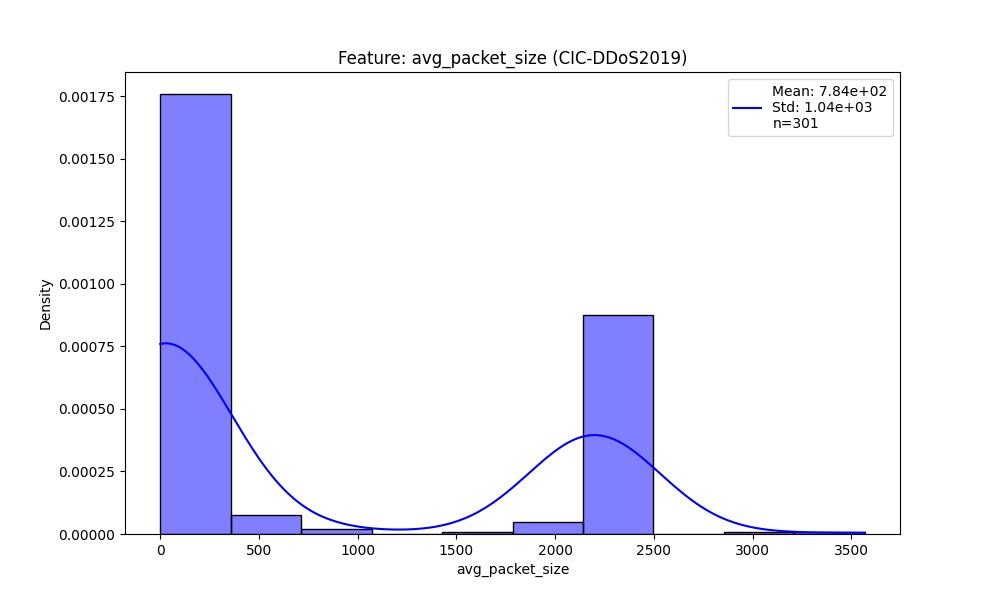
before\_after\_total\_packets.png

Chart generated by the pipeline.



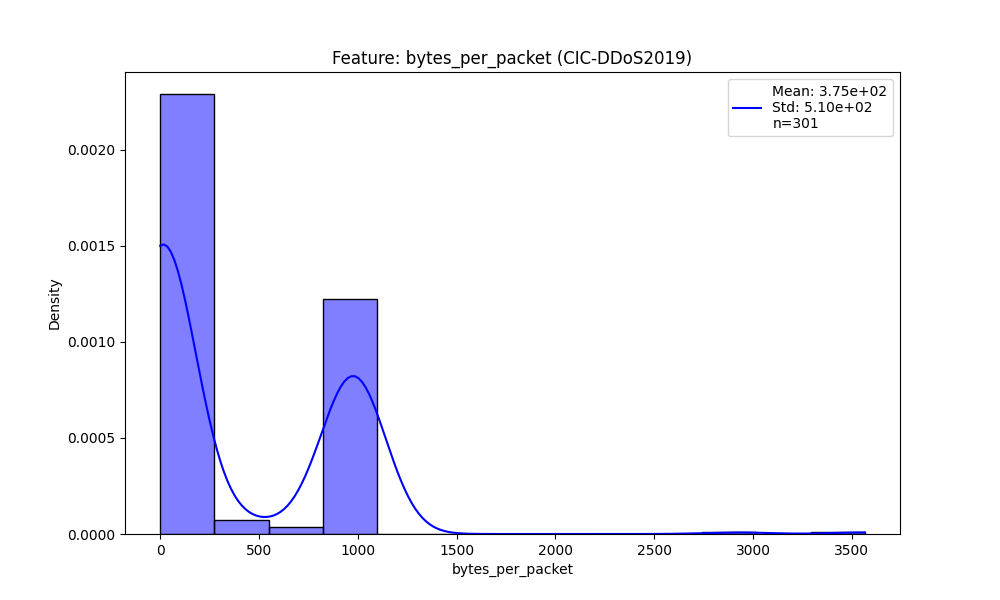
dist\_avg\_packet\_size.png

Chart generated by the pipeline.



dist\_bytes\_per\_packet.png

Chart generated by the pipeline.



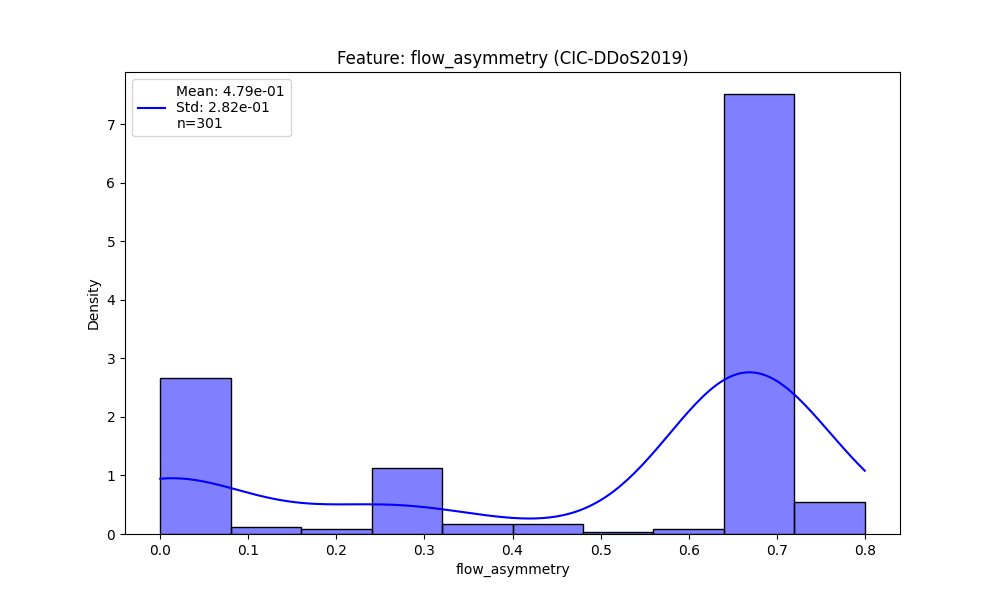
dist\_bytes\_per\_second.png

Chart generated by the pipeline.



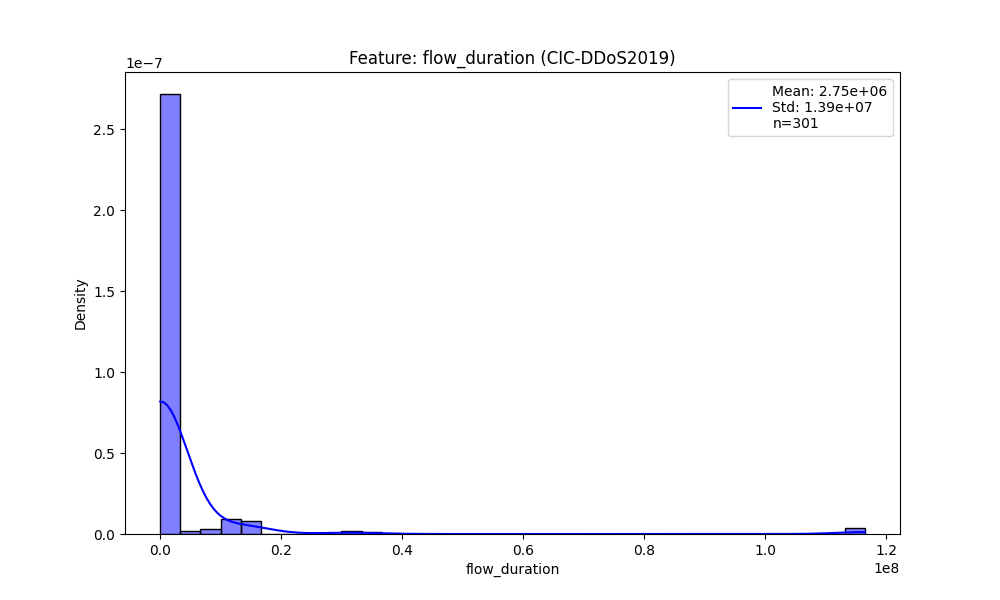
dist\_flow\_asymmetry.png

Chart generated by the pipeline.



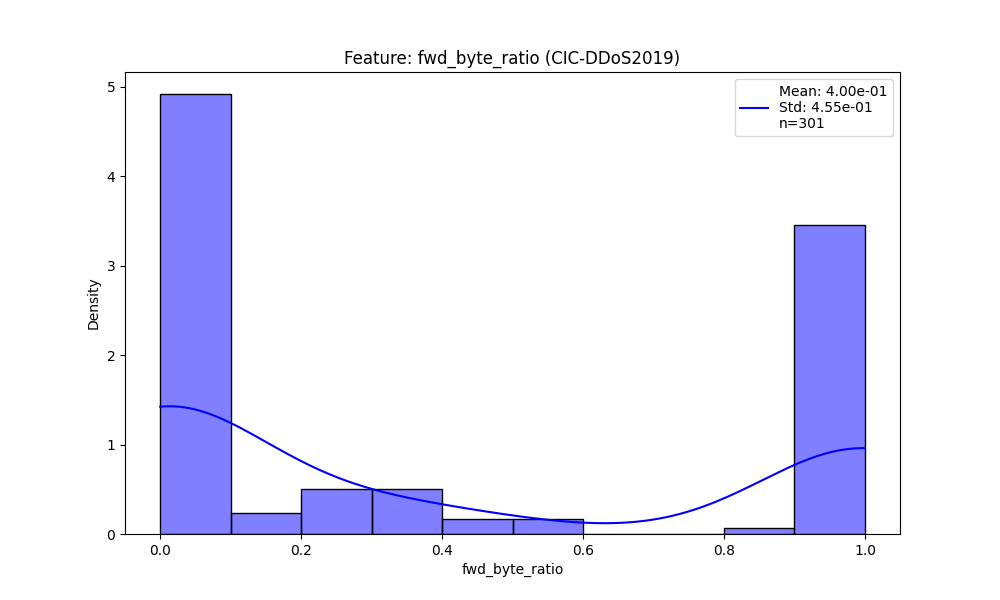
dist\_flow\_duration.png

Chart generated by the pipeline.



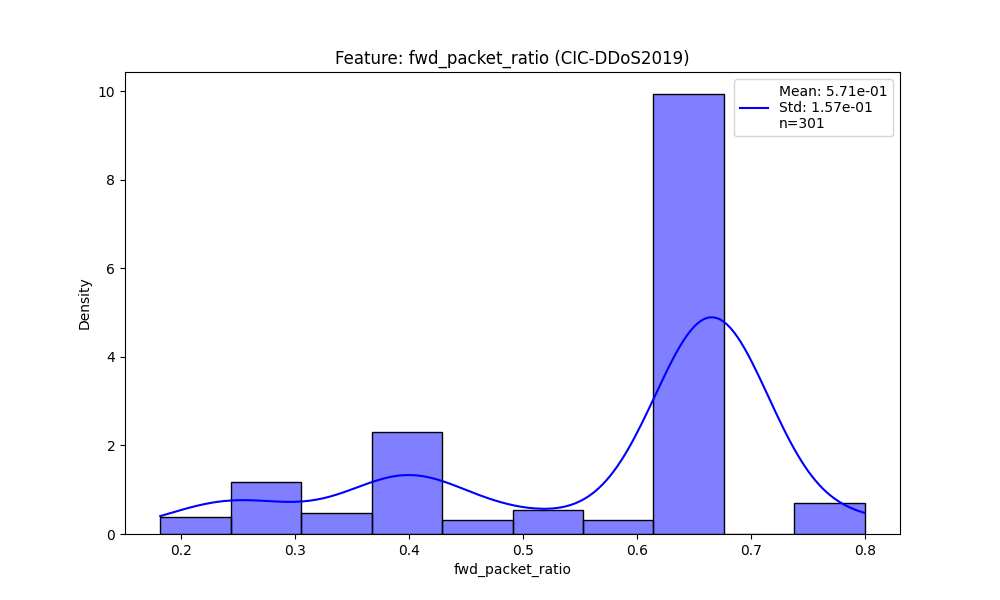
dist\_fwd\_byte\_ratio.png

Chart generated by the pipeline.



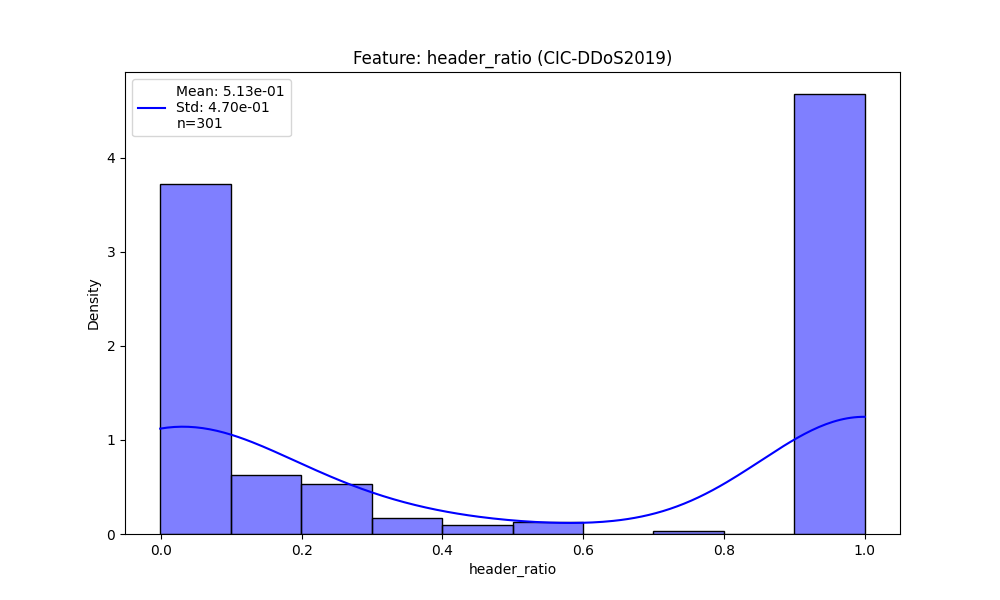
dist\_fwd\_packet\_ratio.png

Chart generated by the pipeline.



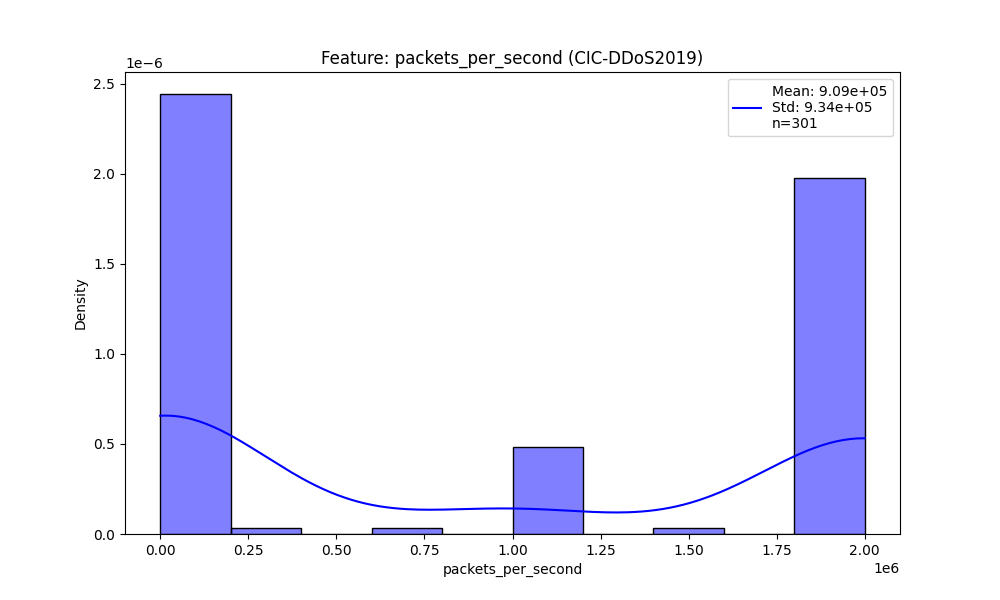
dist\_header\_ratio.png

Chart generated by the pipeline.



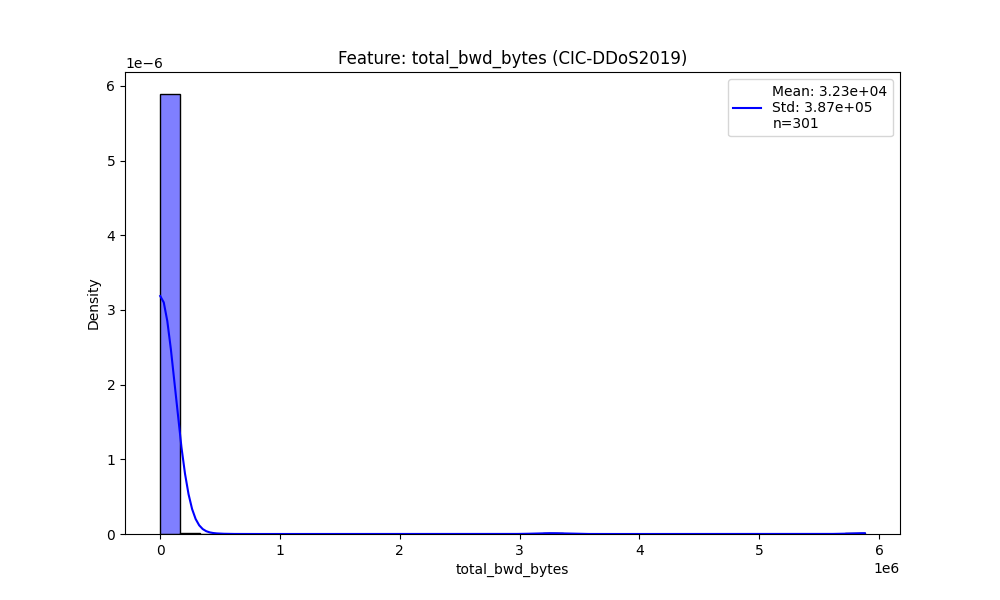
dist\_packets\_per\_second.png

Chart generated by the pipeline.



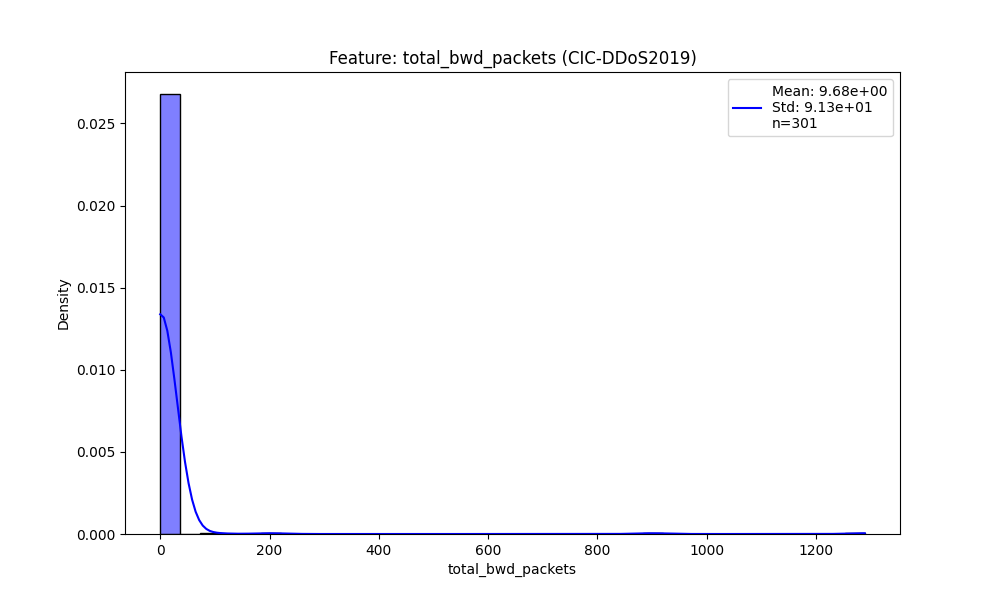
dist\_total\_bwd\_bytes.png

Chart generated by the pipeline.



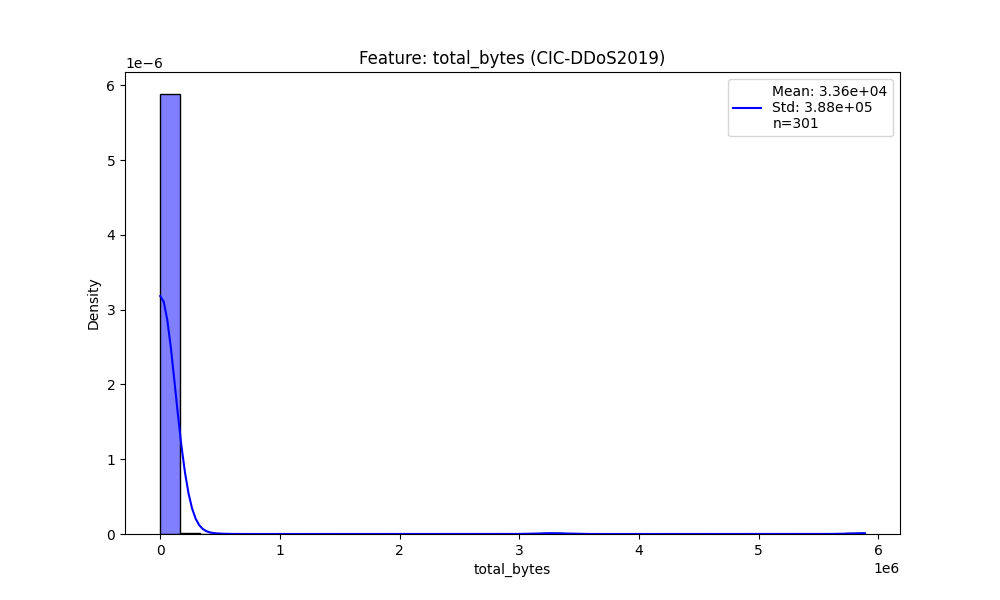
dist\_total\_bwd\_packets.png

Chart generated by the pipeline.



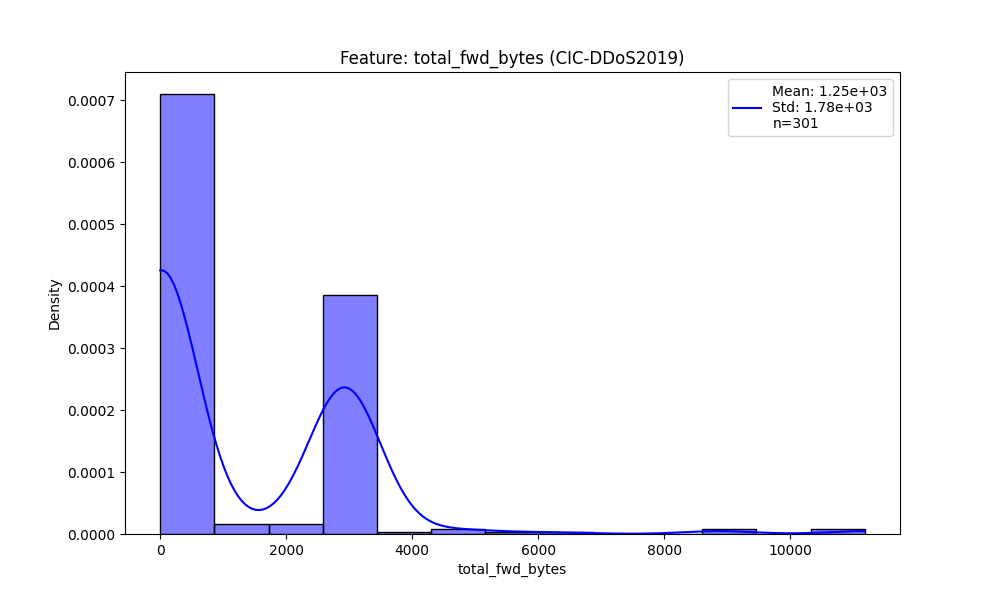
dist\_total\_bytes.png

Chart generated by the pipeline.



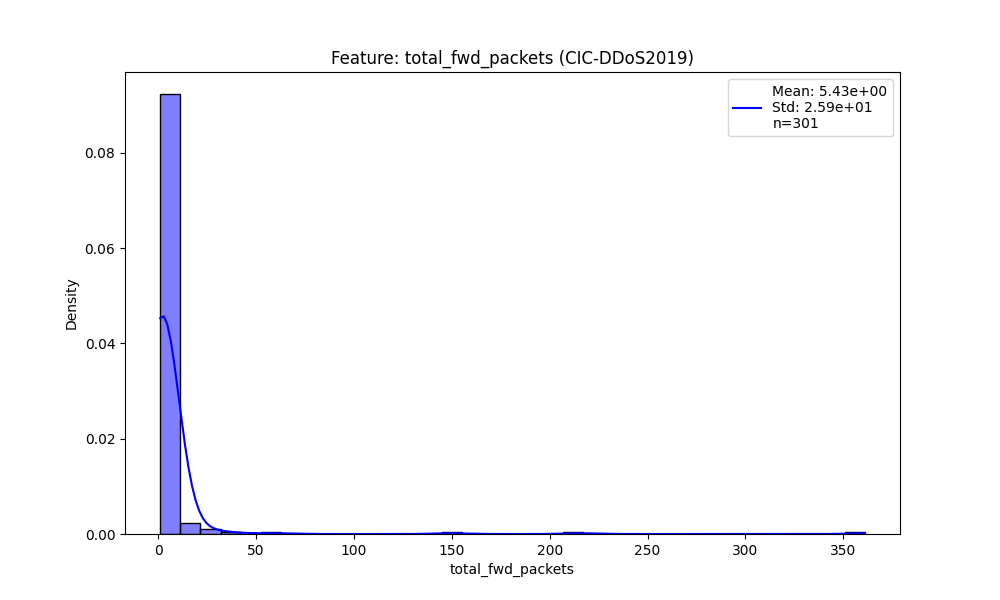
dist\_total\_fwd\_bytes.png

Chart generated by the pipeline.



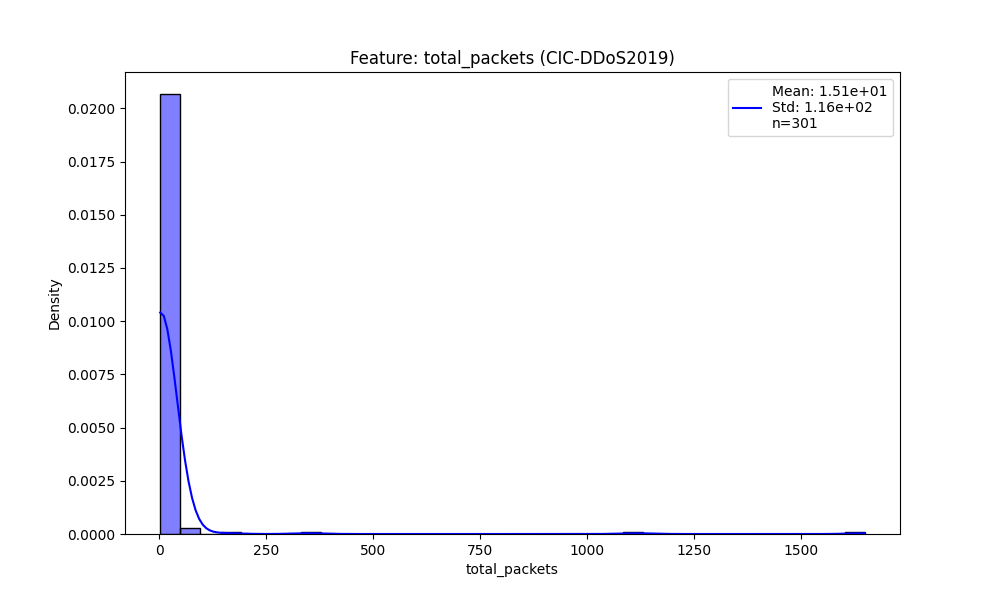
dist\_total\_fwd\_packets.png

Chart generated by the pipeline.



dist\_total\_packets.png

Chart generated by the pipeline.



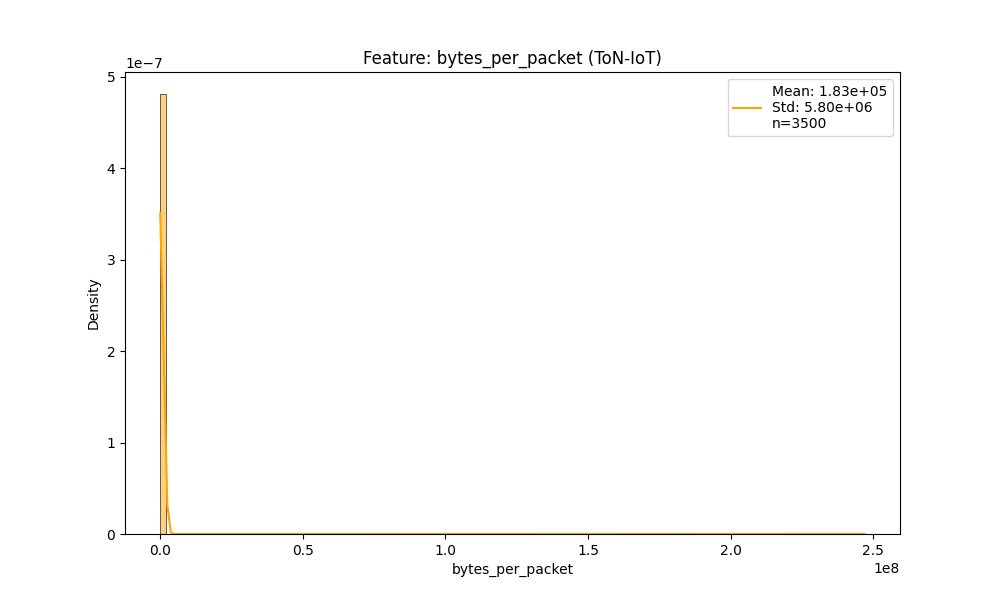
dist\_avg\_packet\_size.png

Chart generated by the pipeline.



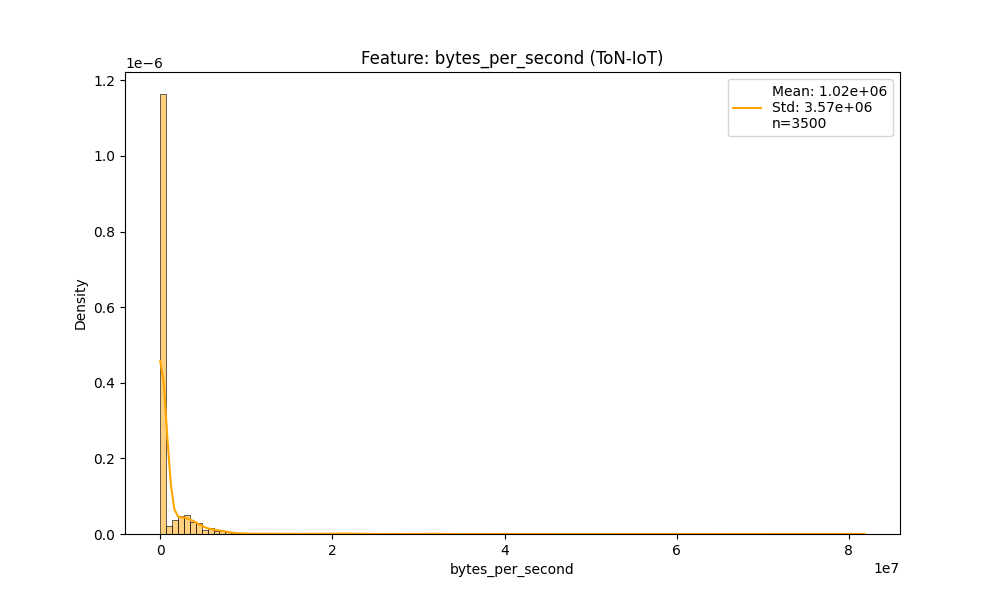
dist\_bytes\_per\_packet.png

Chart generated by the pipeline.



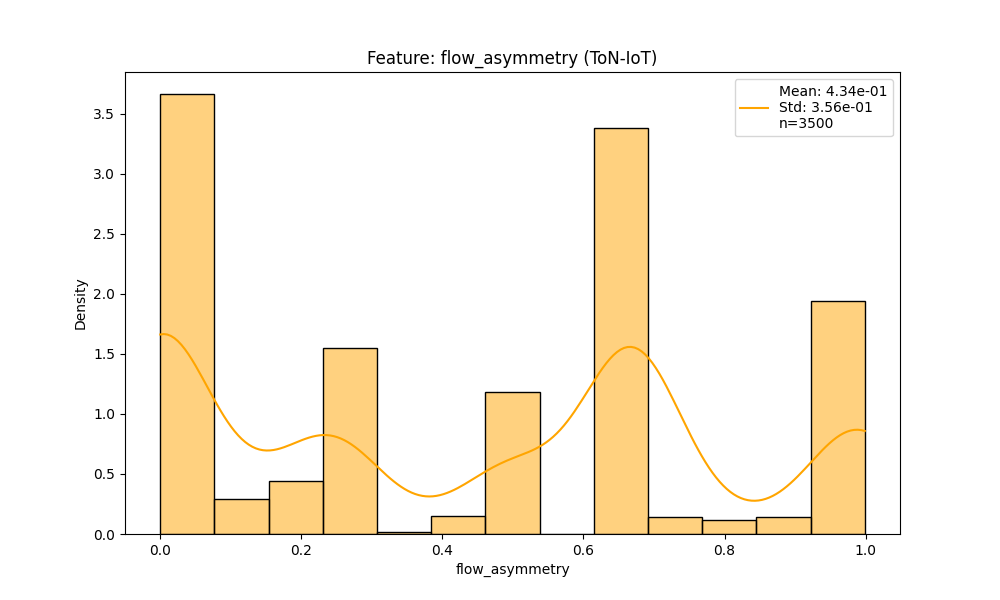
dist\_bytes\_per\_second.png

Chart generated by the pipeline.



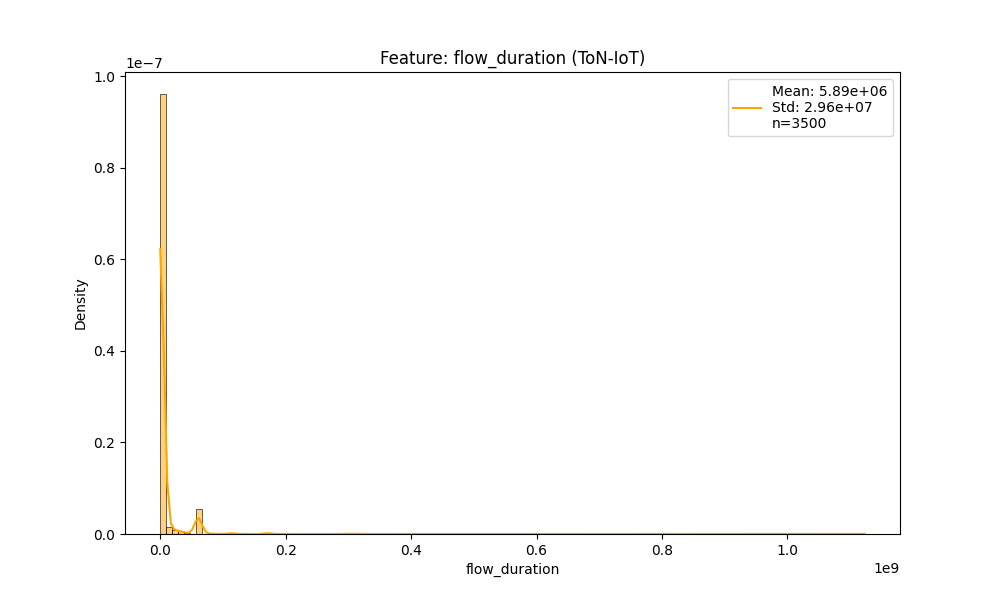
dist\_flow\_asymmetry.png

Chart generated by the pipeline.



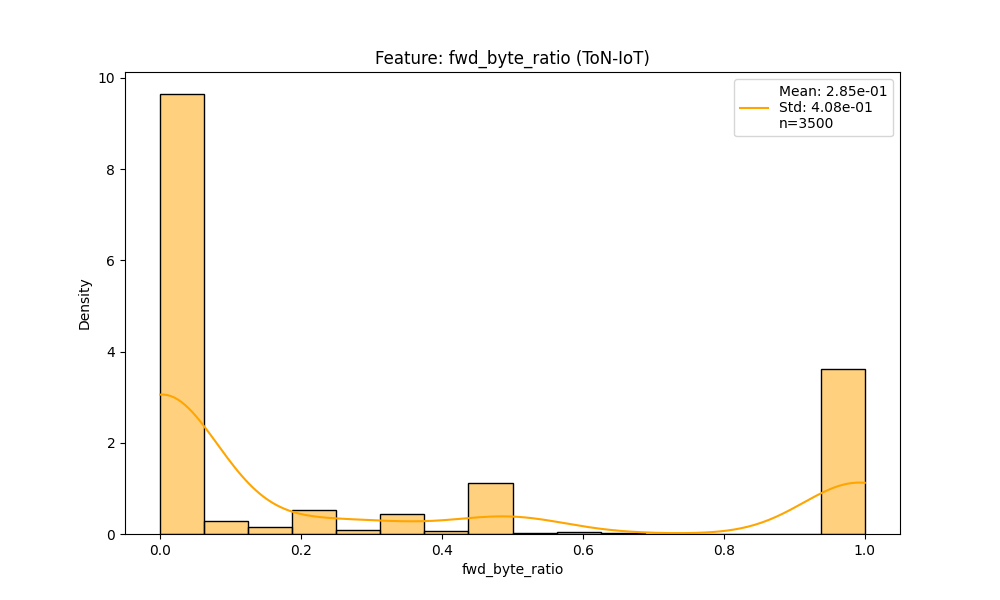
dist\_flow\_duration.png

Chart generated by the pipeline.



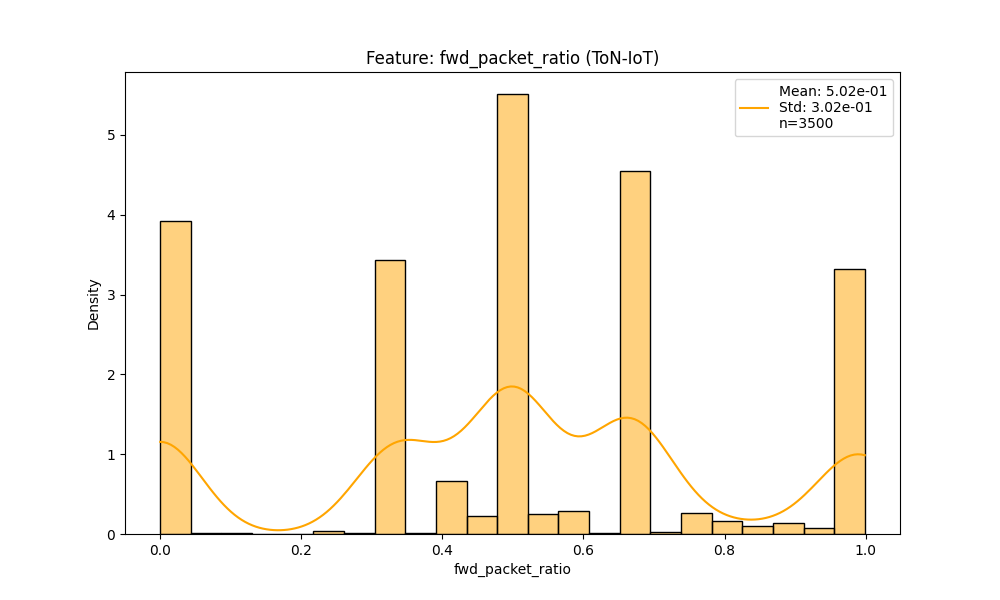
dist\_fwd\_byte\_ratio.png

Chart generated by the pipeline.



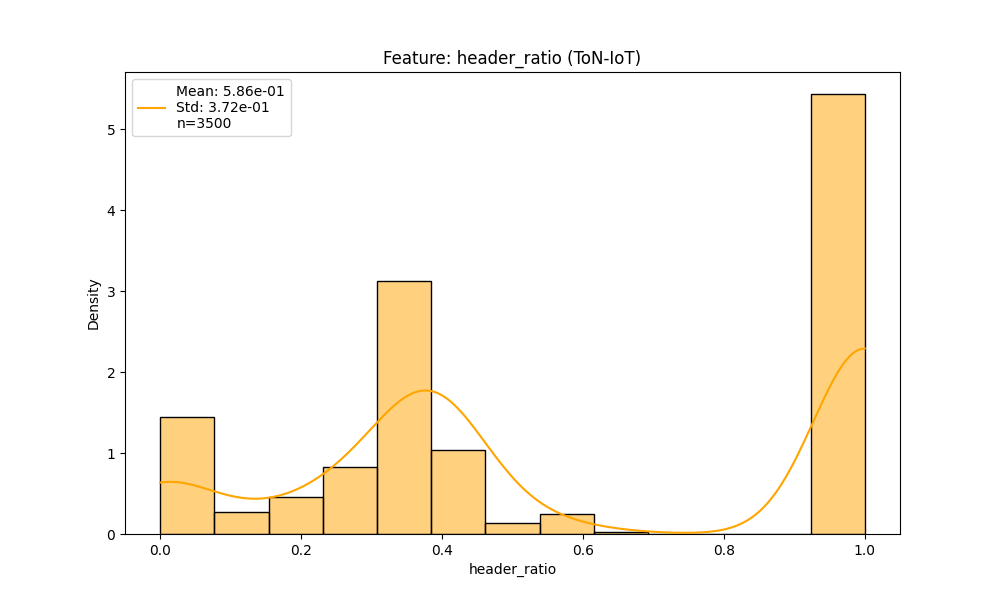
dist\_fwd\_packet\_ratio.png

Chart generated by the pipeline.



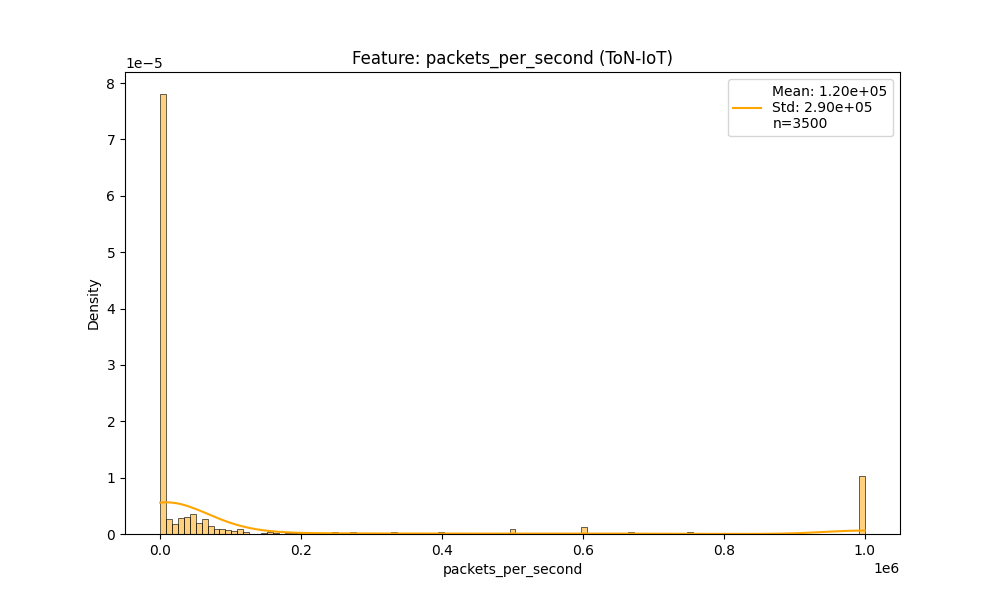
dist\_header\_ratio.png

Chart generated by the pipeline.



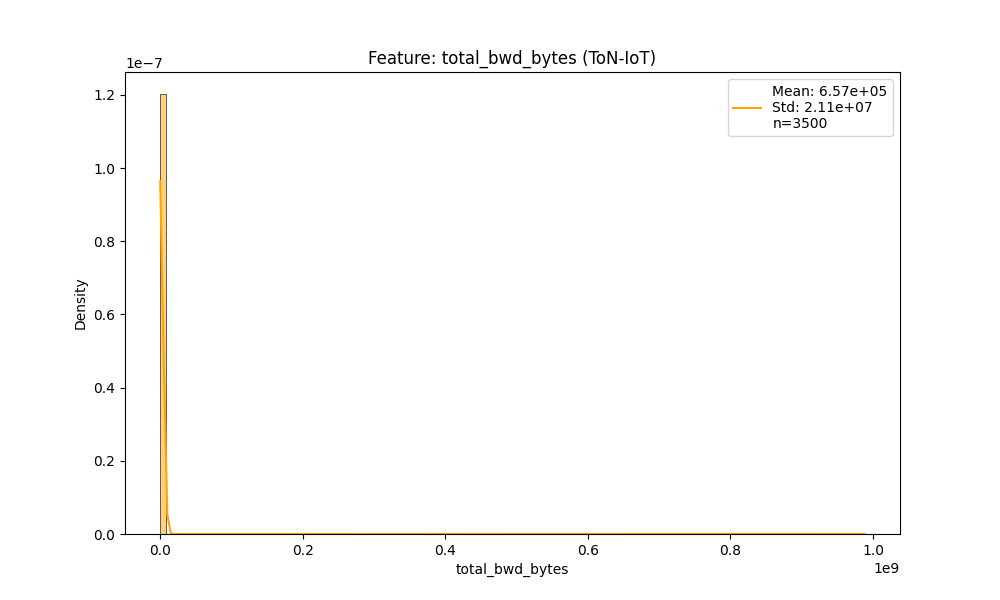
dist\_packets\_per\_second.png

Chart generated by the pipeline.



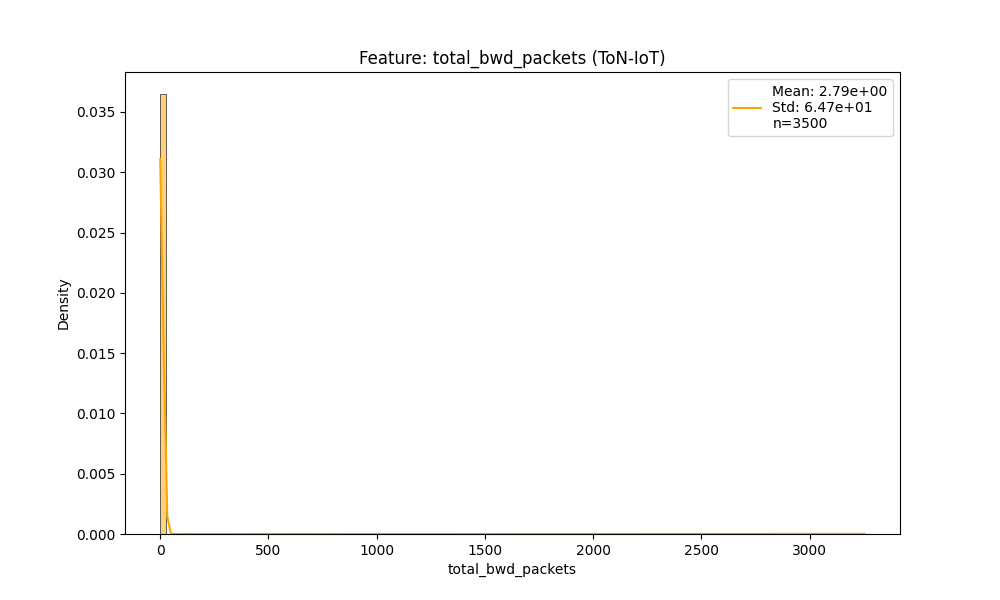
dist\_total\_bwd\_bytes.png

Chart generated by the pipeline.



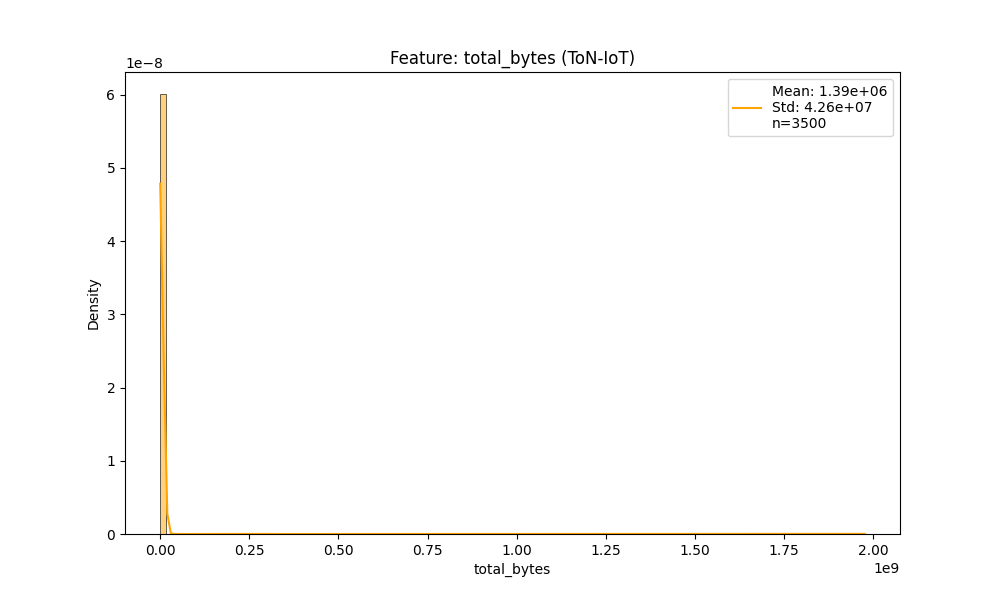
dist\_total\_bwd\_packets.png

Chart generated by the pipeline.



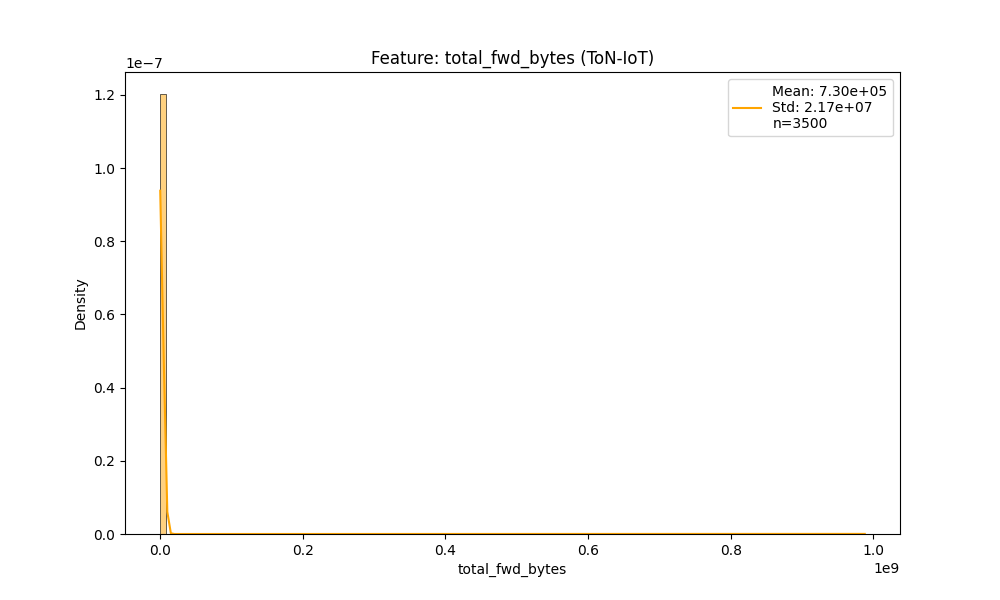
dist\_total\_bytes.png

Chart generated by the pipeline.



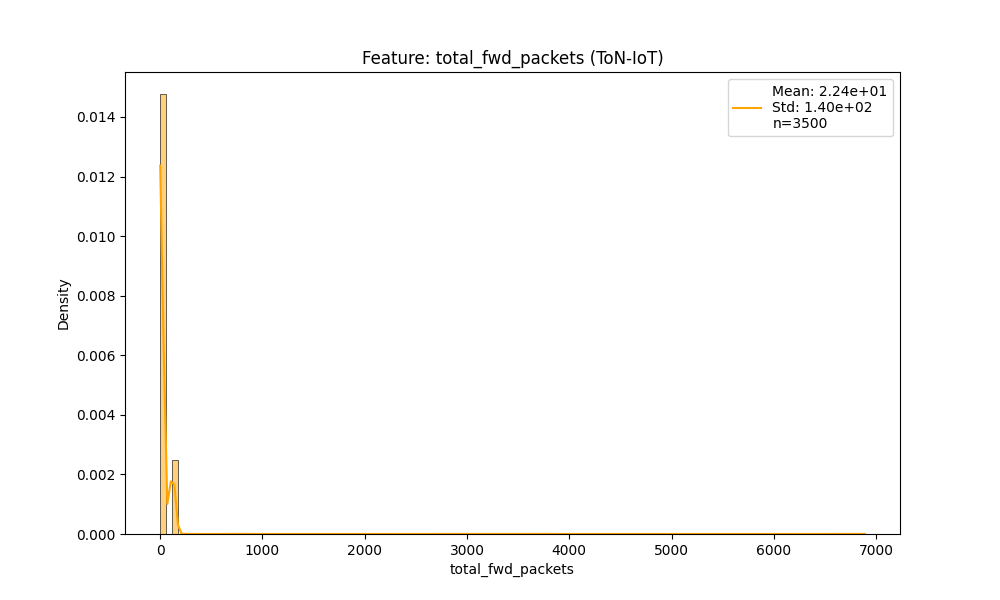
dist\_total\_fwd\_bytes.png

Chart generated by the pipeline.



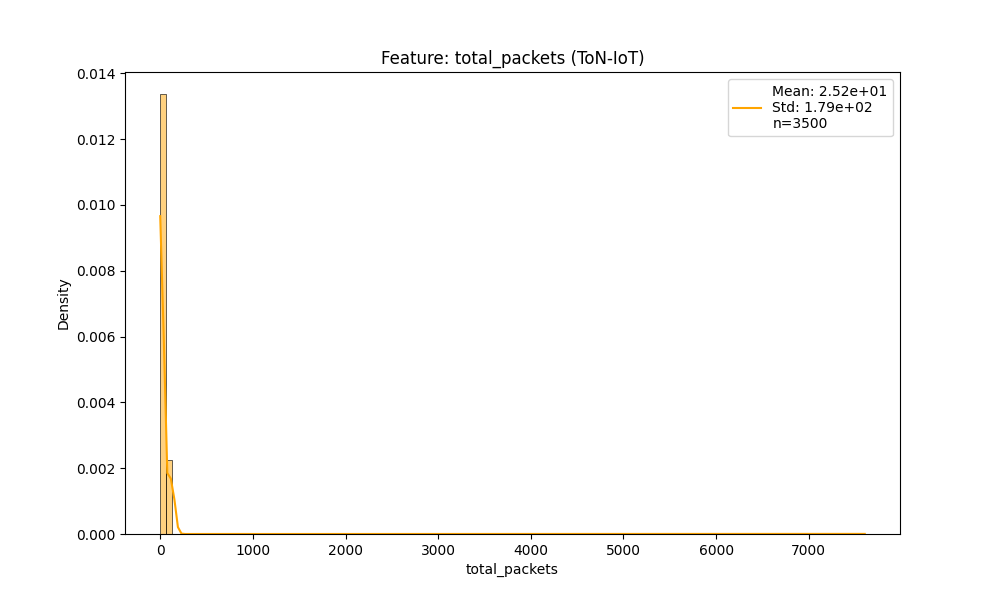
dist\_total\_fwd\_packets.png

Chart generated by the pipeline.



dist\_total\_packets.png

Chart generated by the pipeline.

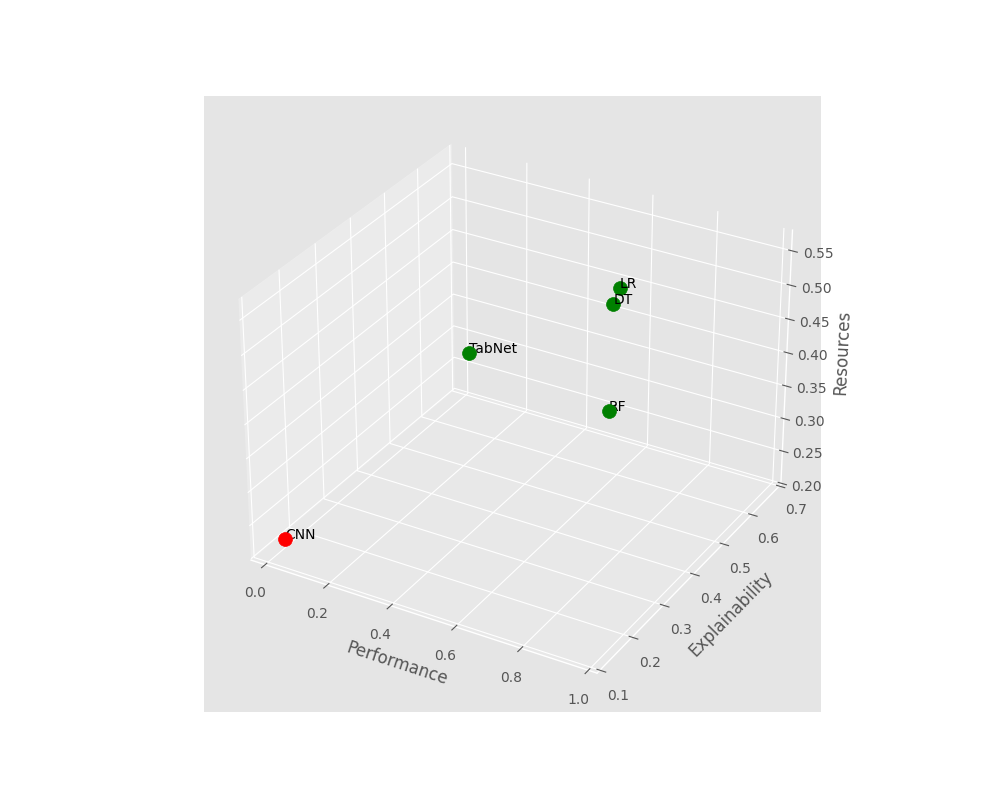


# Decision charts (MCDM)

Summarizes decision matrix, TOPSIS steps, and ranking views.

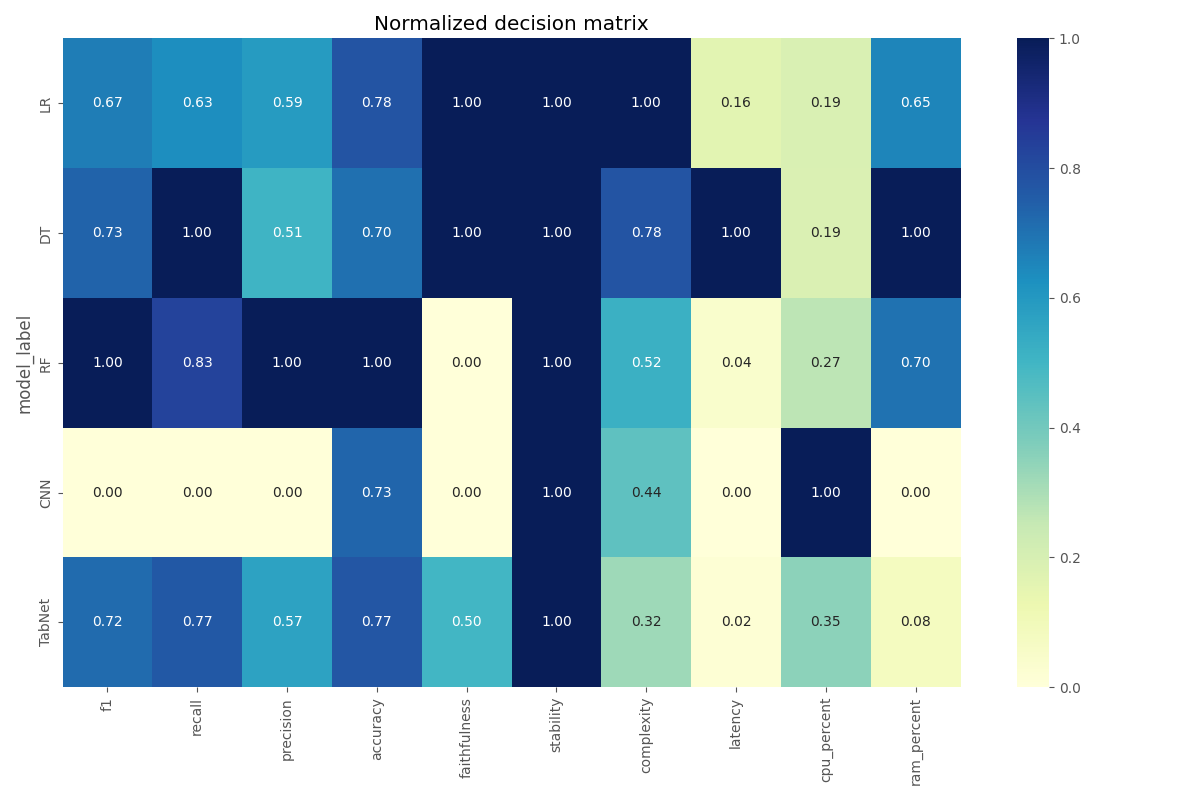
3d\_solution\_space.png

Chart generated by the pipeline.



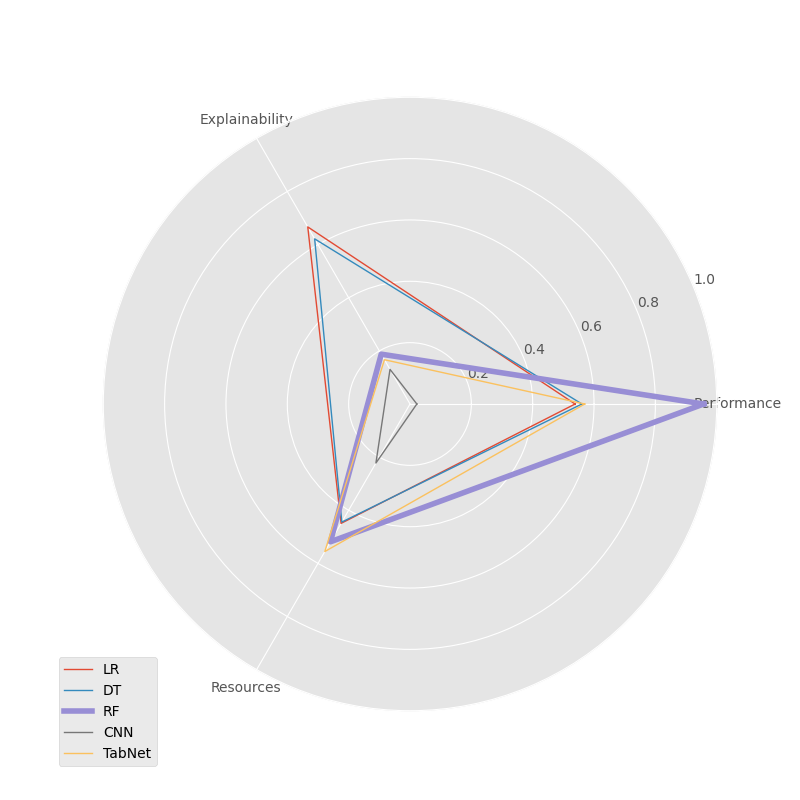
decision\_matrix\_heatmap.png

Chart generated by the pipeline.



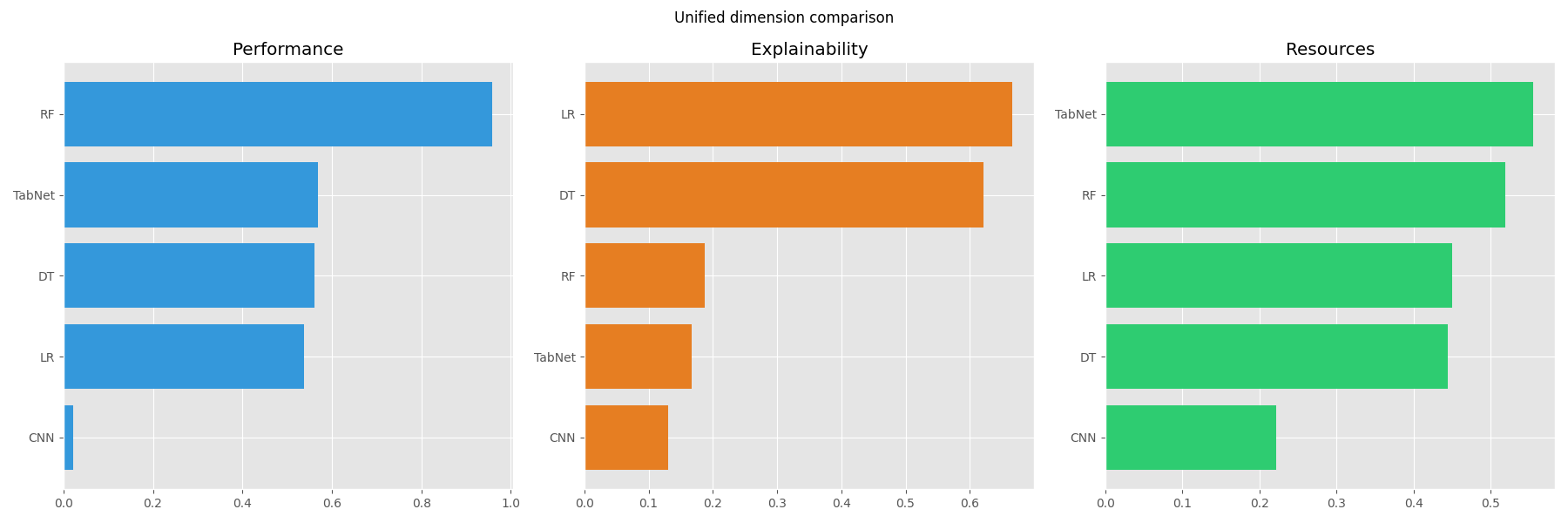
radar\_comparison.png

Radar comparison of top alternatives.



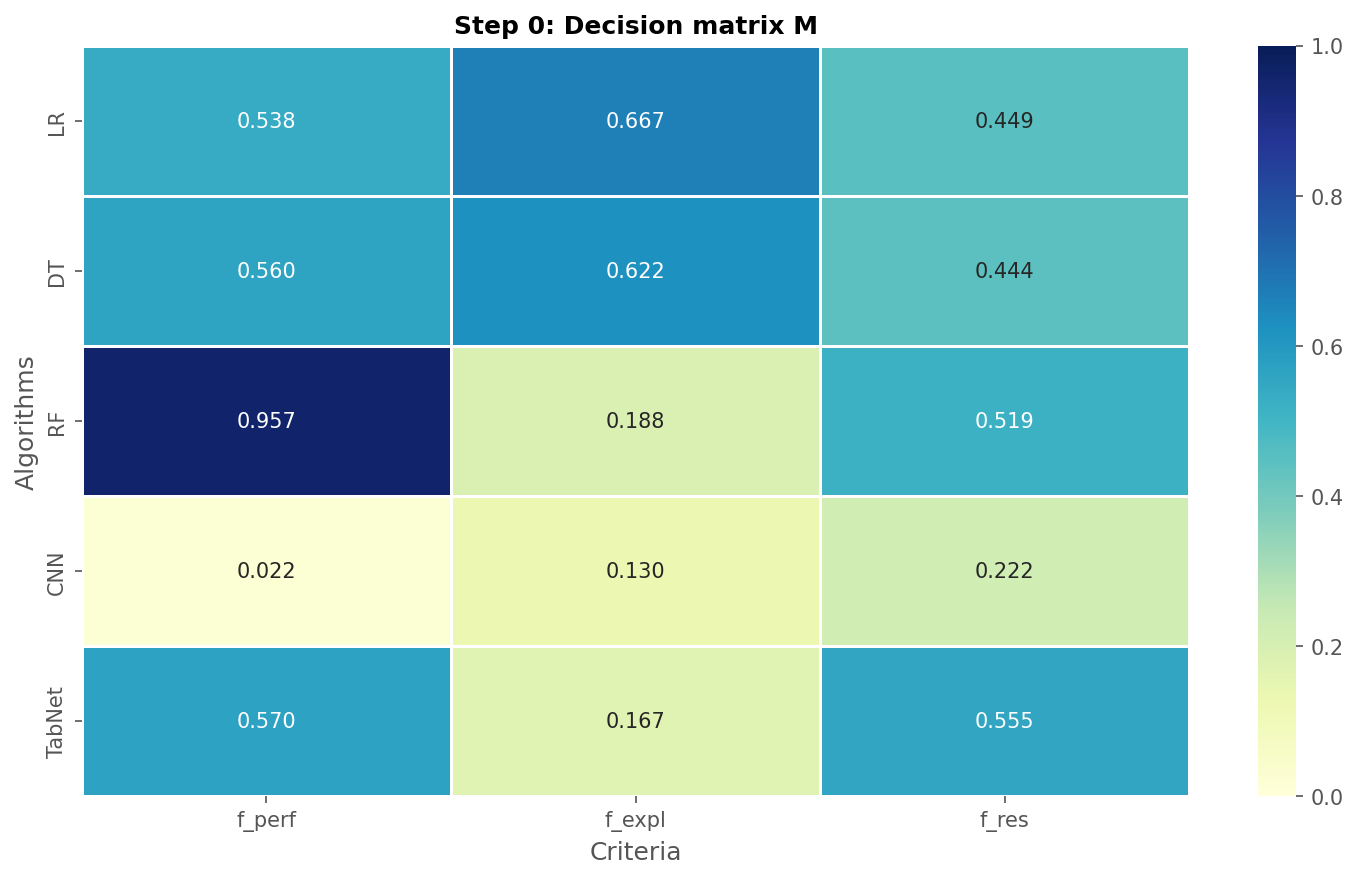
unified\_dimensions\_comparison.png

Chart generated by the pipeline.



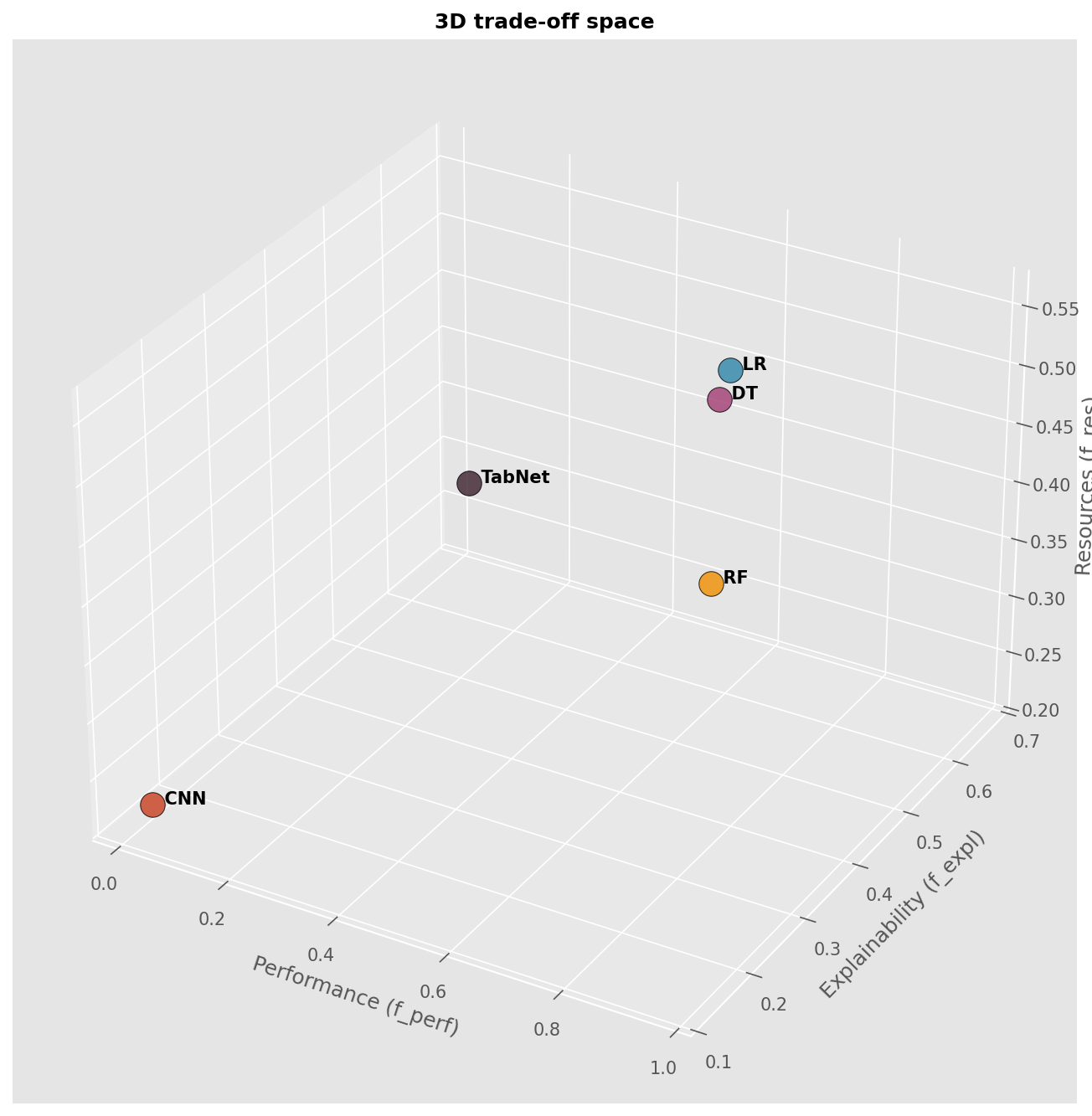
viz\_01\_matrix\_M.png

Chart generated by the pipeline.



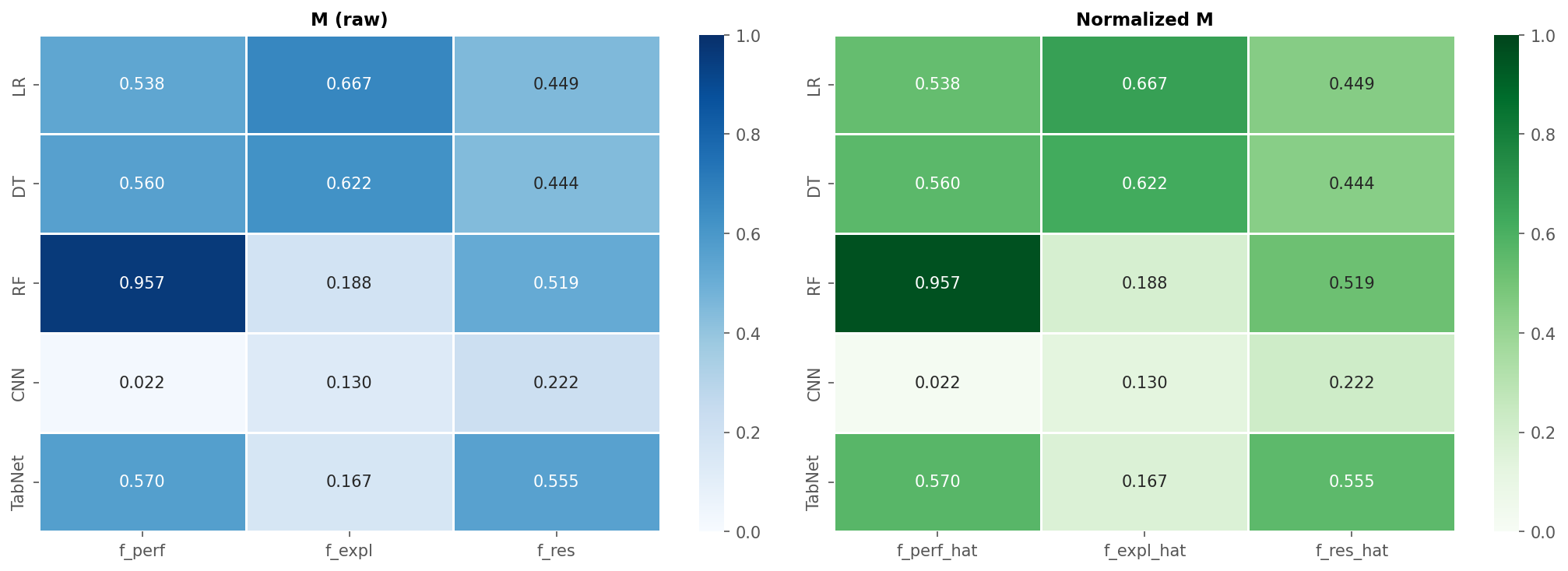
viz\_02\_3d\_tradeoffs.png

Chart generated by the pipeline.



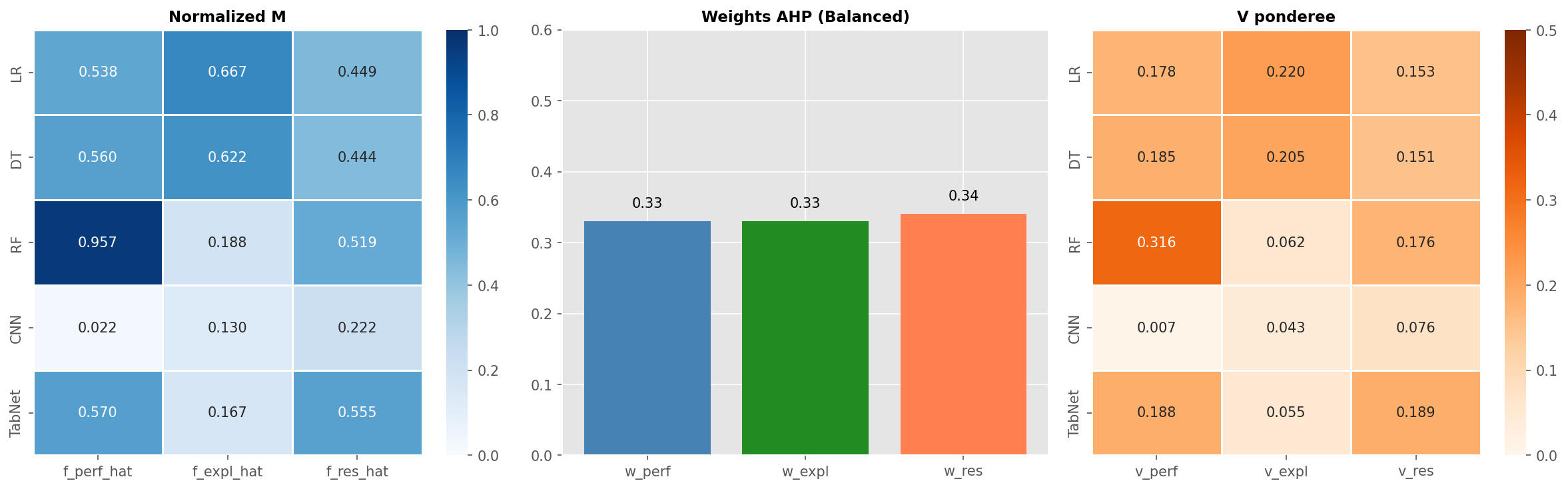
viz\_03\_normalization.png

Chart generated by the pipeline.



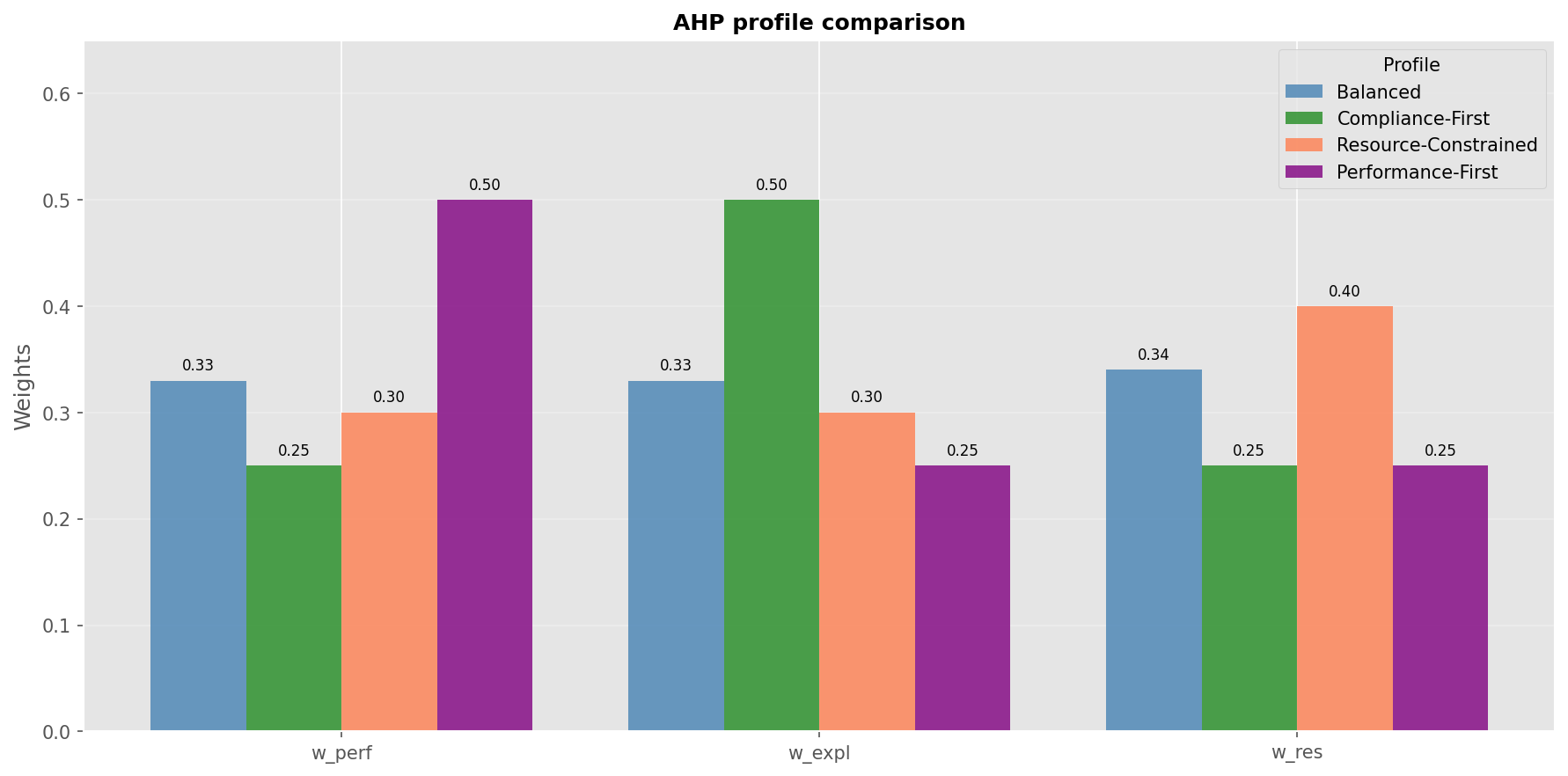
viz\_04\_weighting.png

Chart generated by the pipeline.



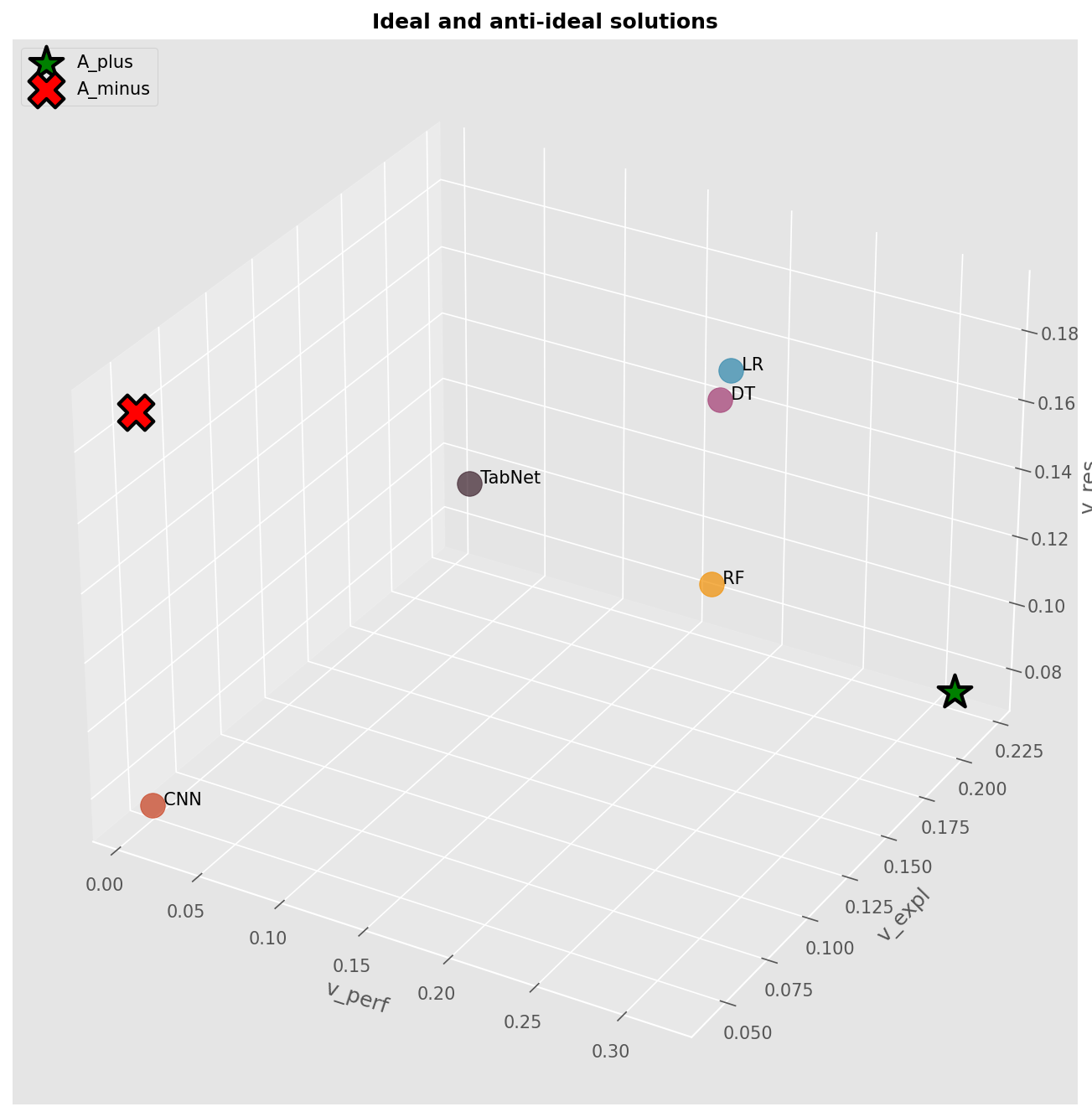
viz\_05\_profiles.png

Chart generated by the pipeline.



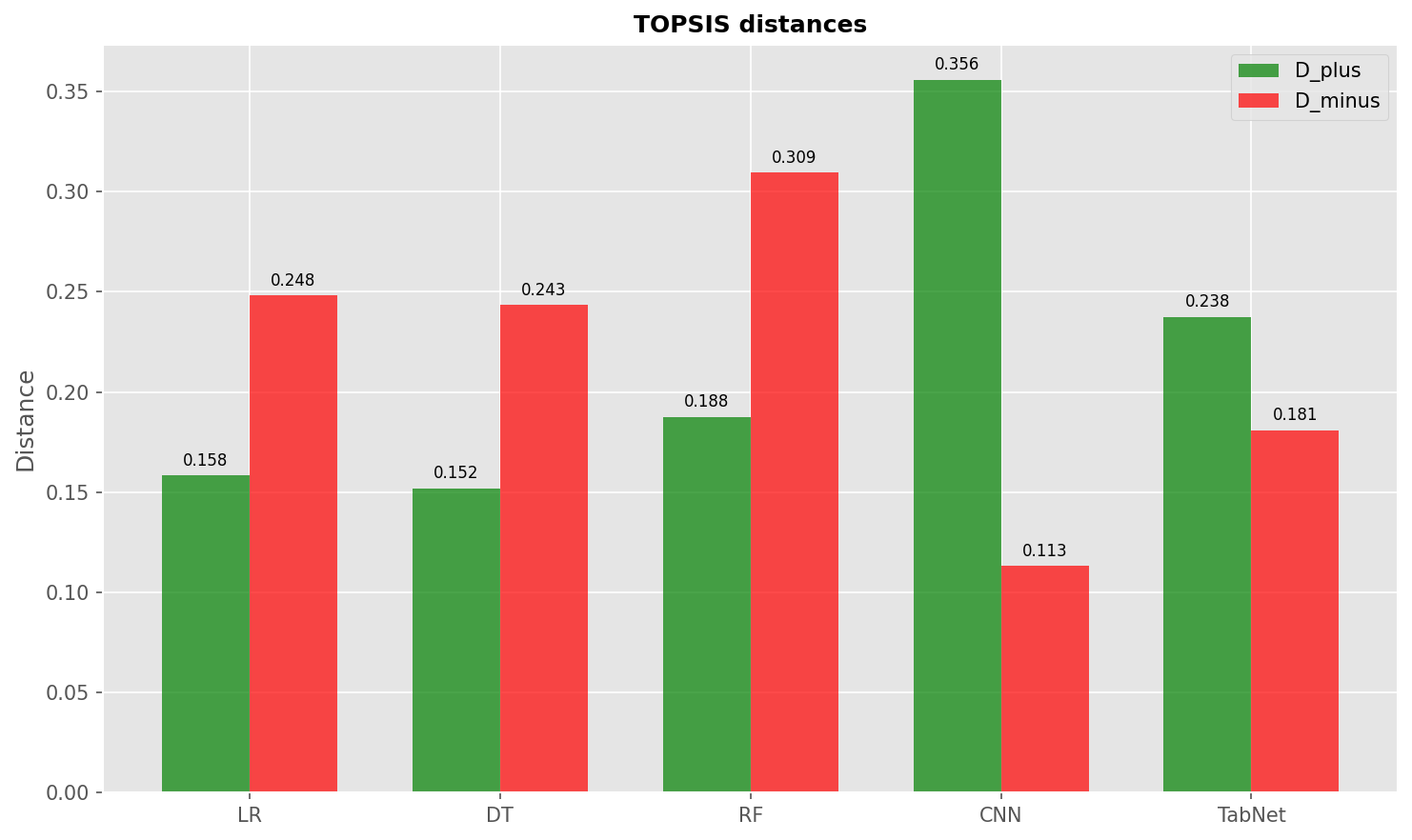
viz\_06\_ideal\_solutions.png

Chart generated by the pipeline.



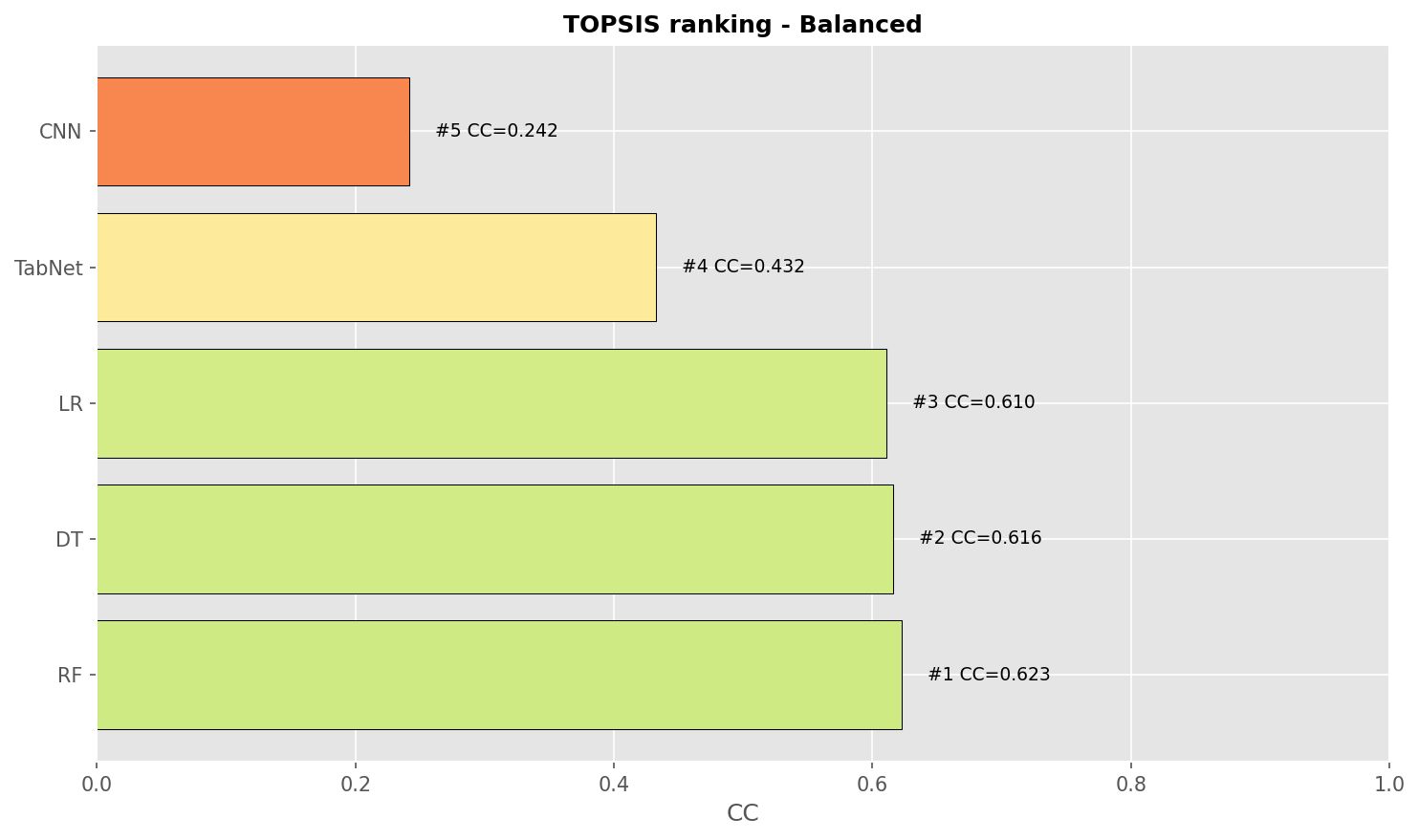
viz\_07\_distances.png

Chart generated by the pipeline.



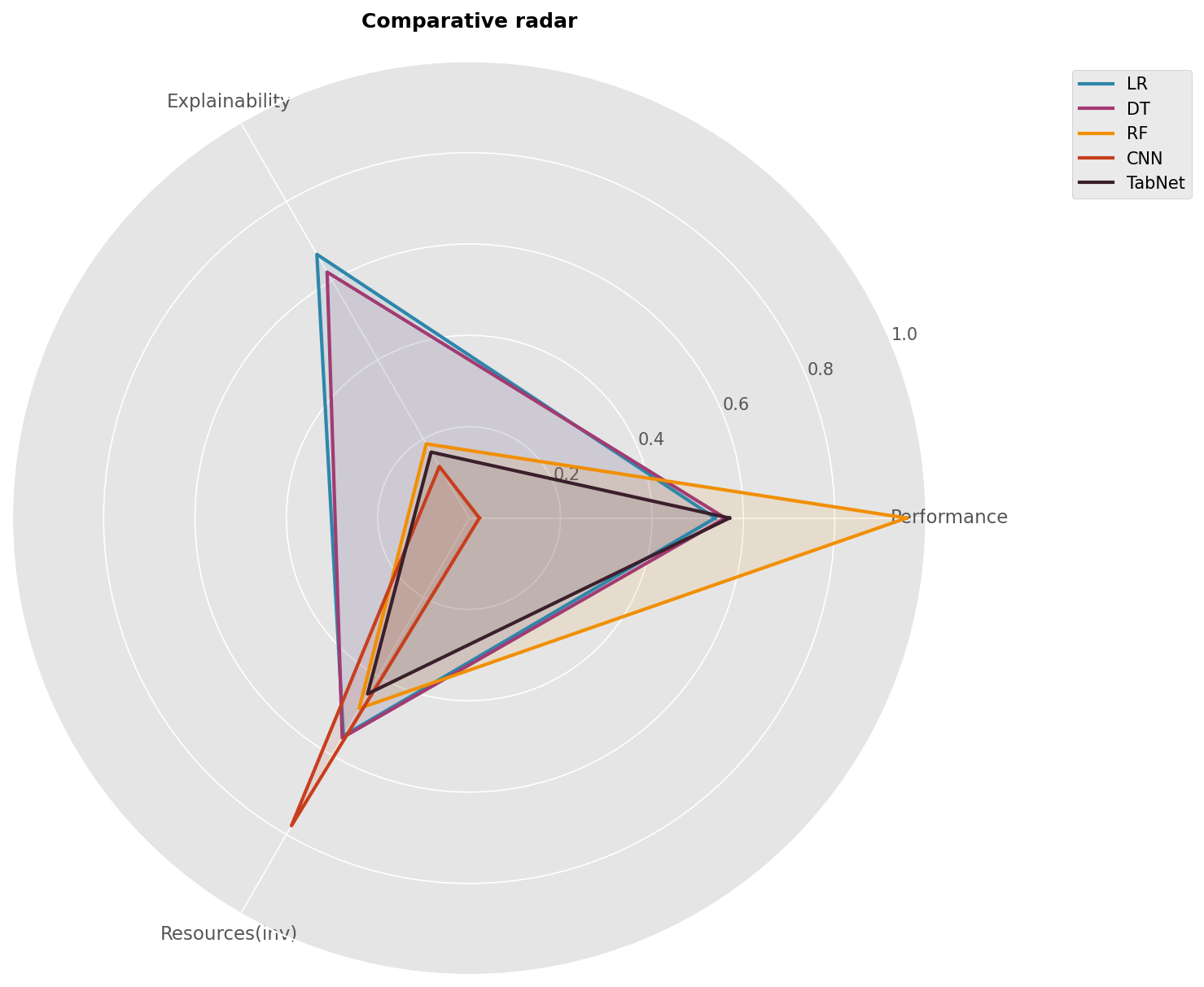
viz\_08\_closeness.png

TOPSIS closeness coefficients for each alternative.



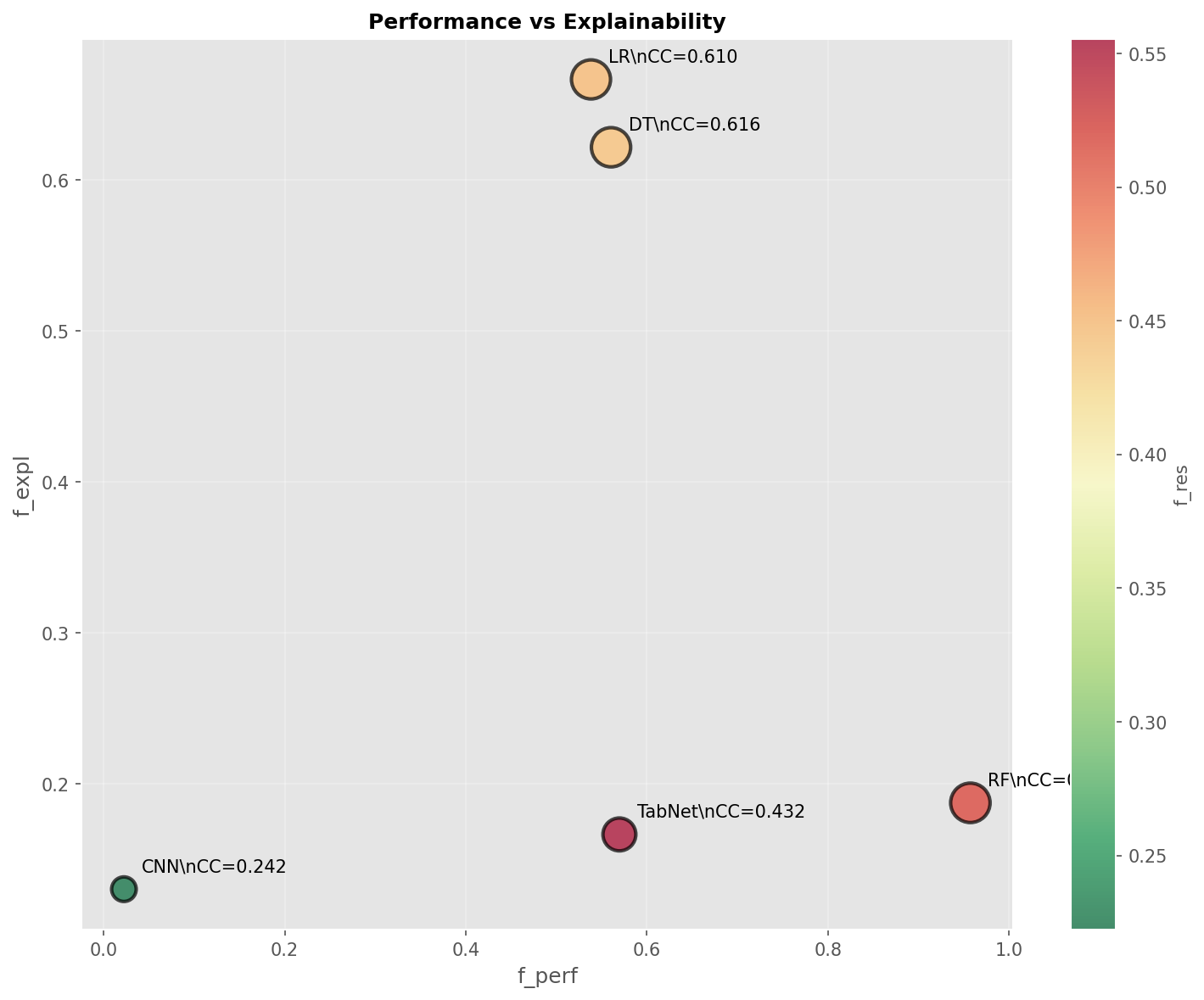
viz\_09\_radar.png

Radar comparison of top alternatives.



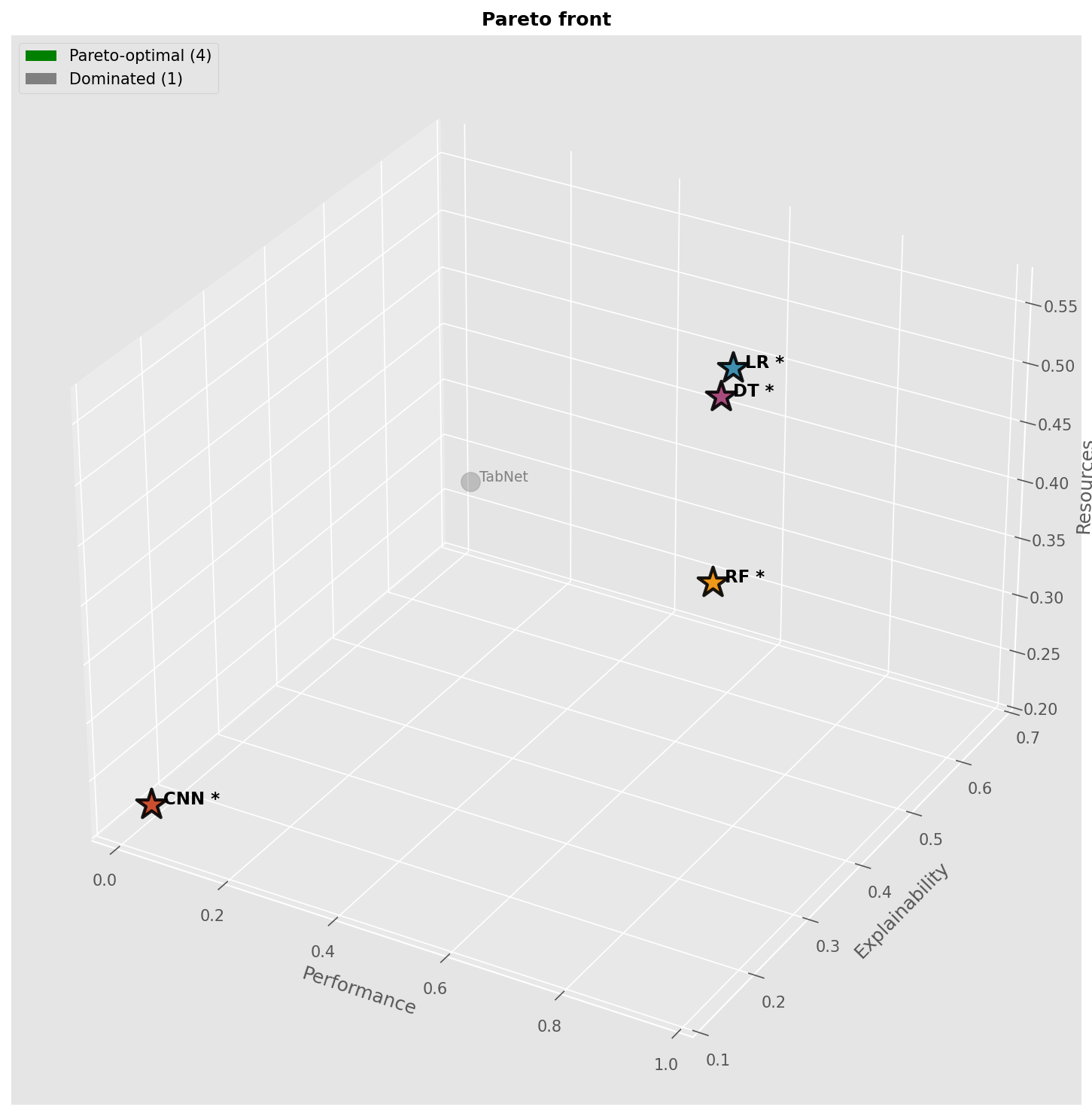
viz\_10\_2d\_perf\_expl.png

Chart generated by the pipeline.



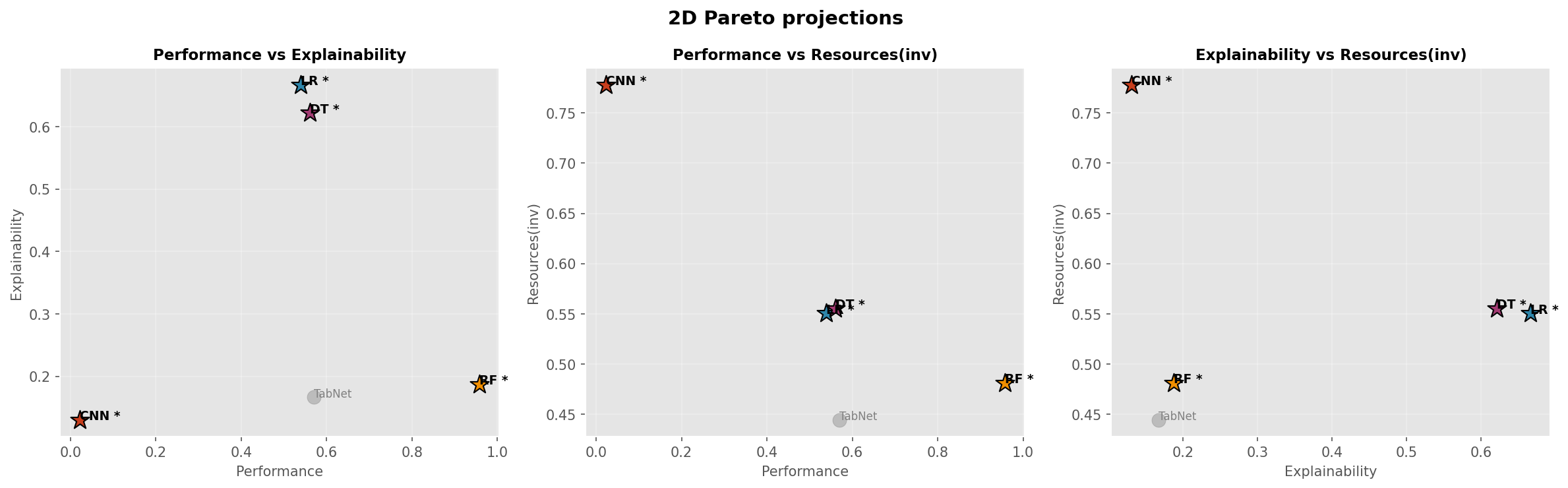
viz\_11\_pareto\_3d.png

Pareto front visualization of non-dominated vs dominated solutions.



viz\_12\_pareto\_2d.png

Pareto front visualization of non-dominated vs dominated solutions.



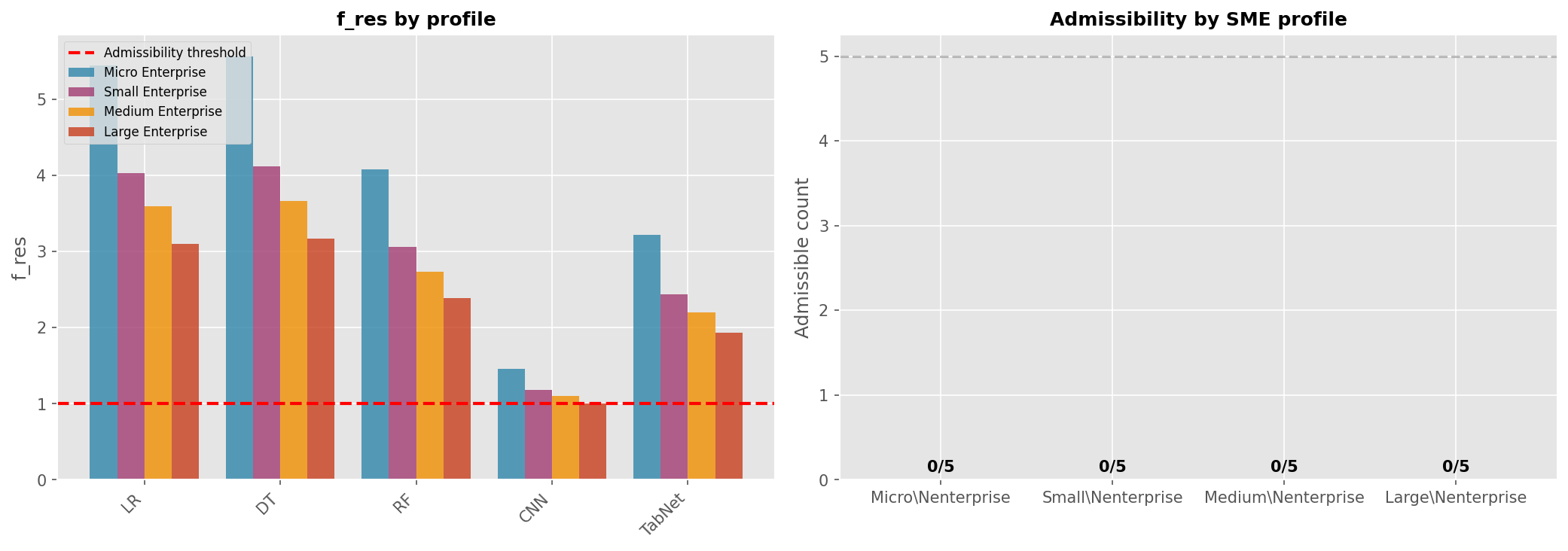
viz\_13\_pareto\_list.png

Pareto front visualization of non-dominated vs dominated solutions.



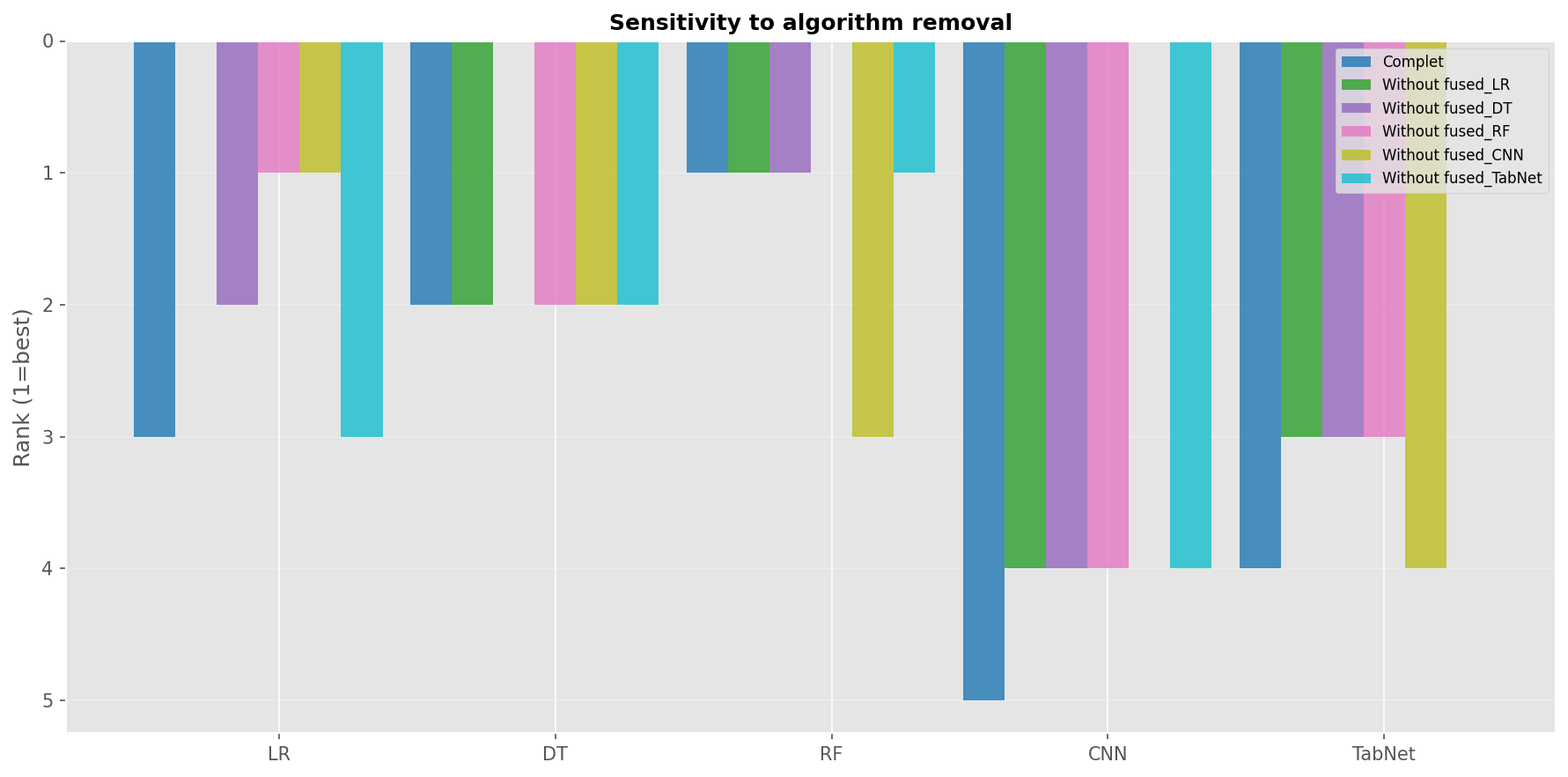
viz\_constraints\_impact.png

Chart generated by the pipeline.



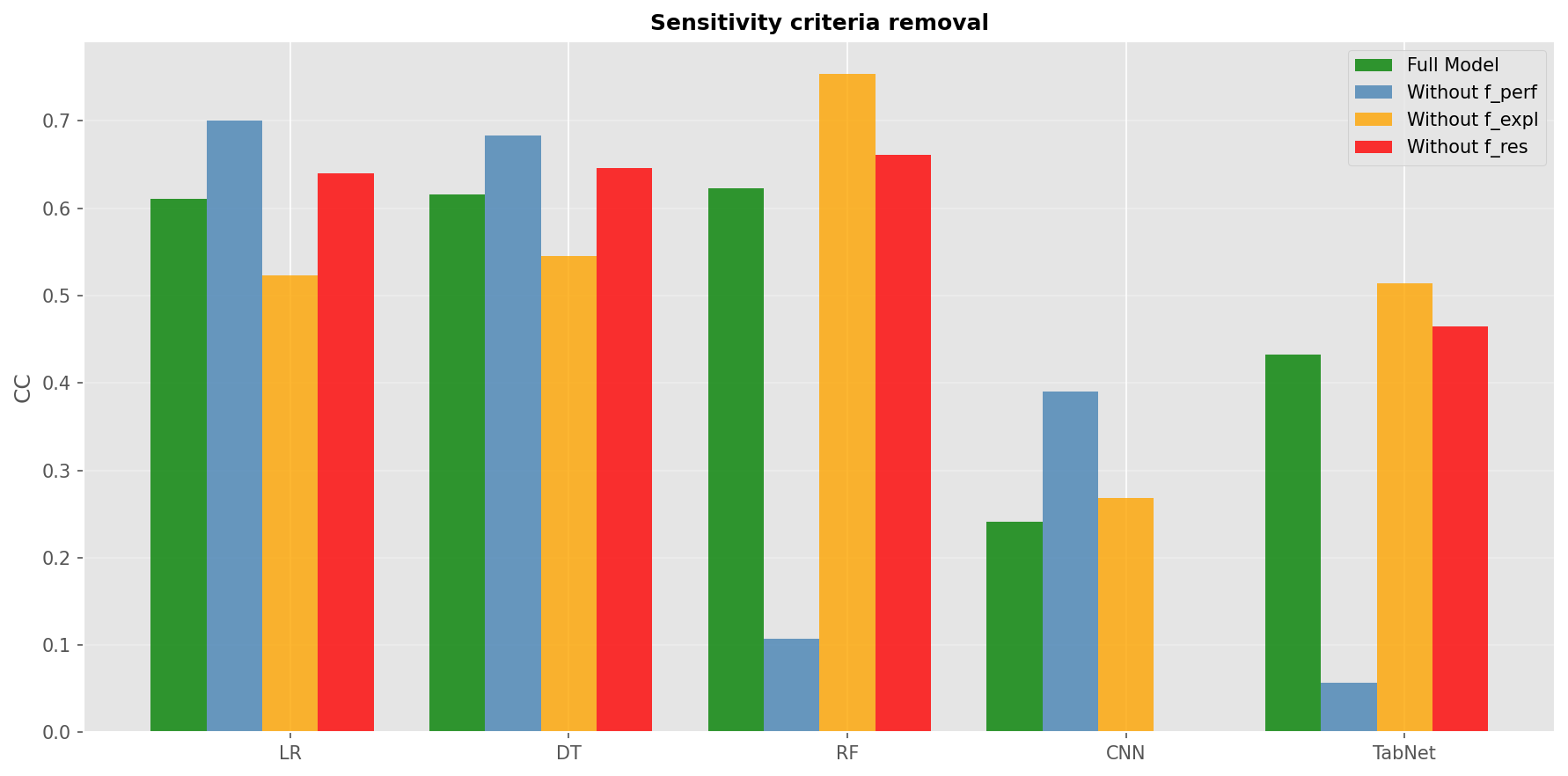
viz\_sensitivity\_algorithms.png

Chart generated by the pipeline.



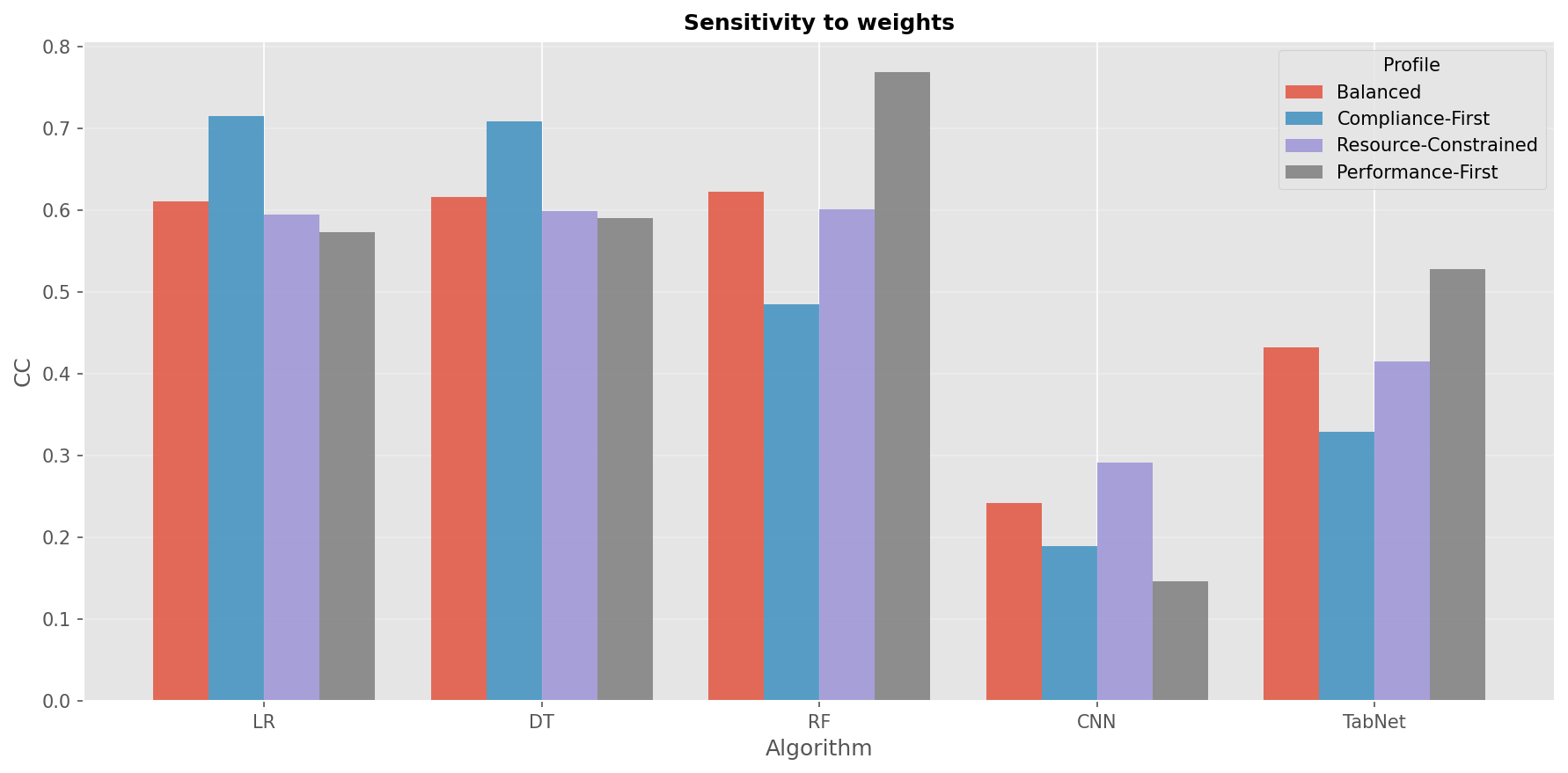
viz\_sensitivity\_criteria.png

Chart generated by the pipeline.



viz\_sensitivity\_weights.png

AHP weights used for TOPSIS.

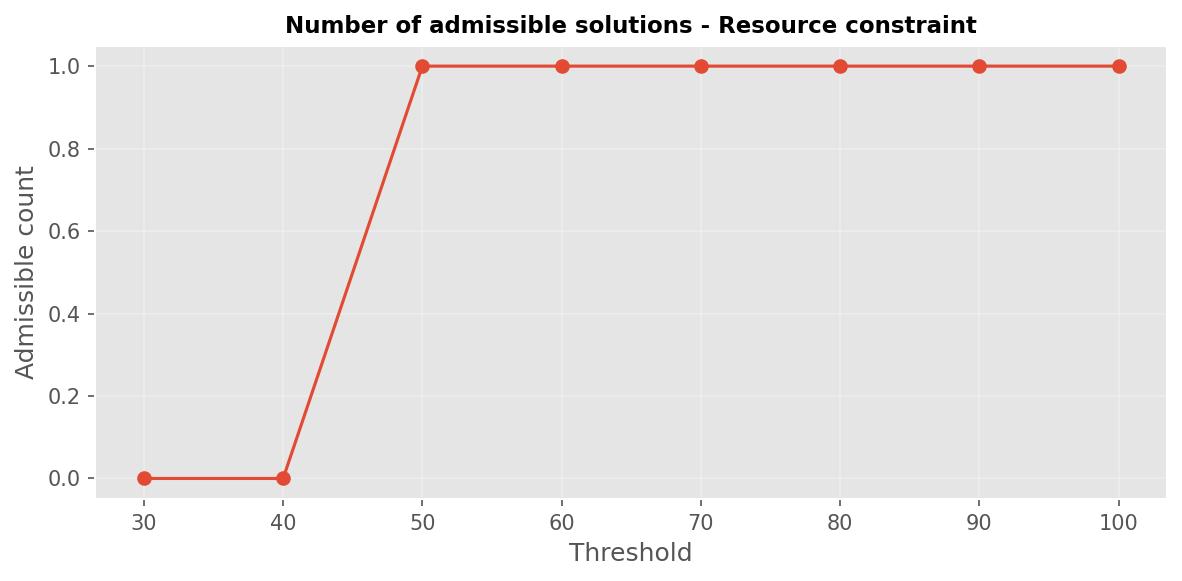


# Threshold variations

Shows admissible vs rejected solutions across threshold levels.

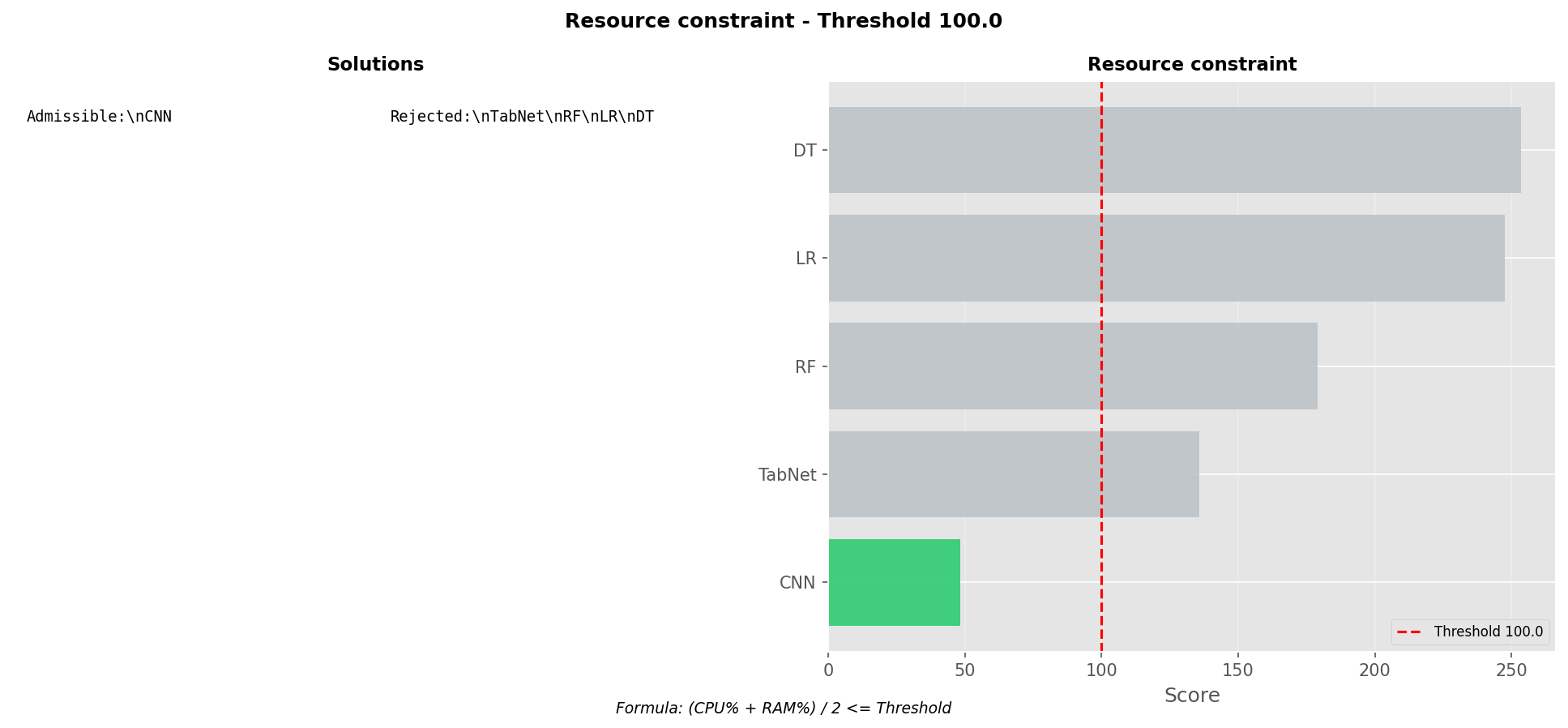
resource\_constraint\_resume.png

Chart generated by the pipeline.



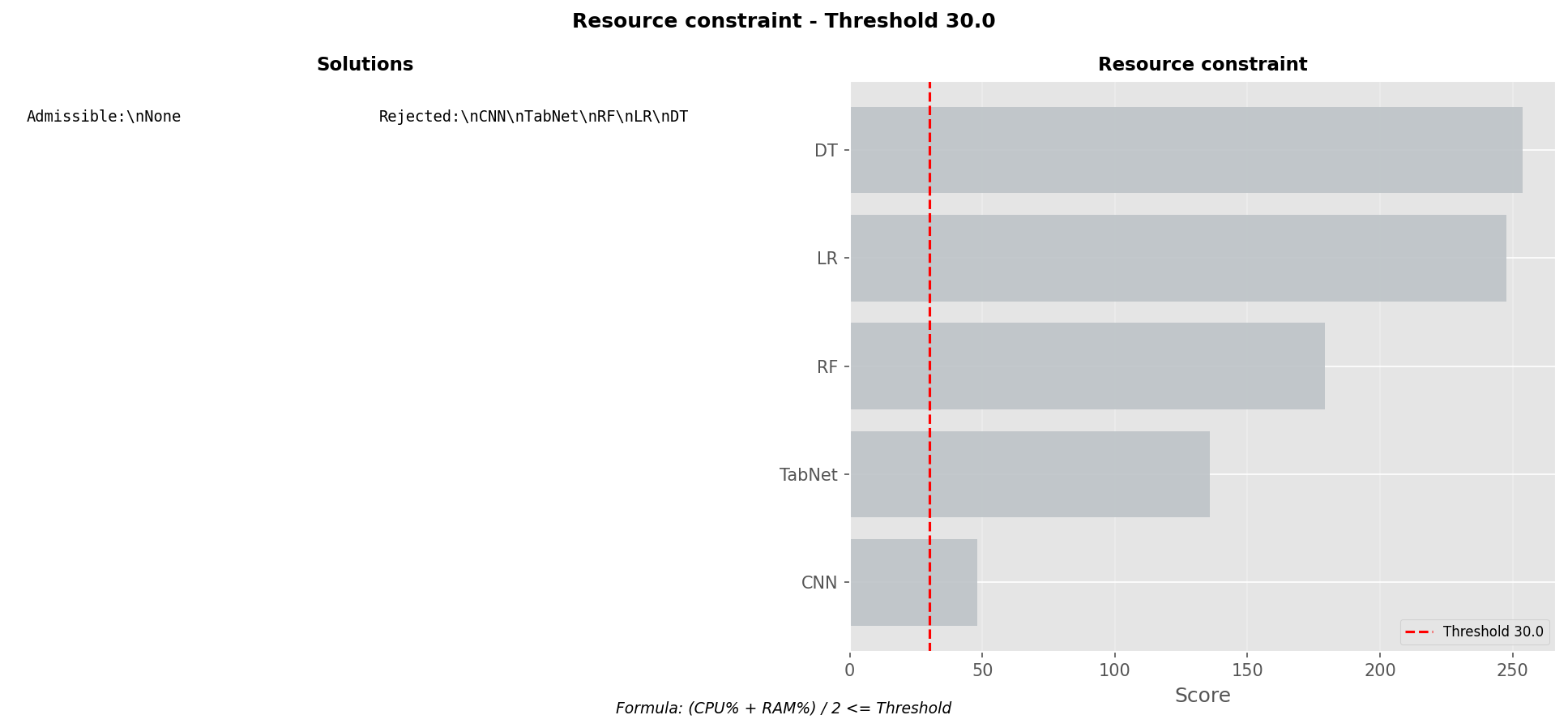
resource\_constraint\_threshold\_100.png

Chart generated by the pipeline.



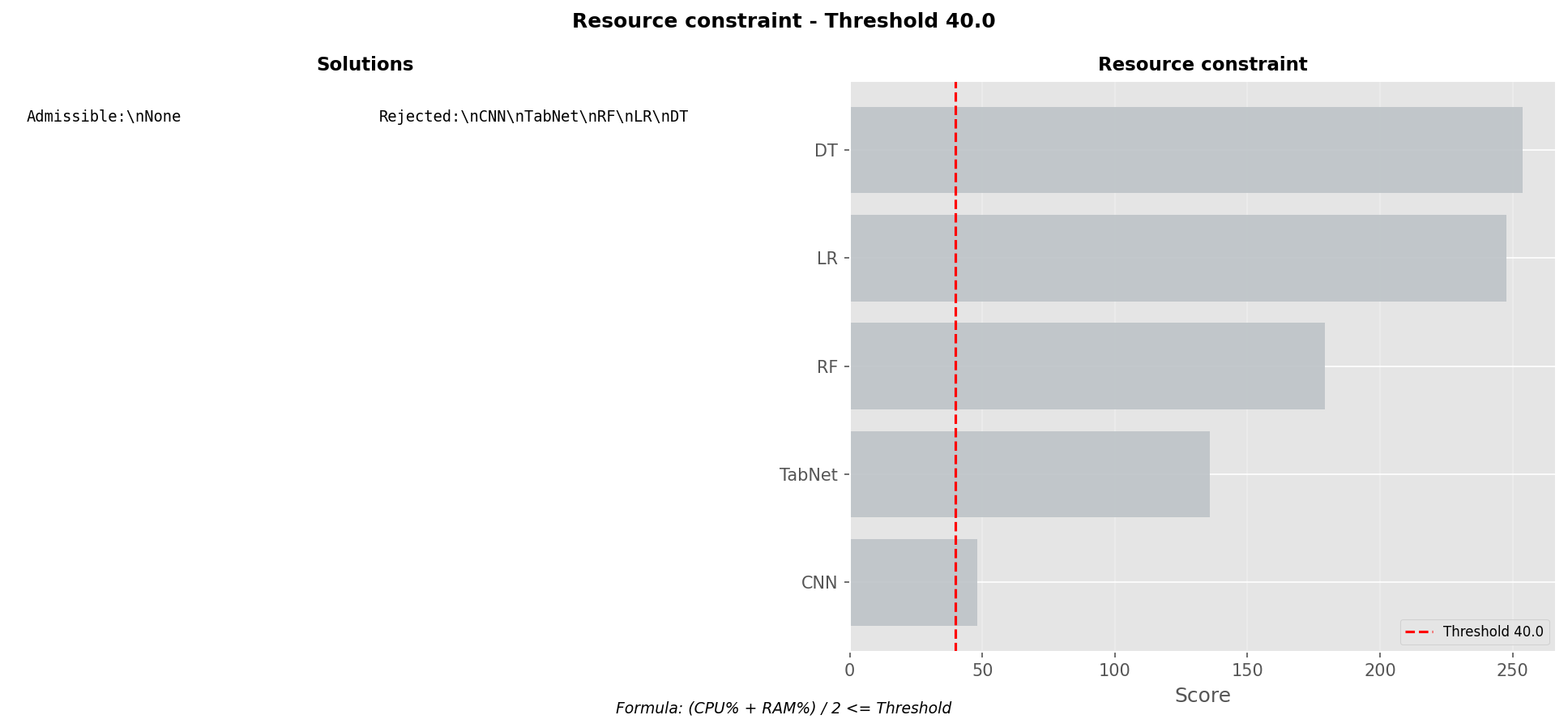
resource\_constraint\_threshold\_30.png

Chart generated by the pipeline.



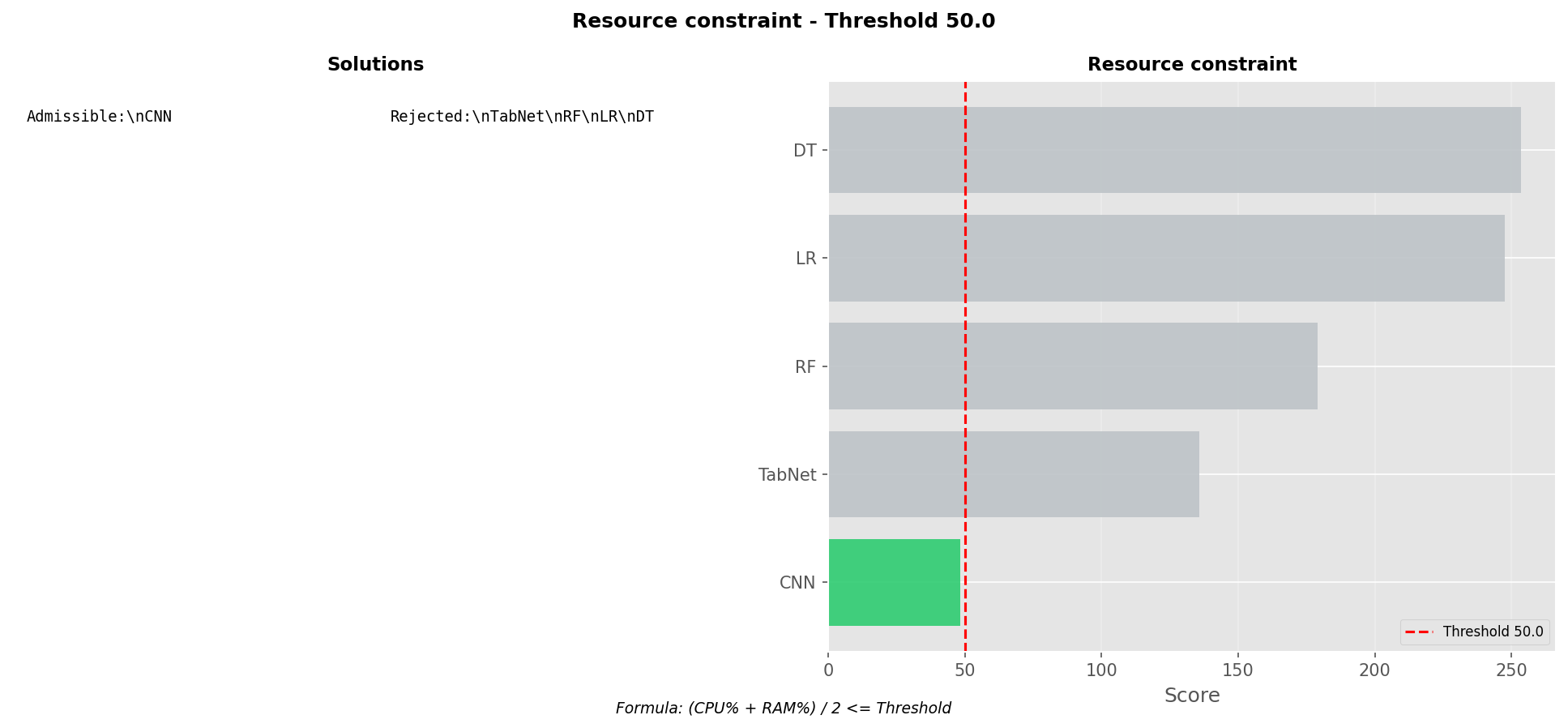
resource\_constraint\_threshold\_40.png

Chart generated by the pipeline.



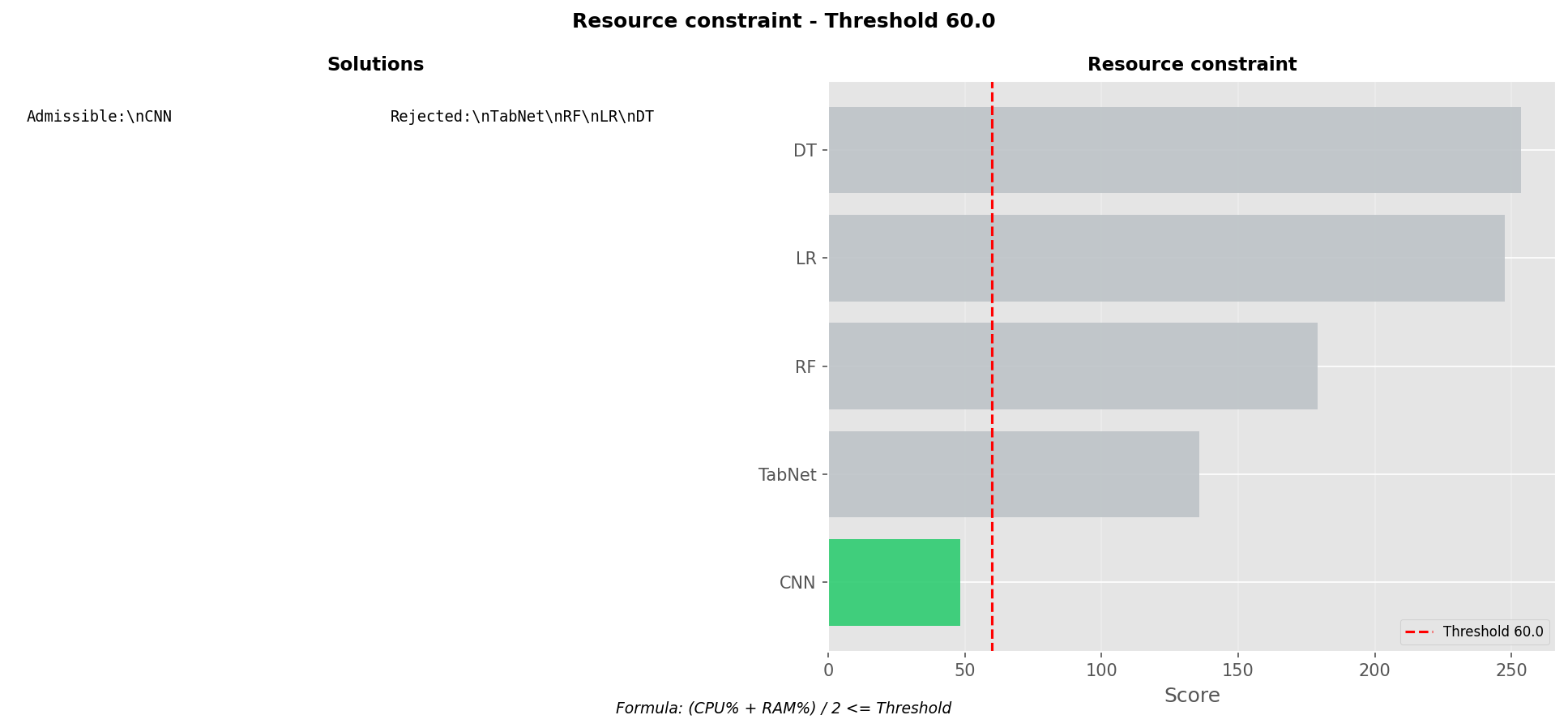
resource\_constraint\_threshold\_50.png

Chart generated by the pipeline.



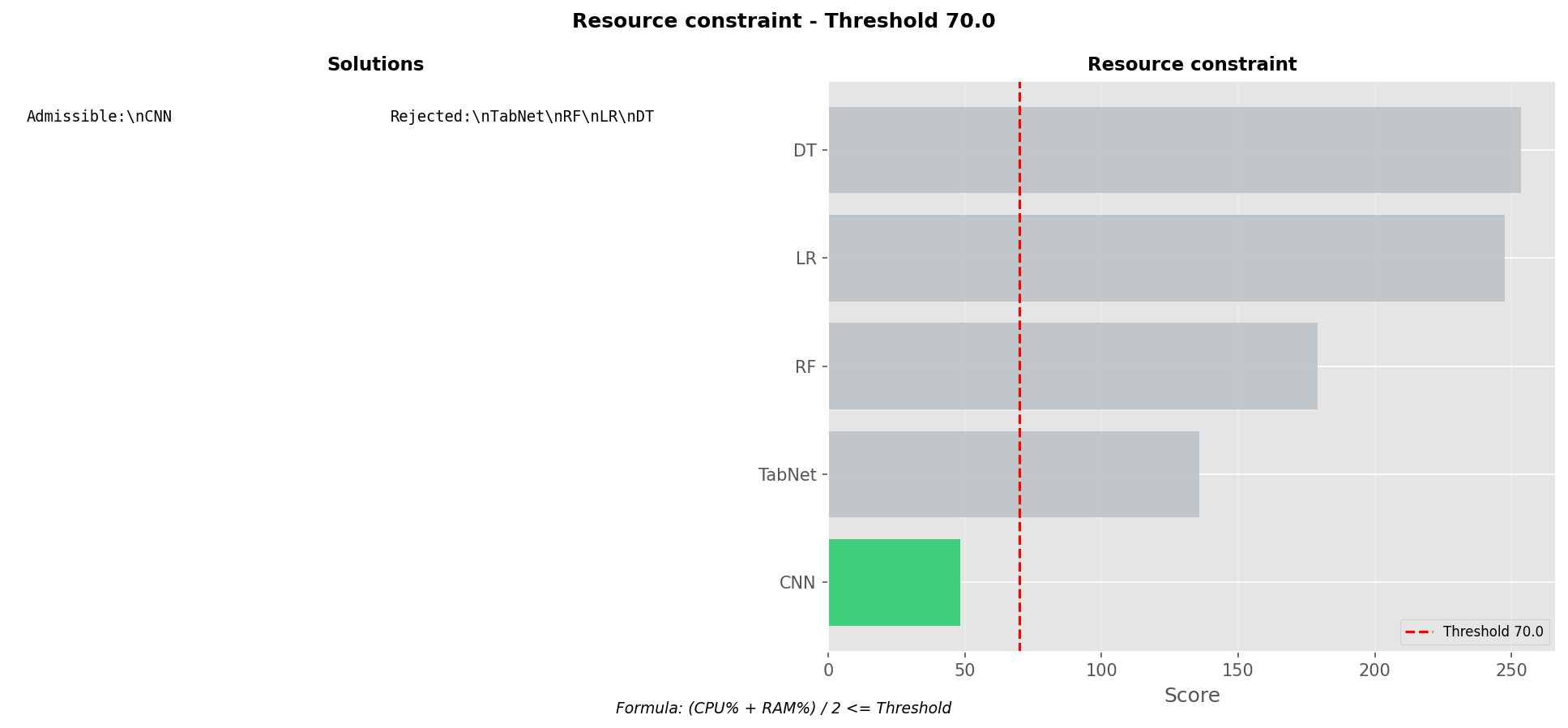
resource\_constraint\_threshold\_60.png

Chart generated by the pipeline.



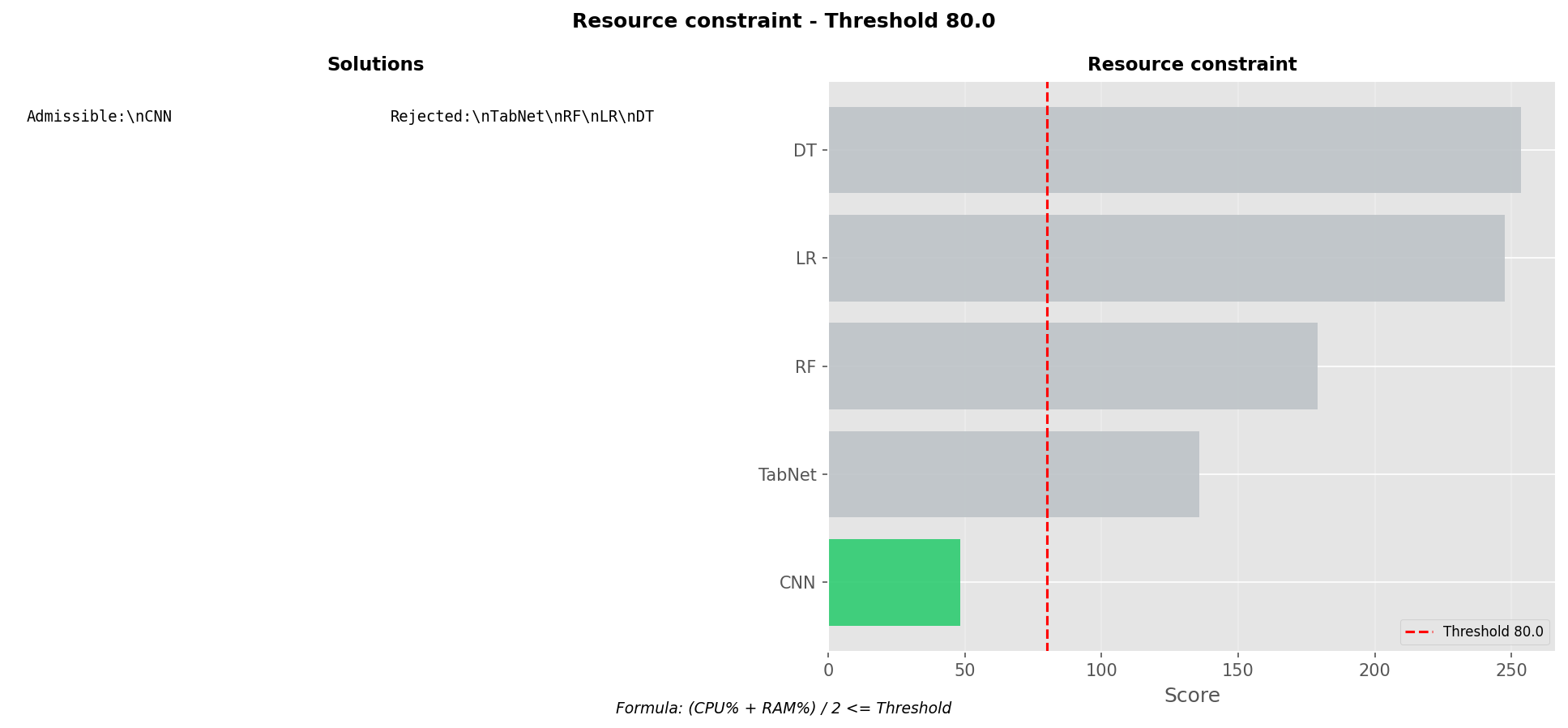
resource\_constraint\_threshold\_70.png

Chart generated by the pipeline.



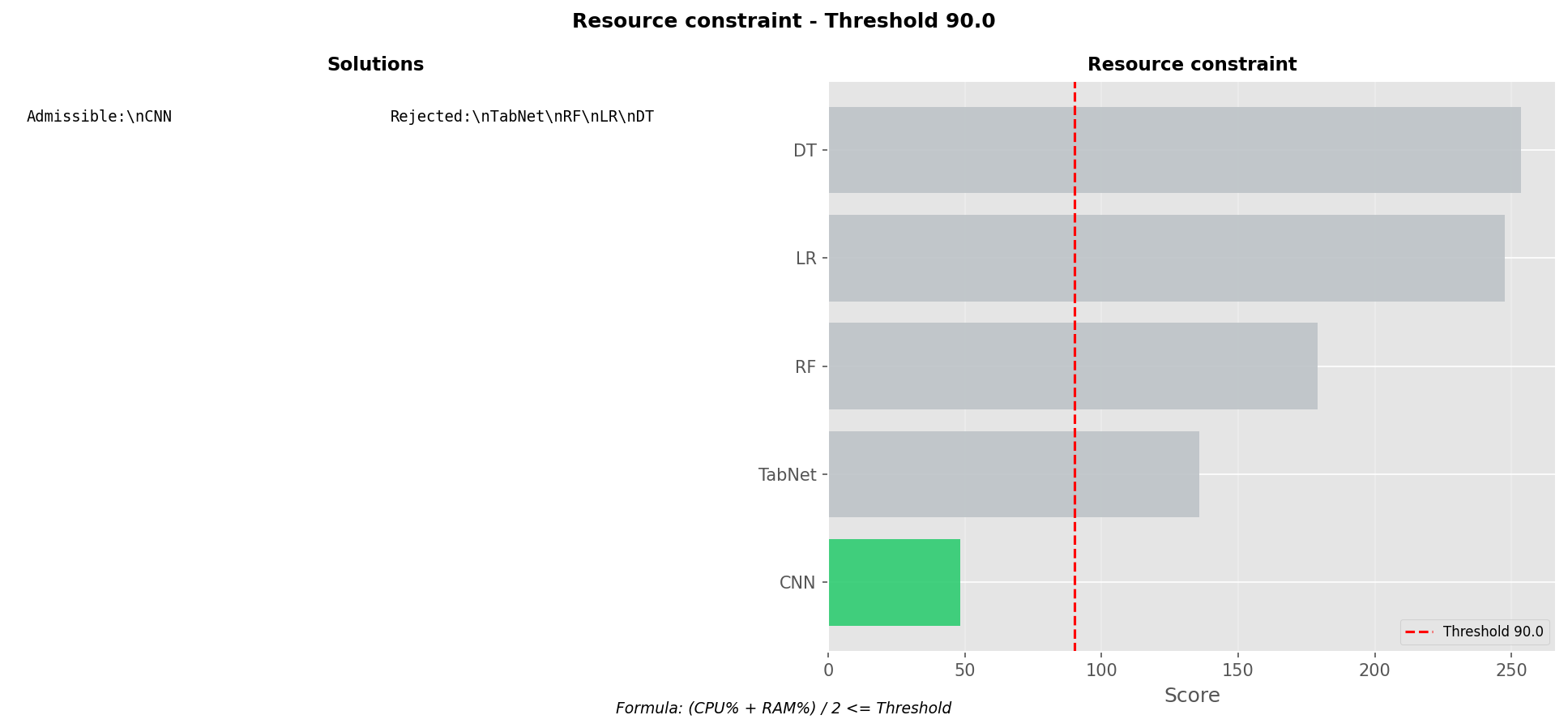
resource\_constraint\_threshold\_80.png

Chart generated by the pipeline.



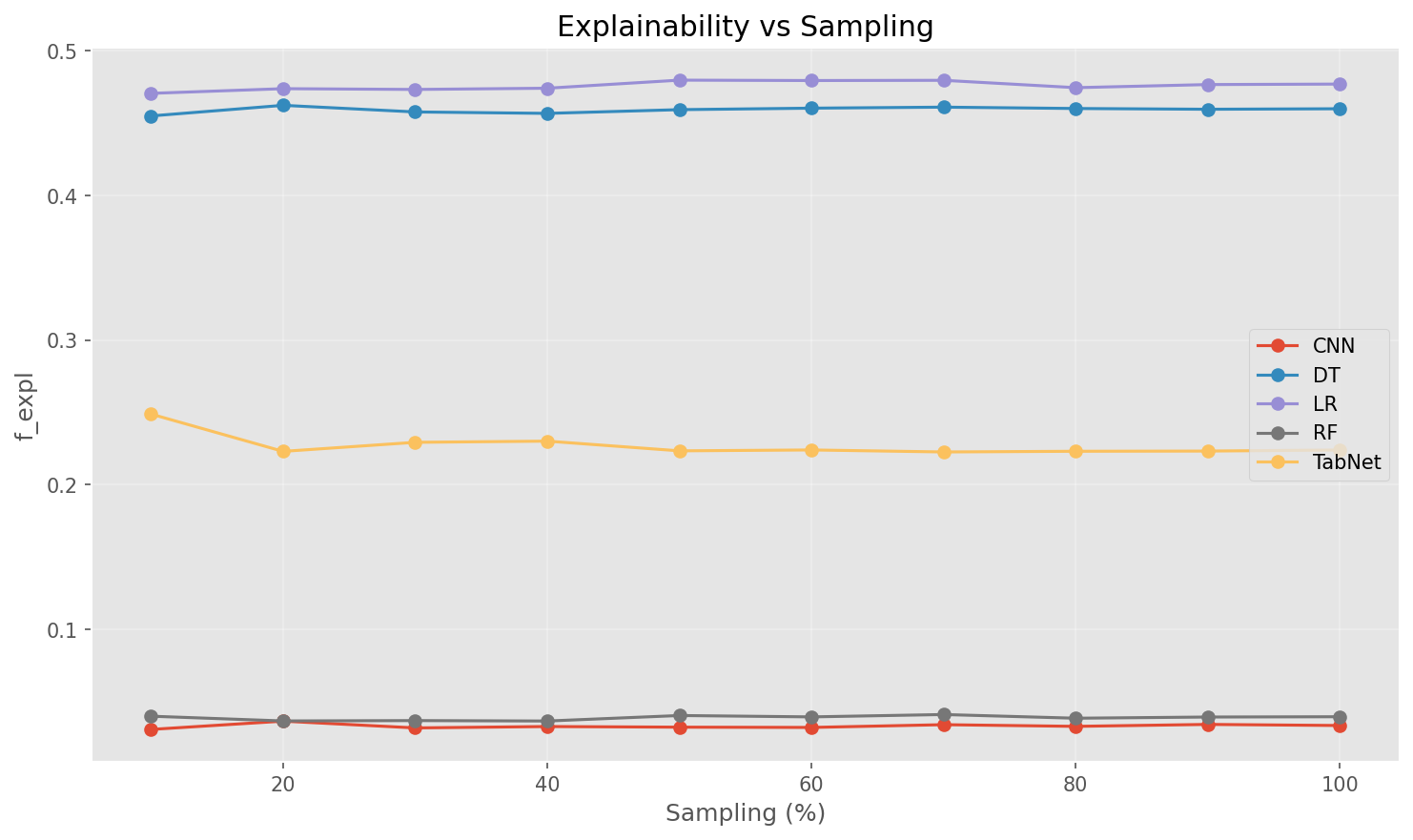
resource\_constraint\_threshold\_90.png

Chart generated by the pipeline.



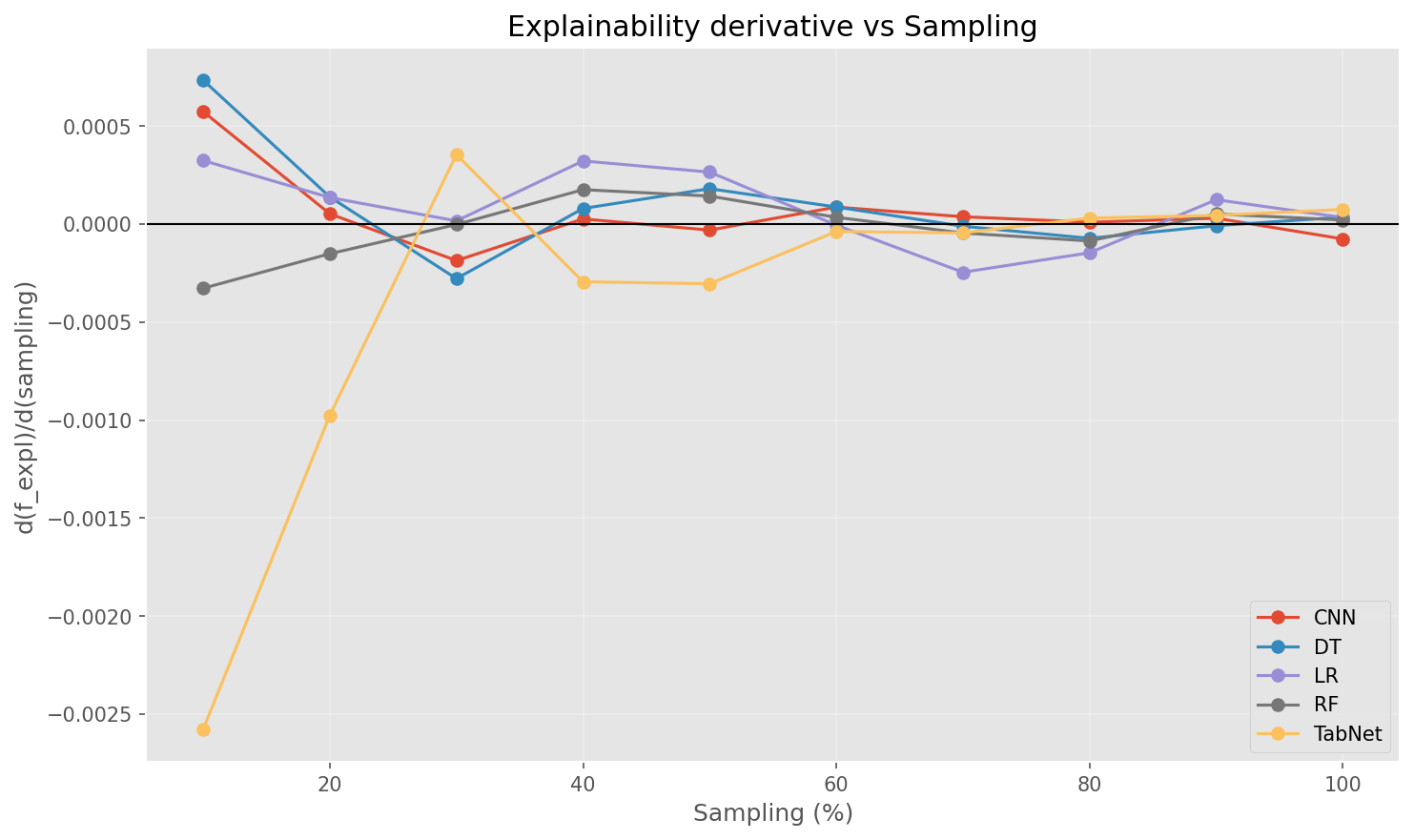
explainability\_sampling\_curve.png

Metric evolution across sampling ratios.



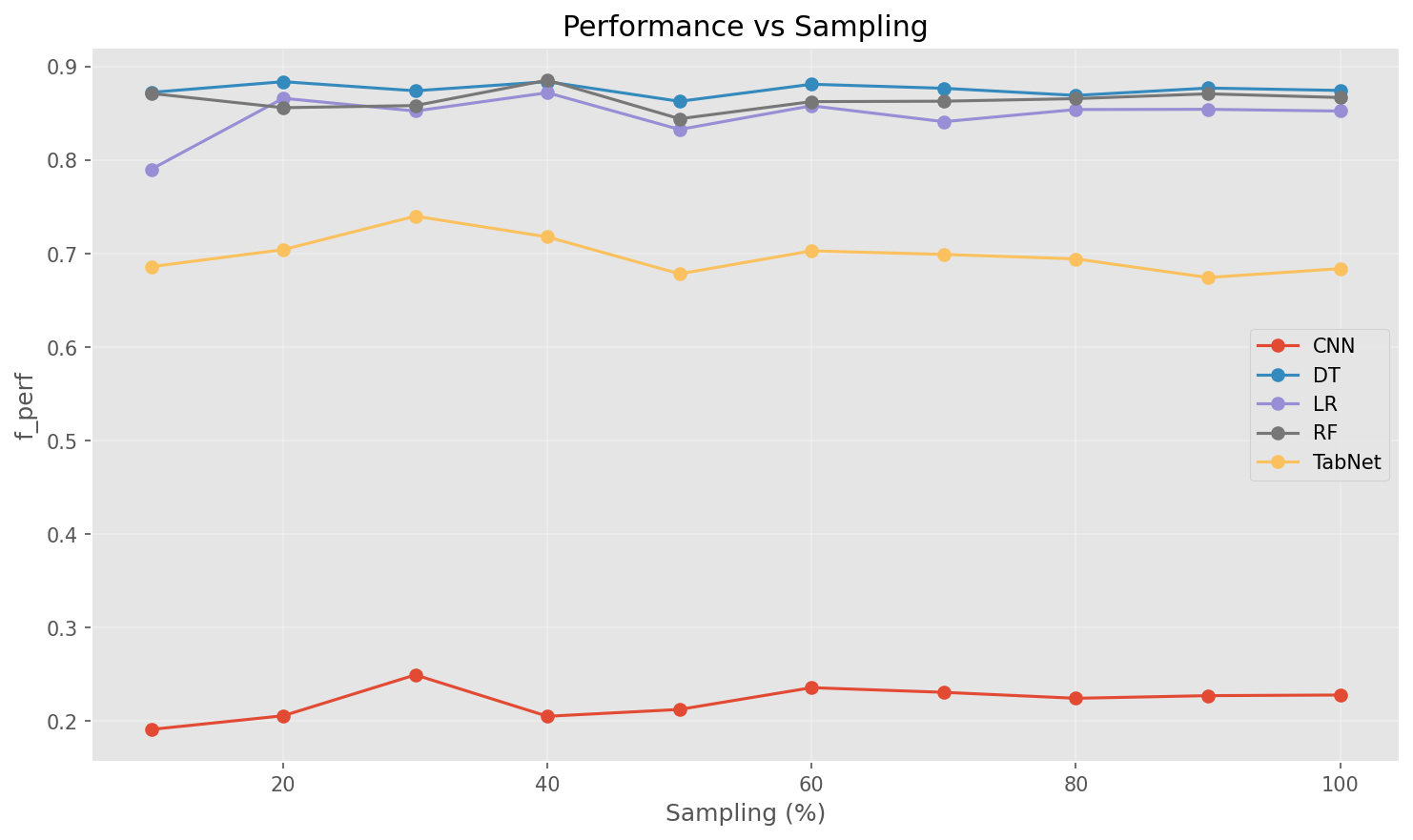
explainability\_sampling\_derivative.png

Derivative plot showing sensitivity of the metric to sampling rate.



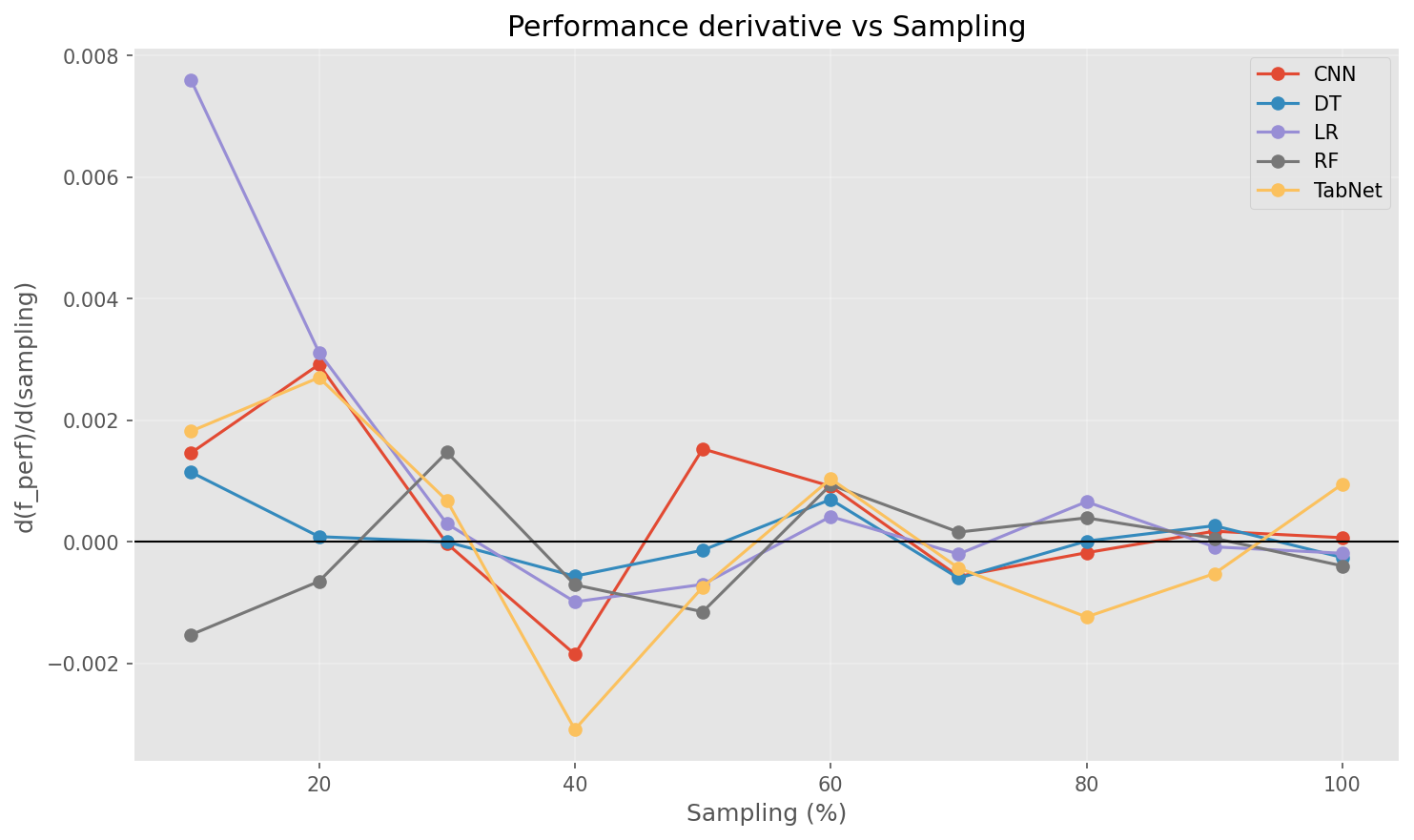
performance\_sampling\_curve.png

Metric evolution across sampling ratios.



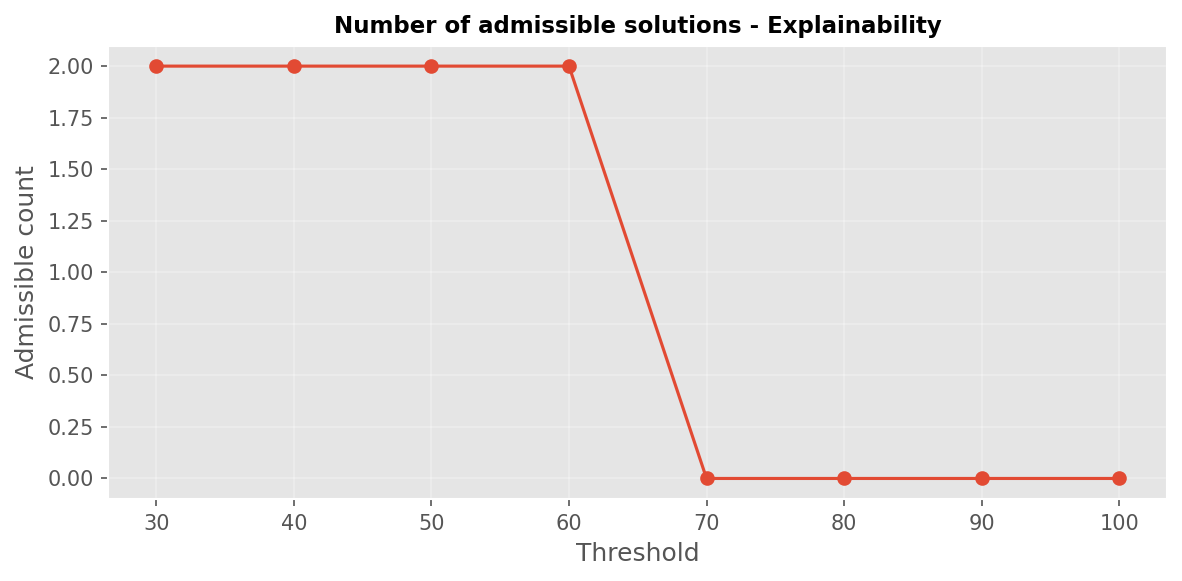
performance\_sampling\_derivative.png

Derivative plot showing sensitivity of the metric to sampling rate.



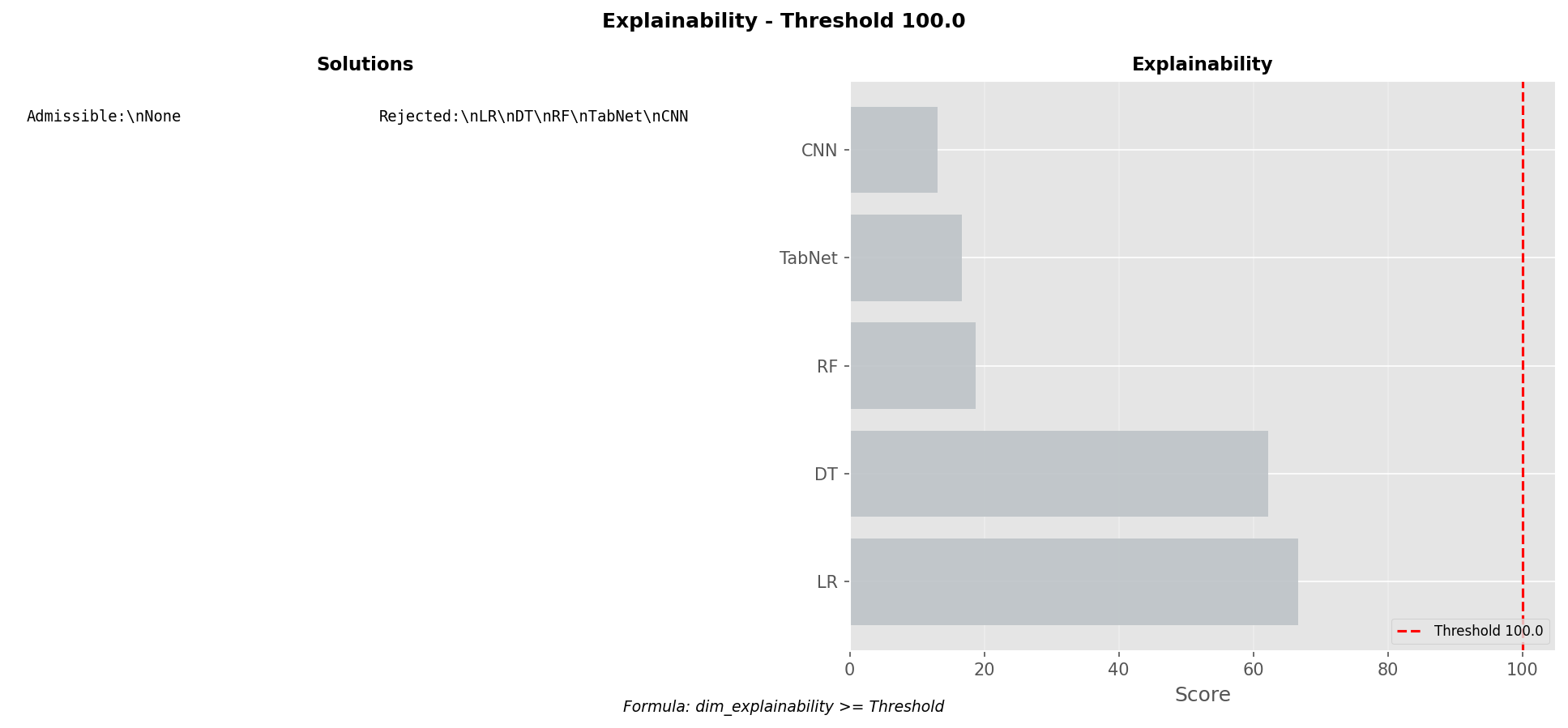
explainability\_resume.png

Chart generated by the pipeline.



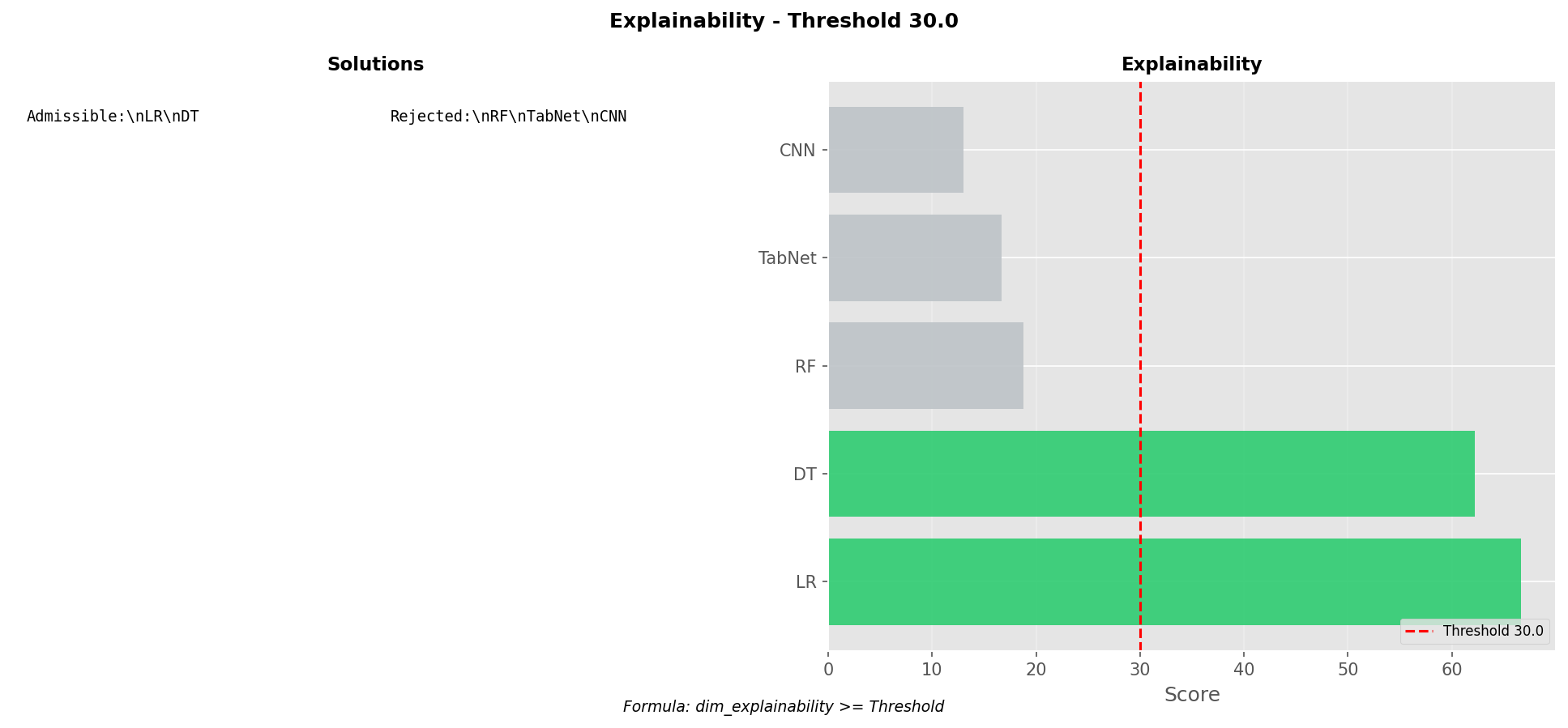
explainability\_threshold\_100.png

Chart generated by the pipeline.



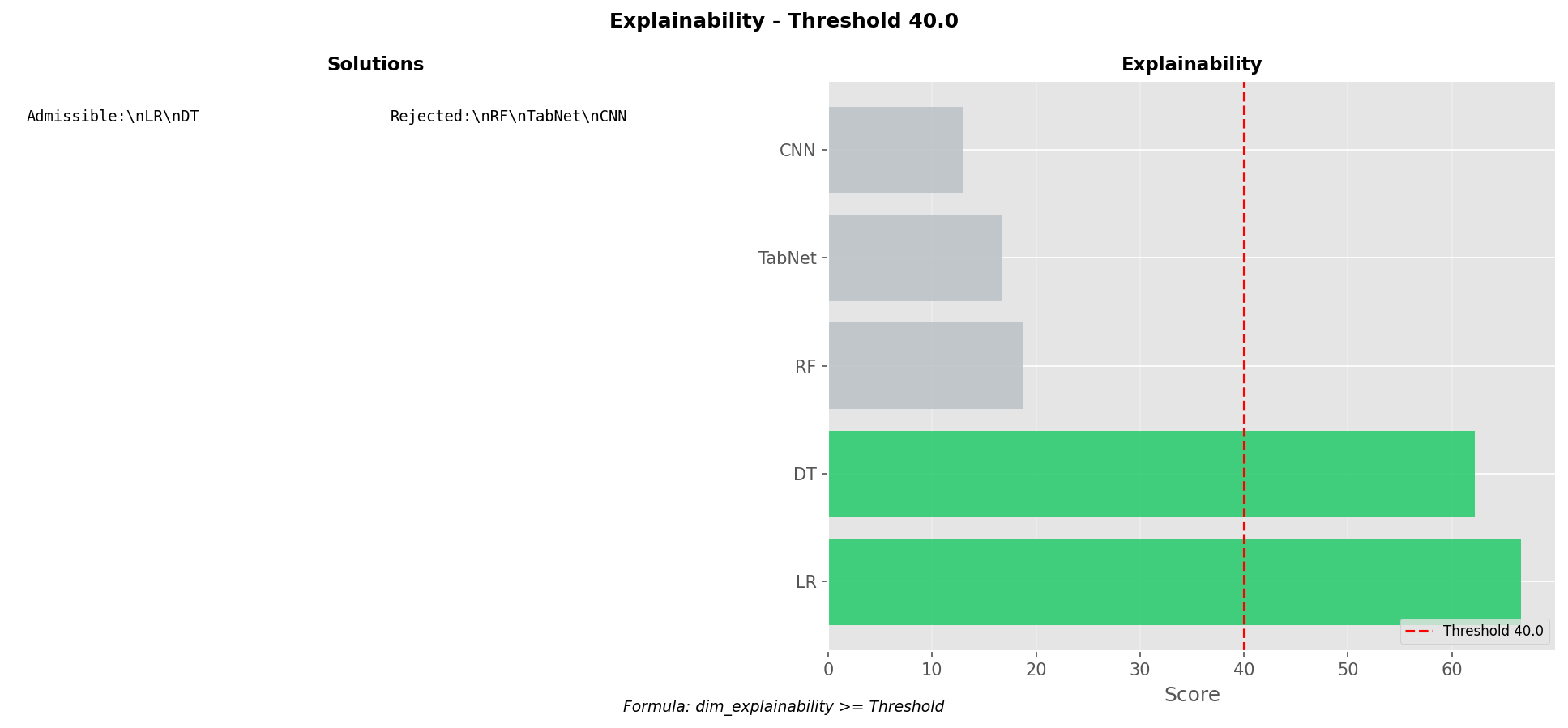
explainability\_threshold\_30.png

Chart generated by the pipeline.



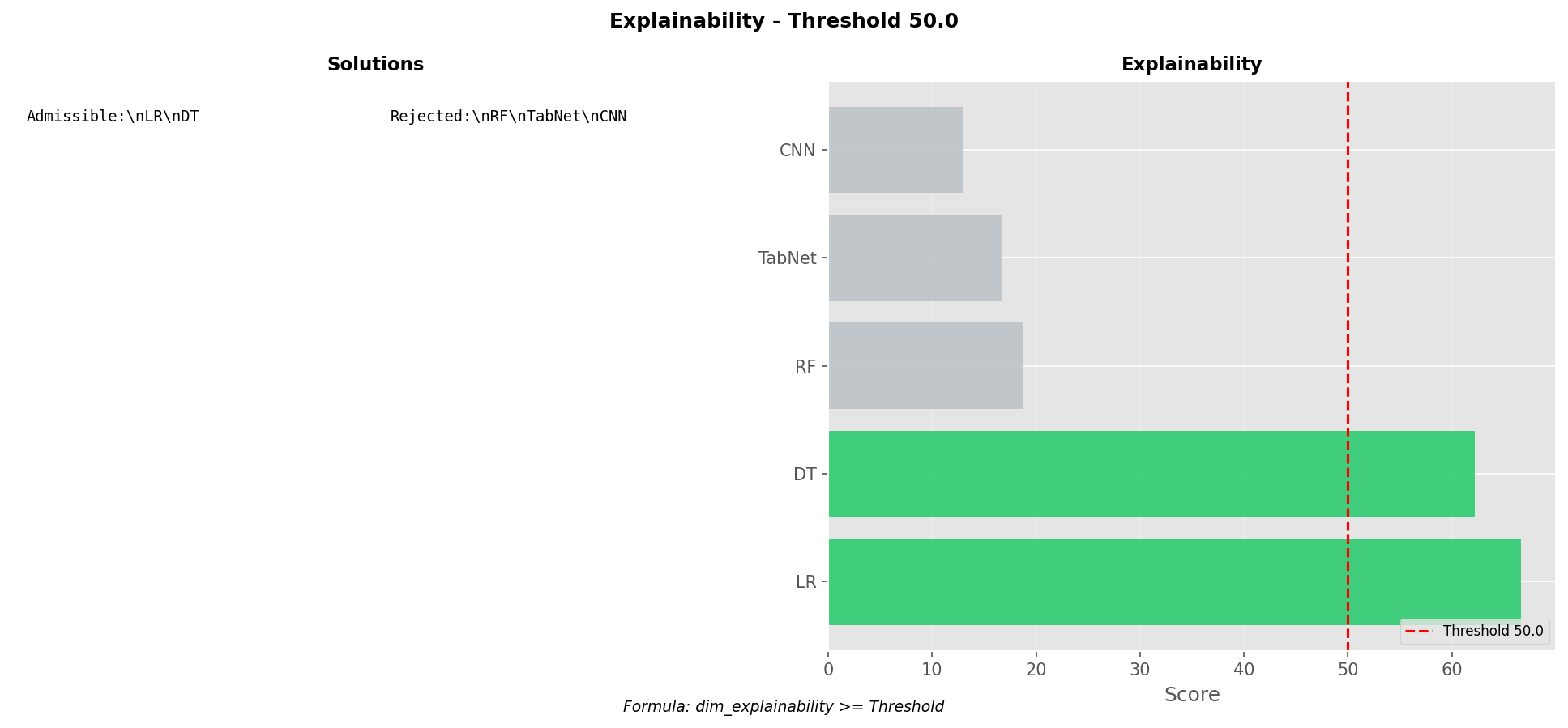
explainability\_threshold\_40.png

Chart generated by the pipeline.



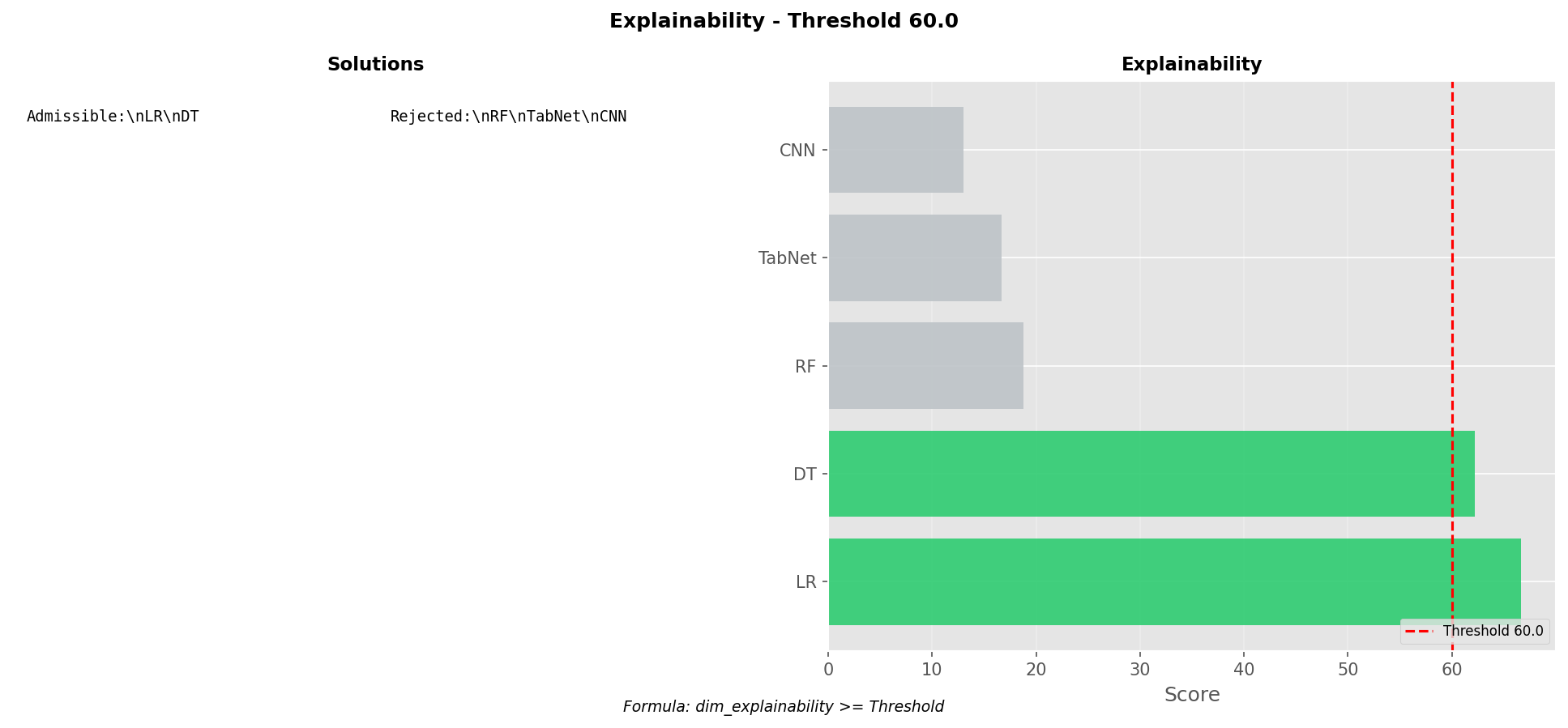
explainability\_threshold\_50.png

Chart generated by the pipeline.



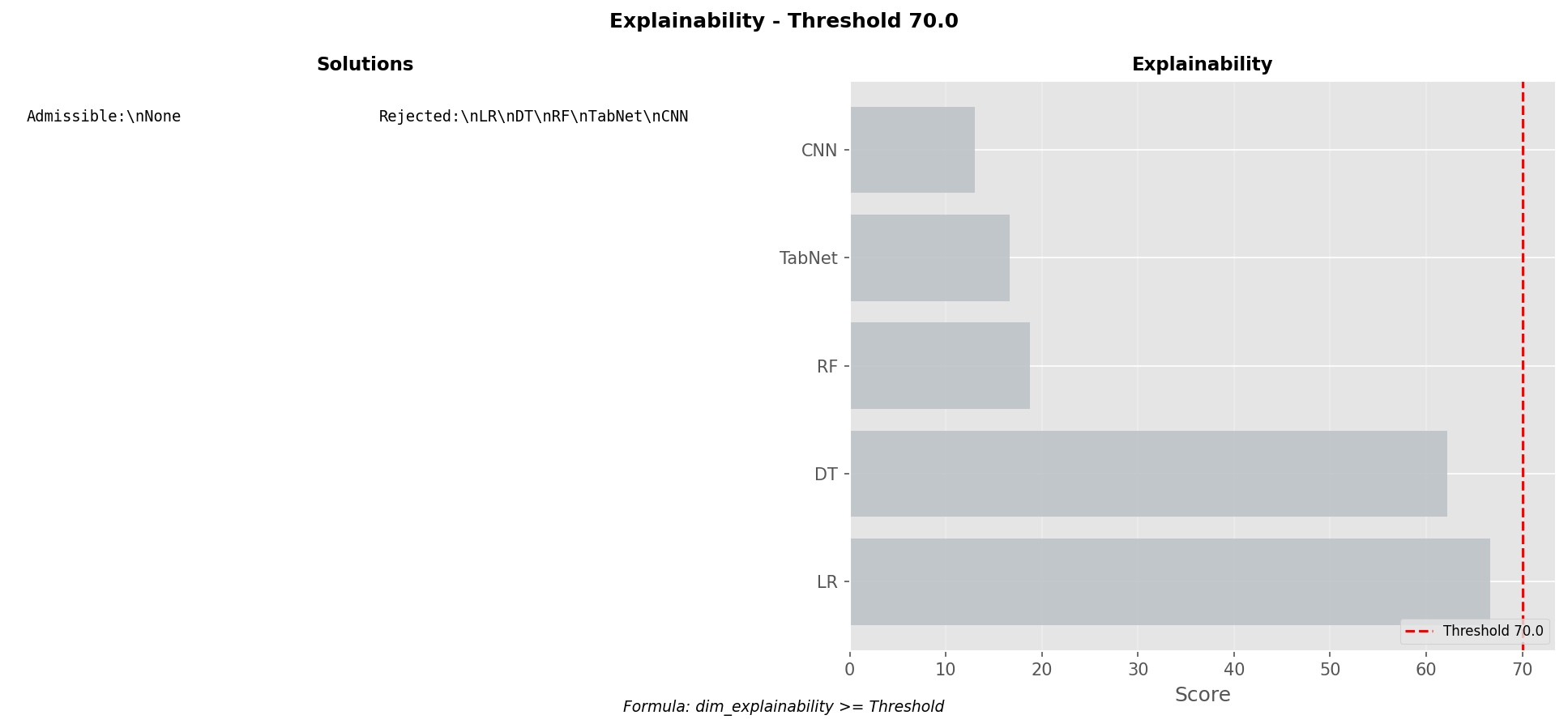
explainability\_threshold\_60.png

Chart generated by the pipeline.



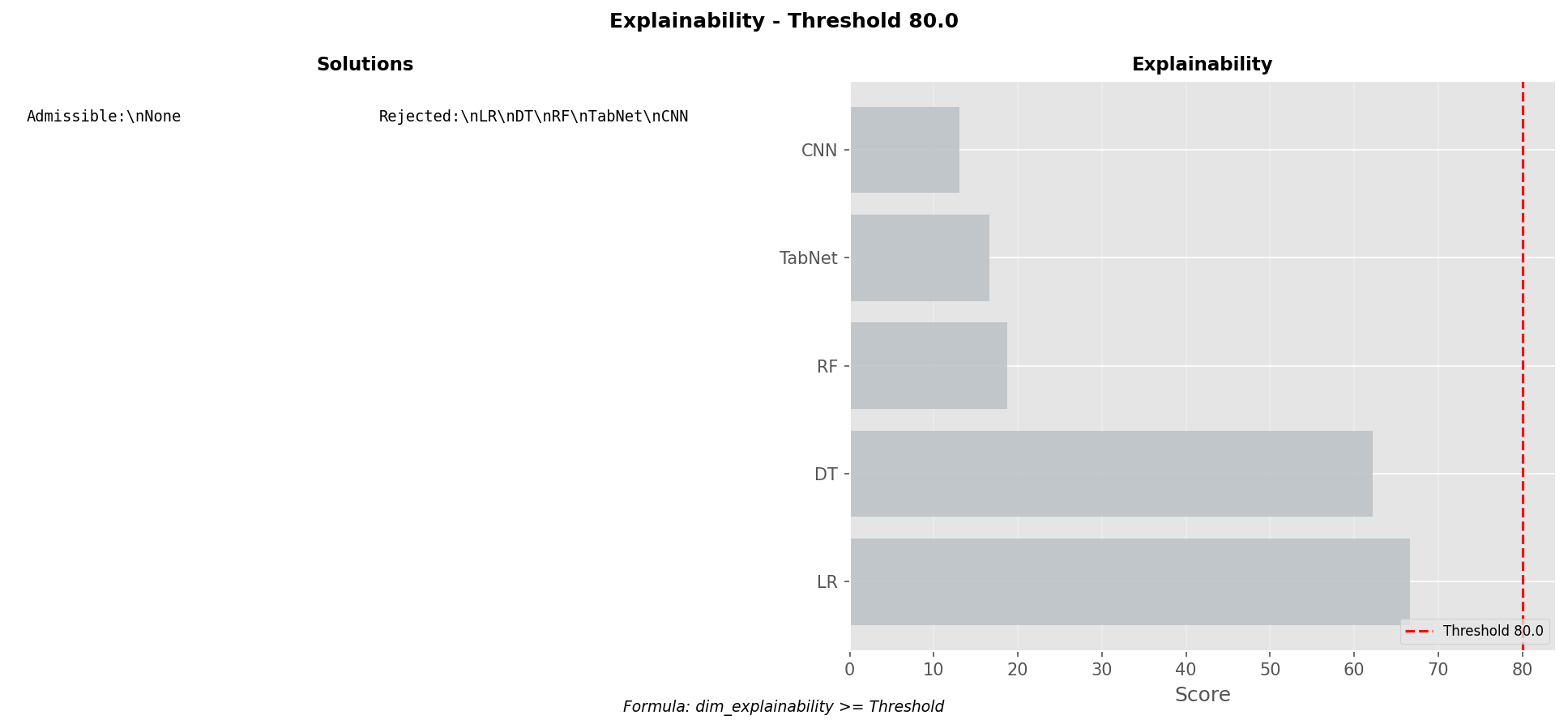
explainability\_threshold\_70.png

Chart generated by the pipeline.



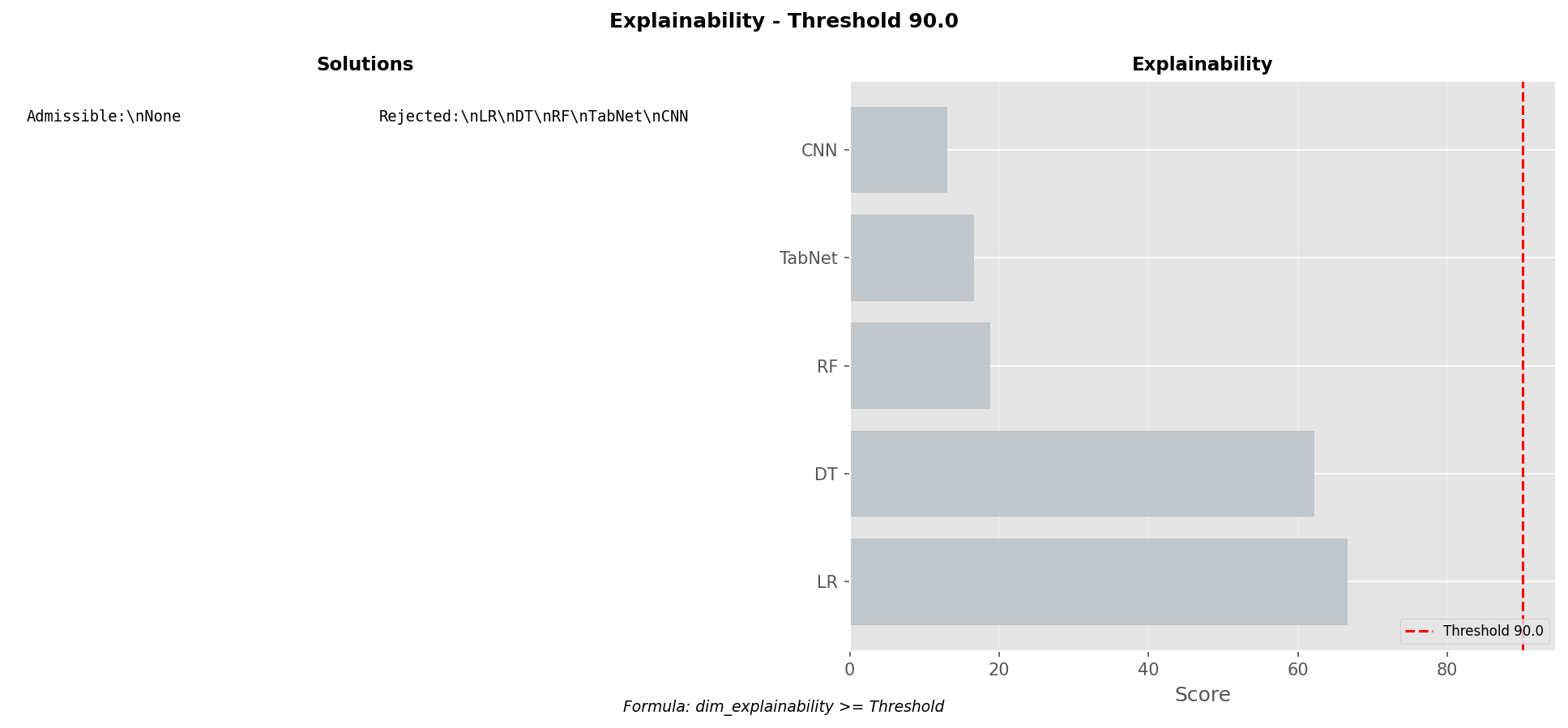
explainability\_threshold\_80.png

Chart generated by the pipeline.



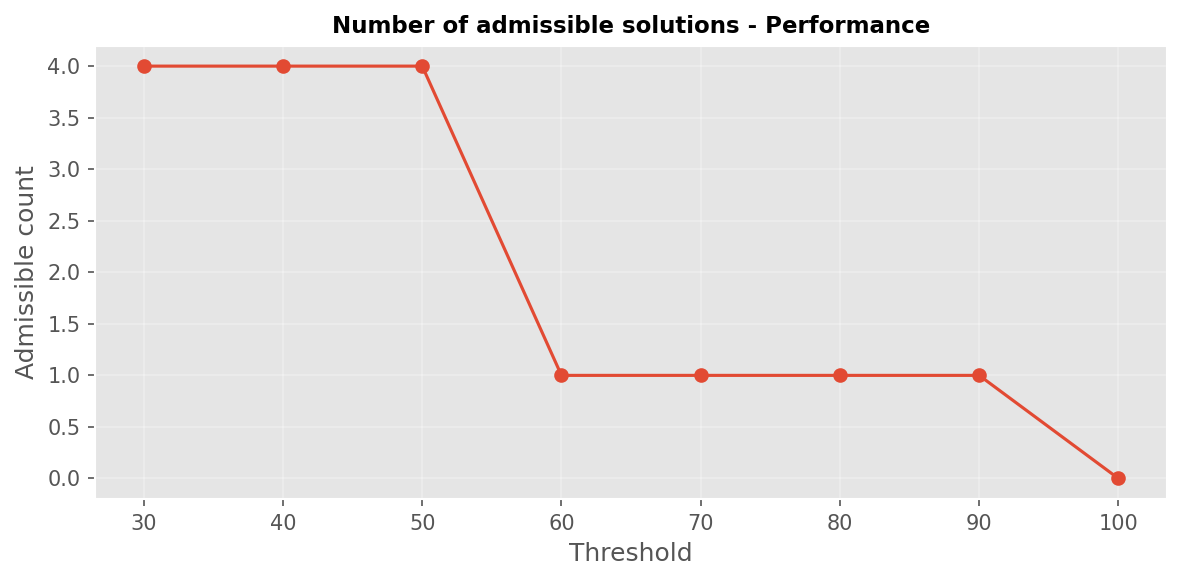
explainability\_threshold\_90.png

Chart generated by the pipeline.



performance\_resume.png

Chart generated by the pipeline.



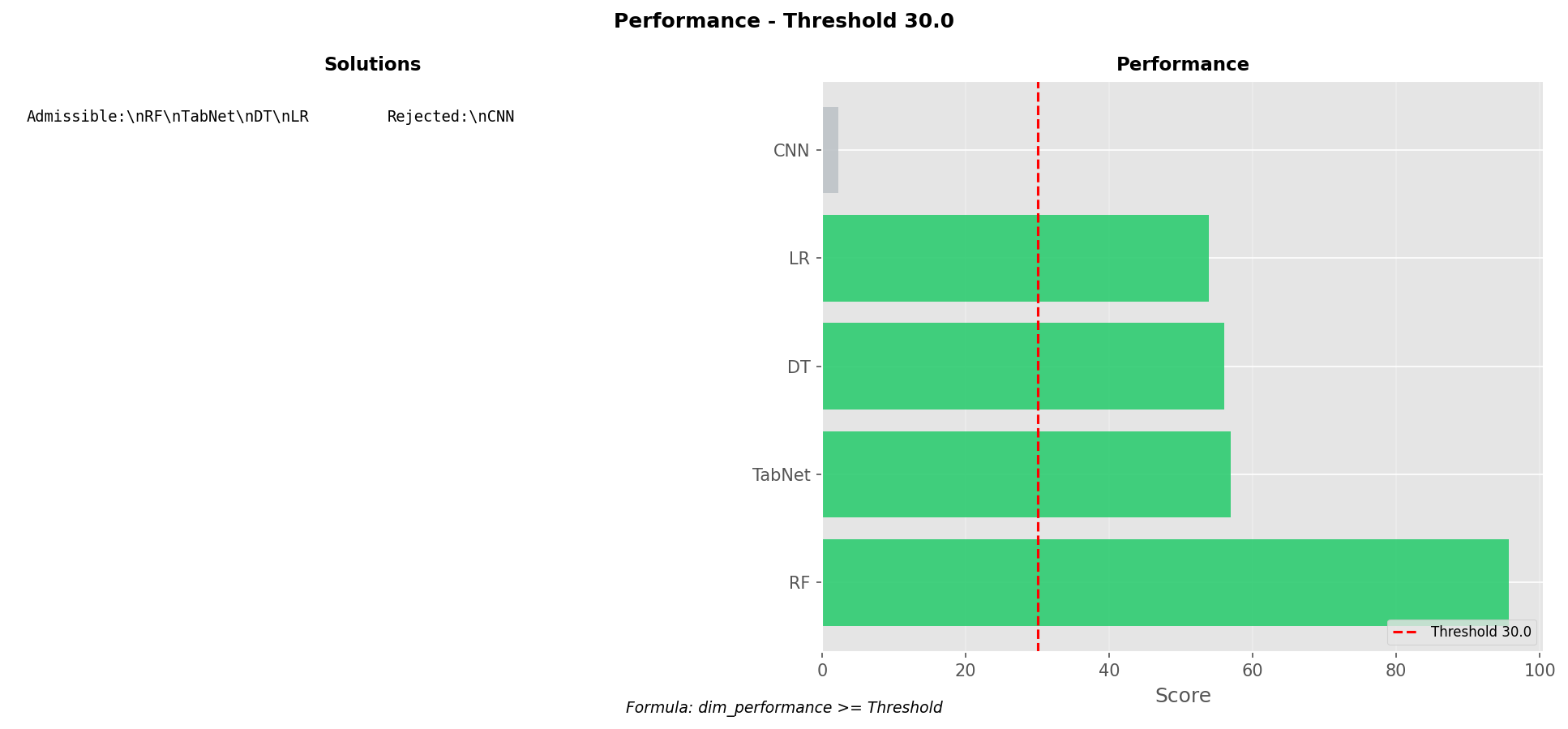
performance\_threshold\_100.png

Chart generated by the pipeline.



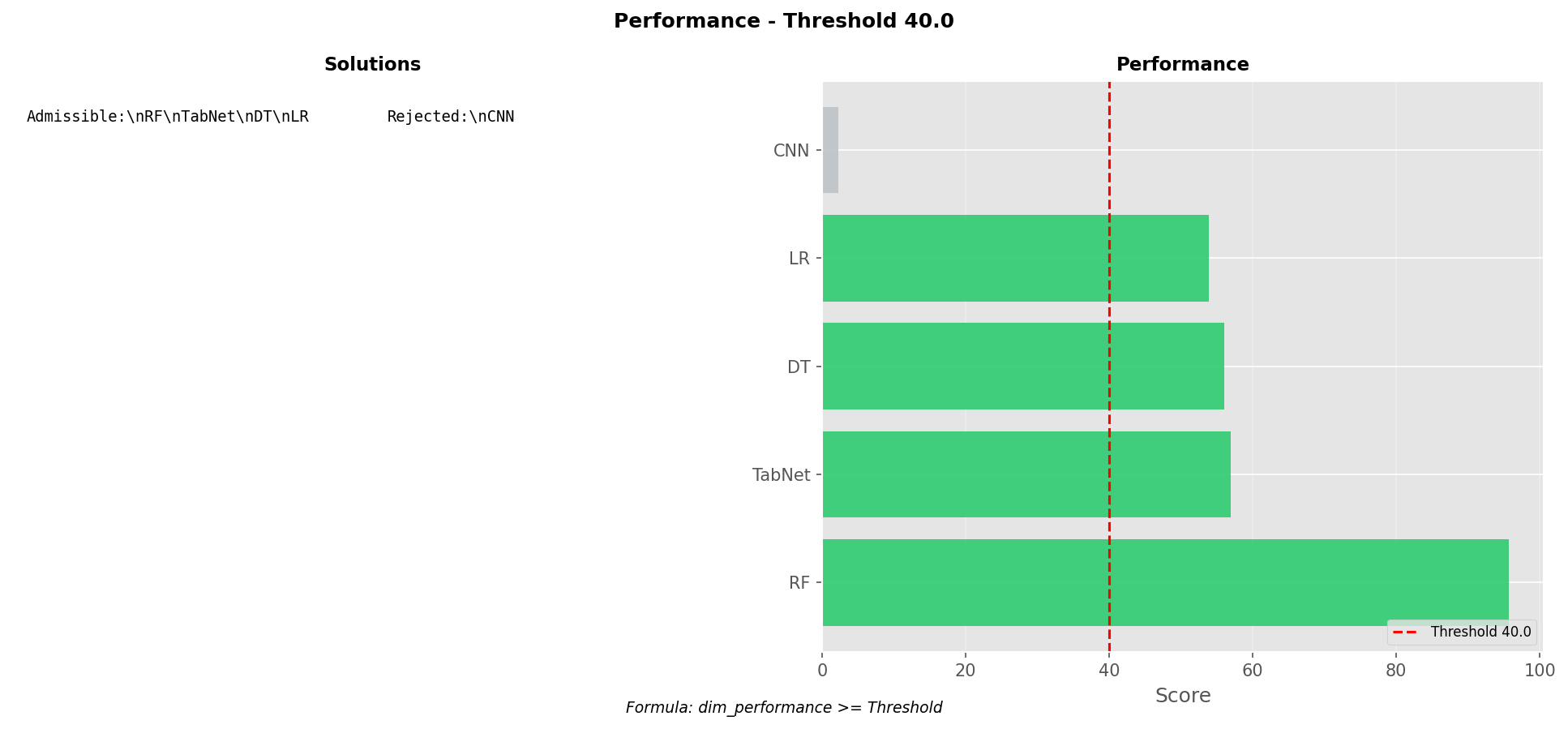
performance\_threshold\_30.png

Chart generated by the pipeline.



performance\_threshold\_40.png

Chart generated by the pipeline.



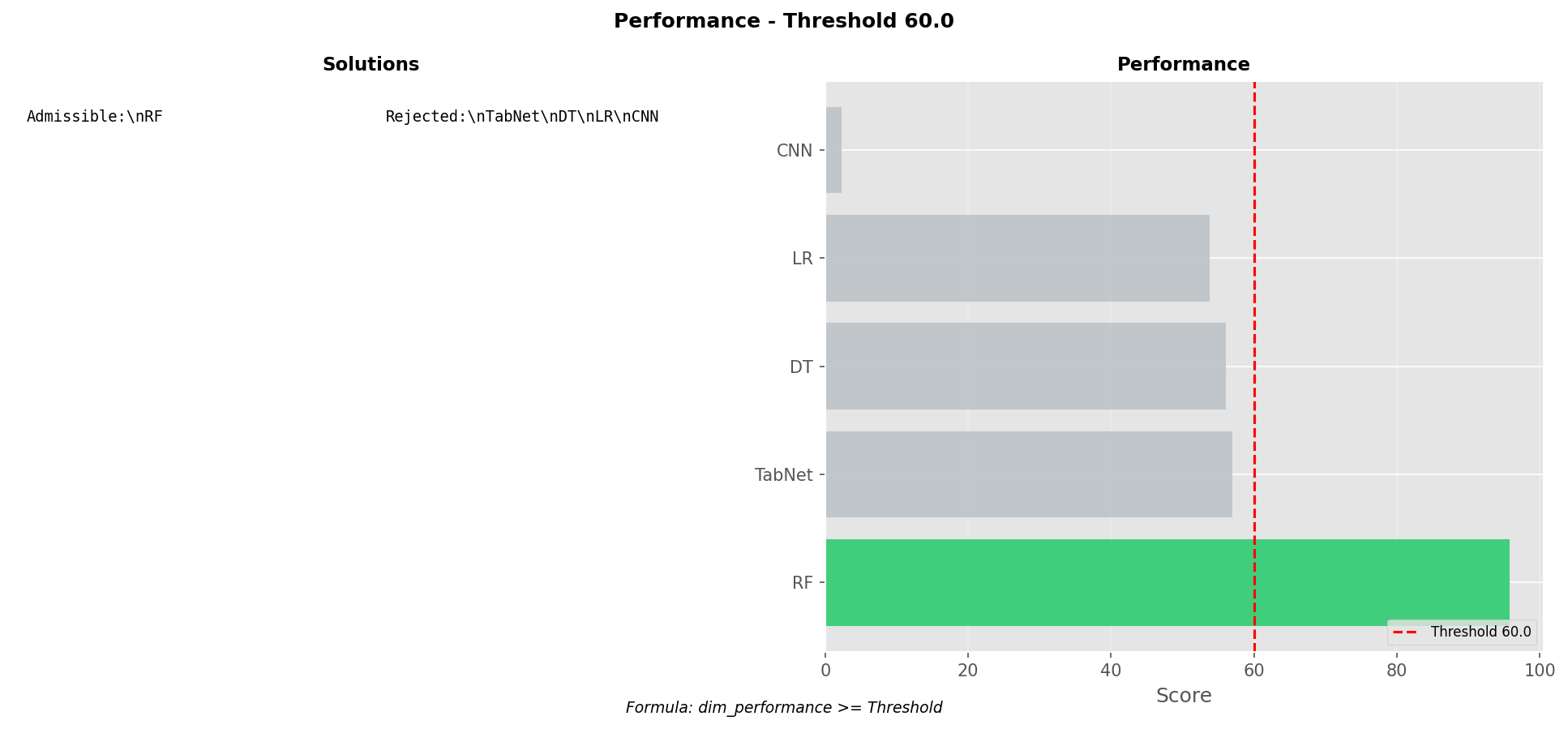
performance\_threshold\_50.png

Chart generated by the pipeline.



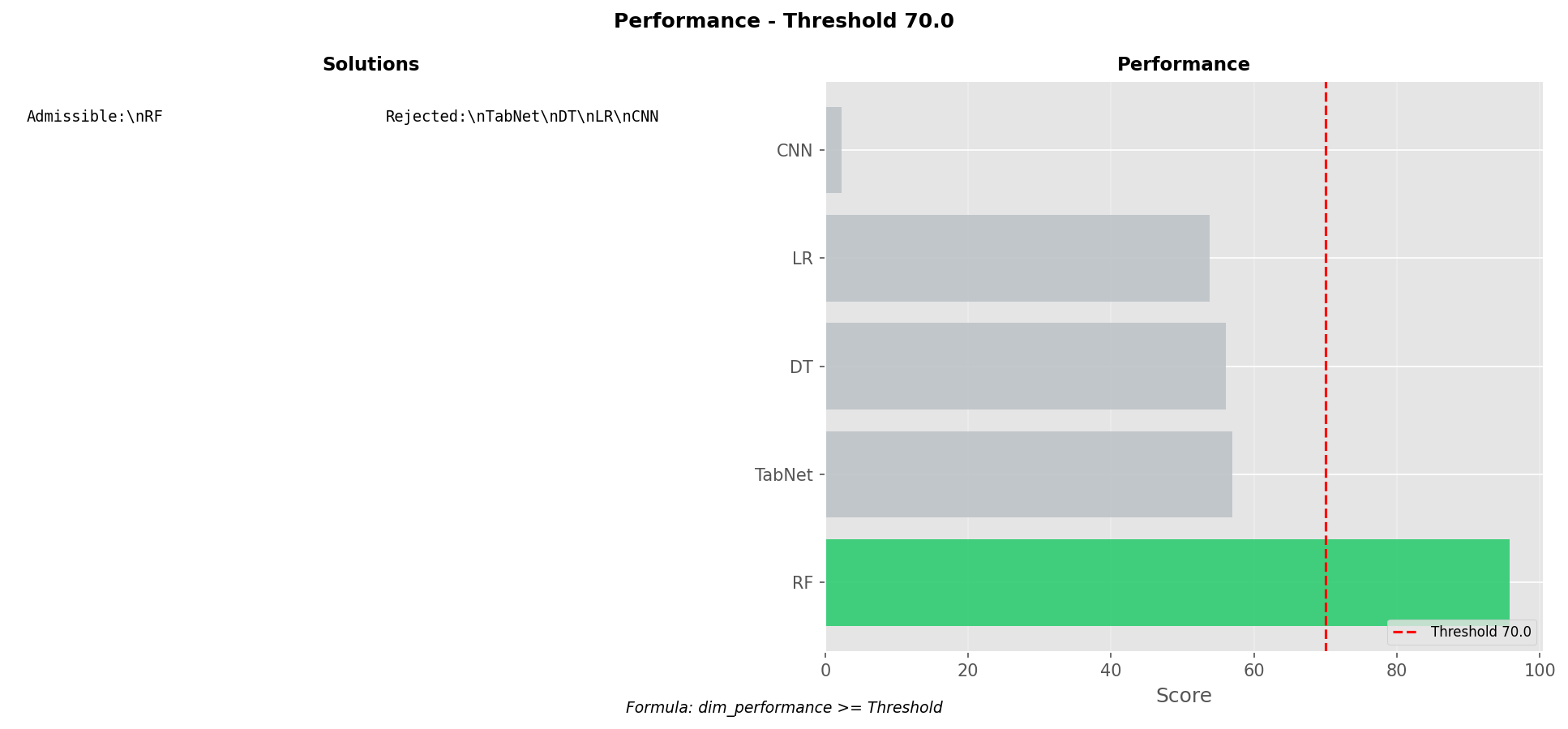
performance\_threshold\_60.png

Chart generated by the pipeline.



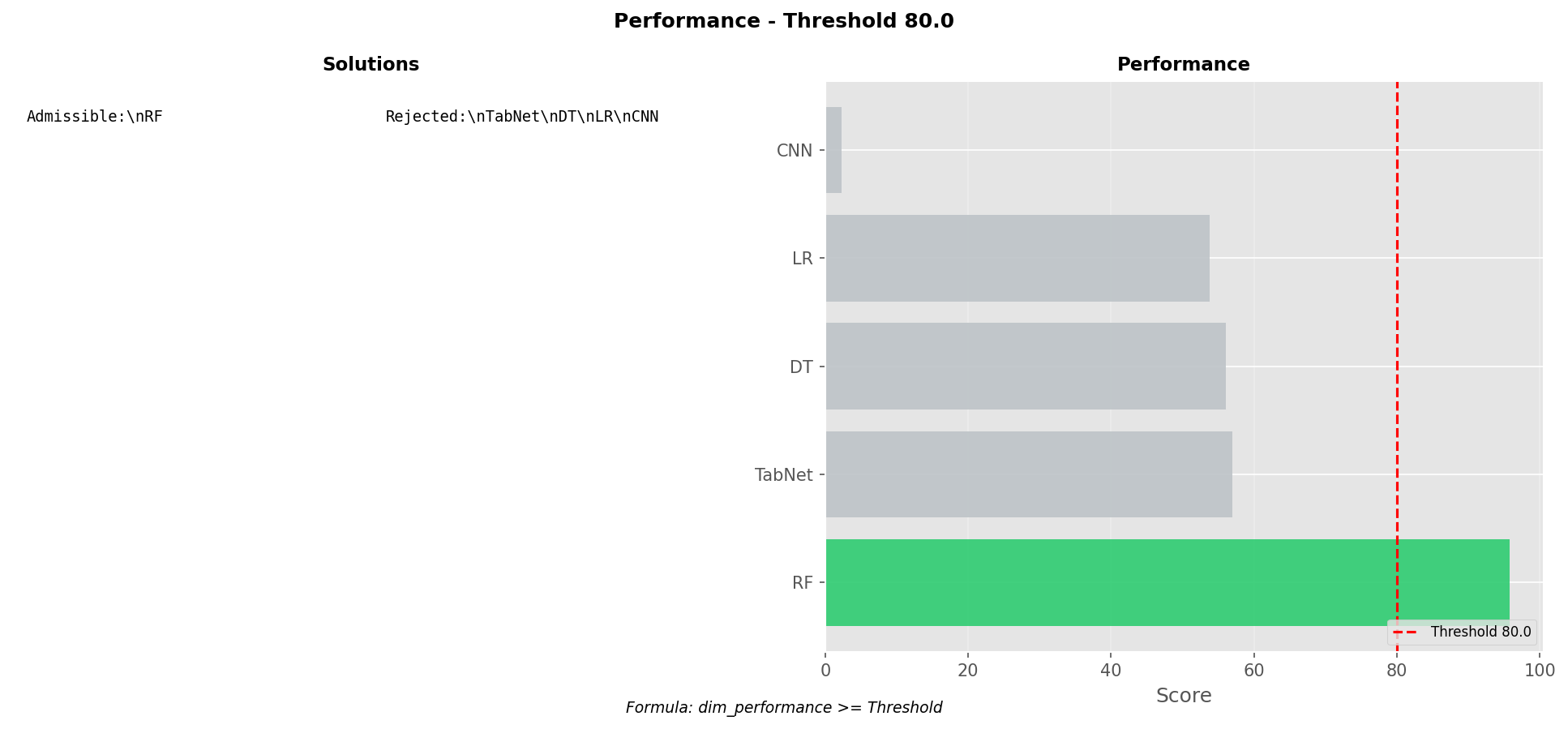
performance\_threshold\_70.png

Chart generated by the pipeline.



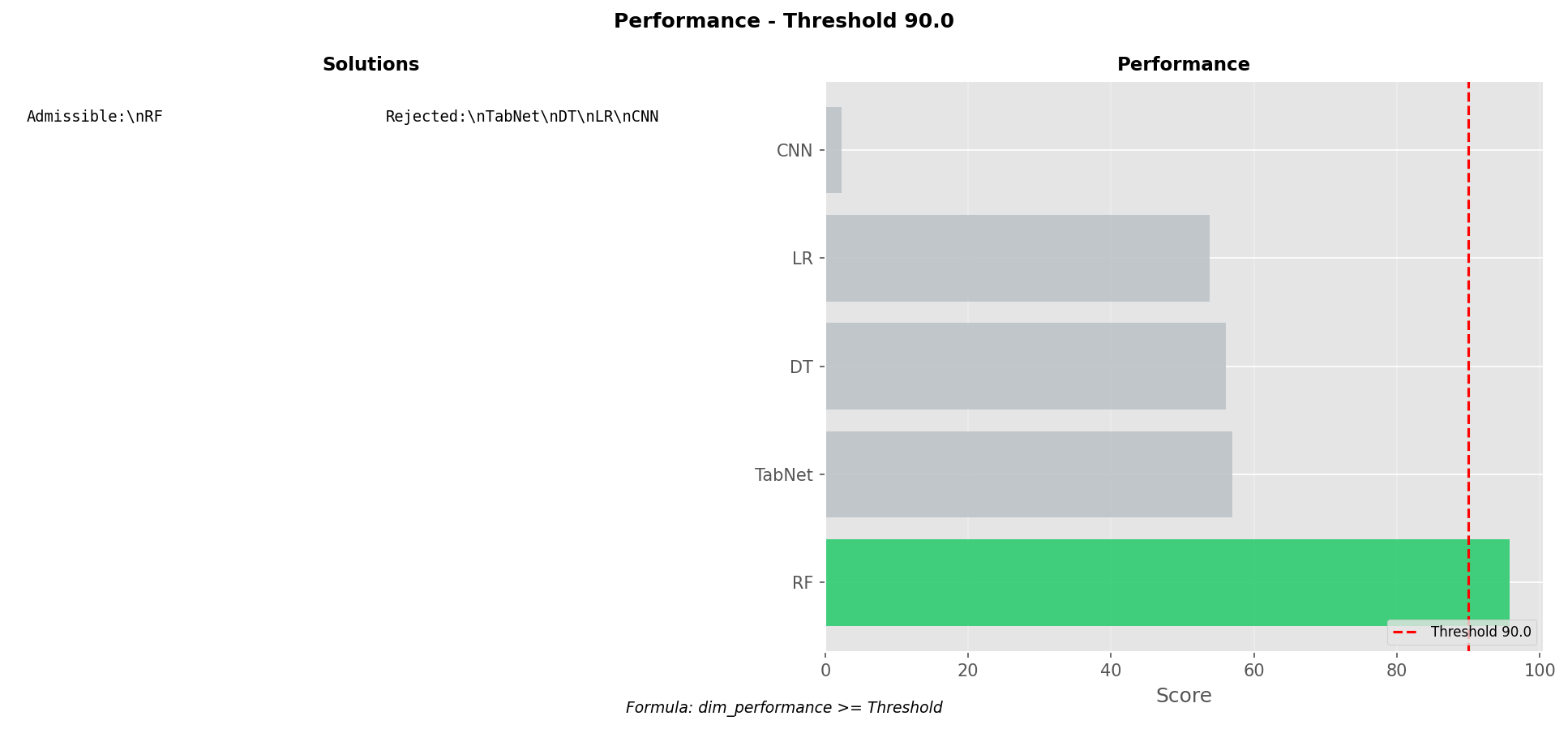
performance\_threshold\_80.png

Chart generated by the pipeline.



performance\_threshold\_90.png

Chart generated by the pipeline.

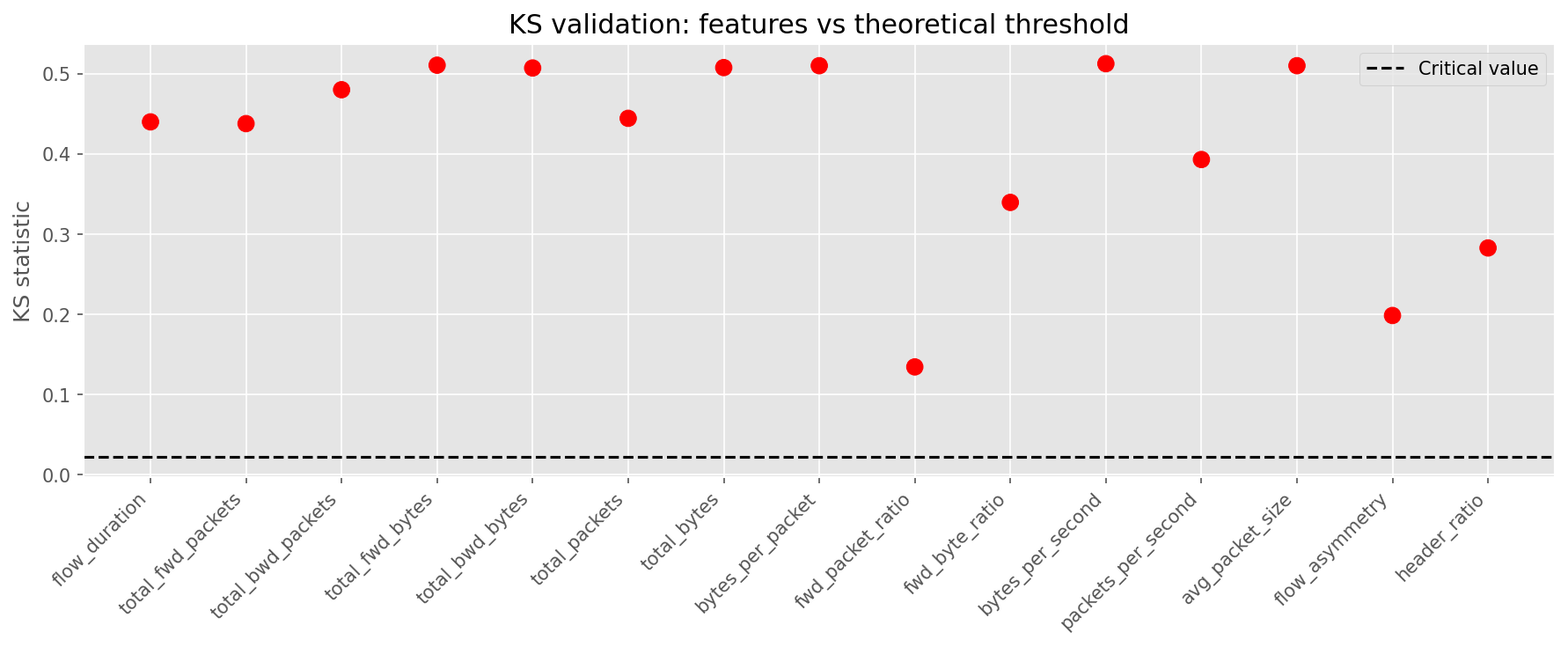


# TOPSIS visual report

Includes KS validation, feature importance, decision matrices, and final ranking.

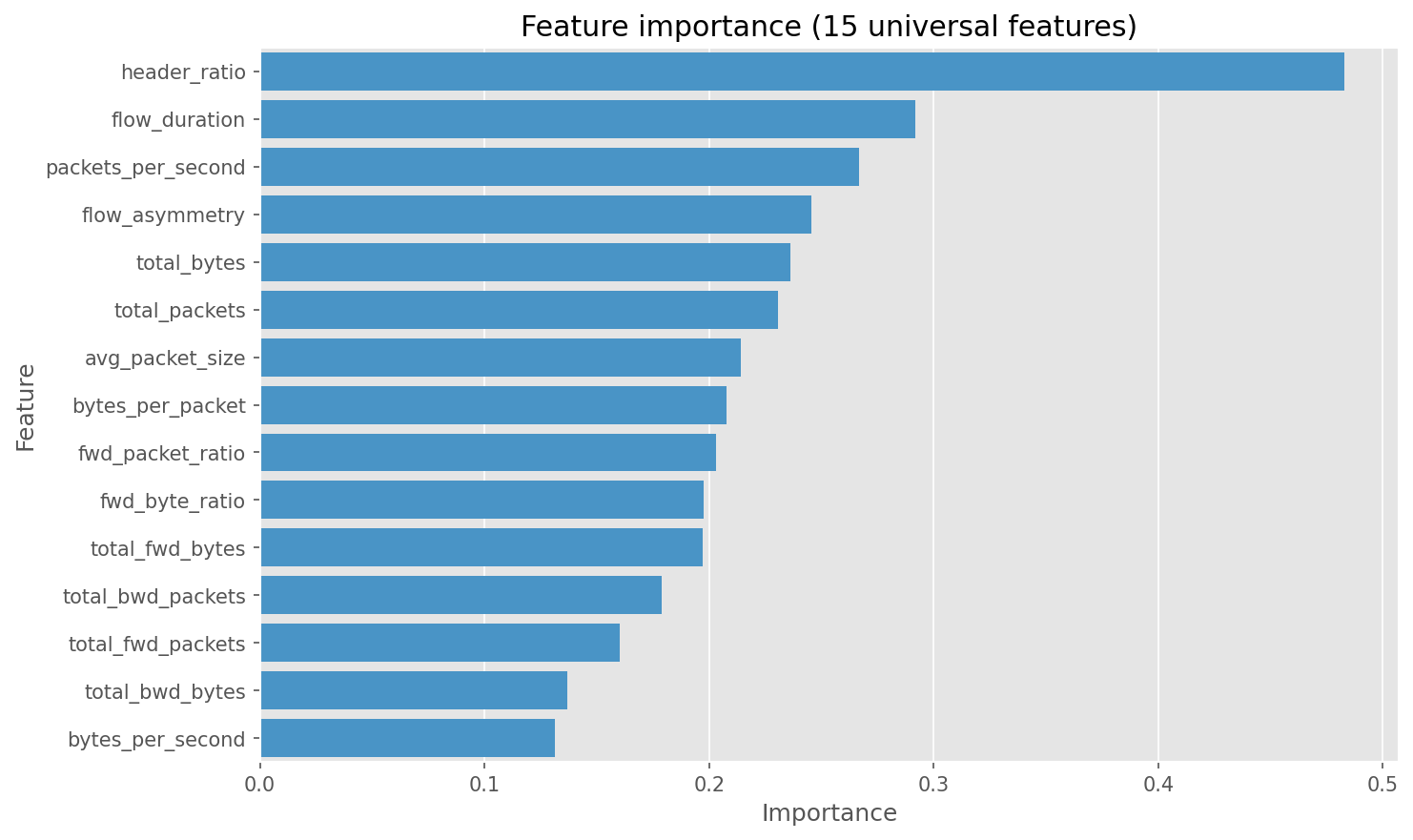
01\_ks\_validation.png

KS statistics per feature against the theoretical threshold.



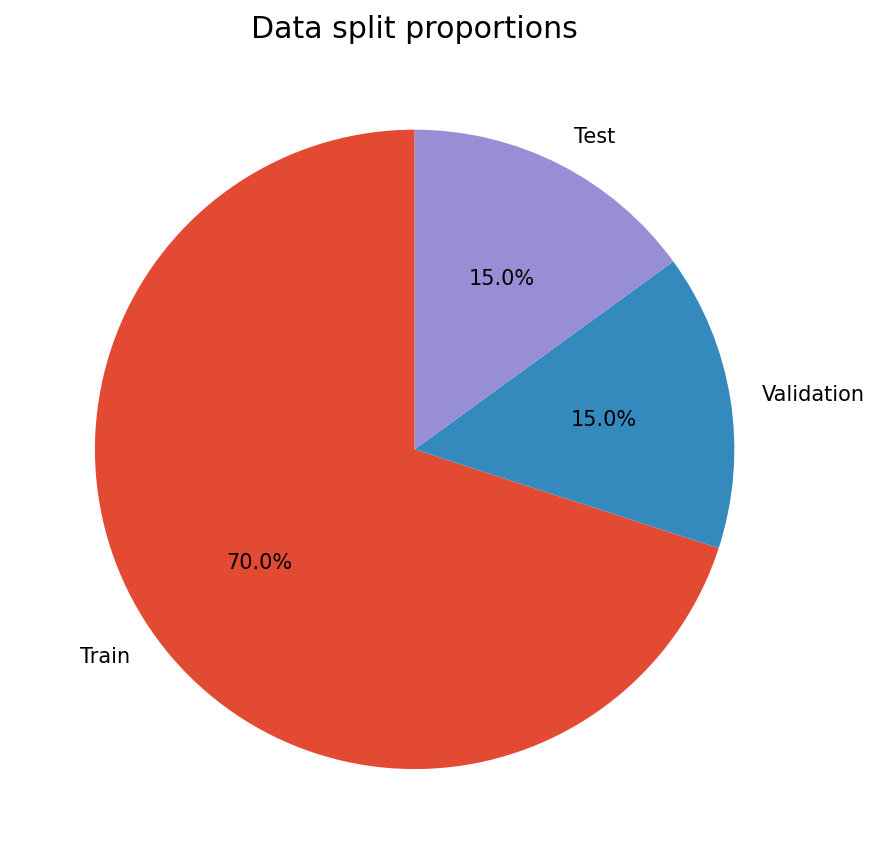
02\_feature\_importance.png

Feature ranking by relevance to the target label.



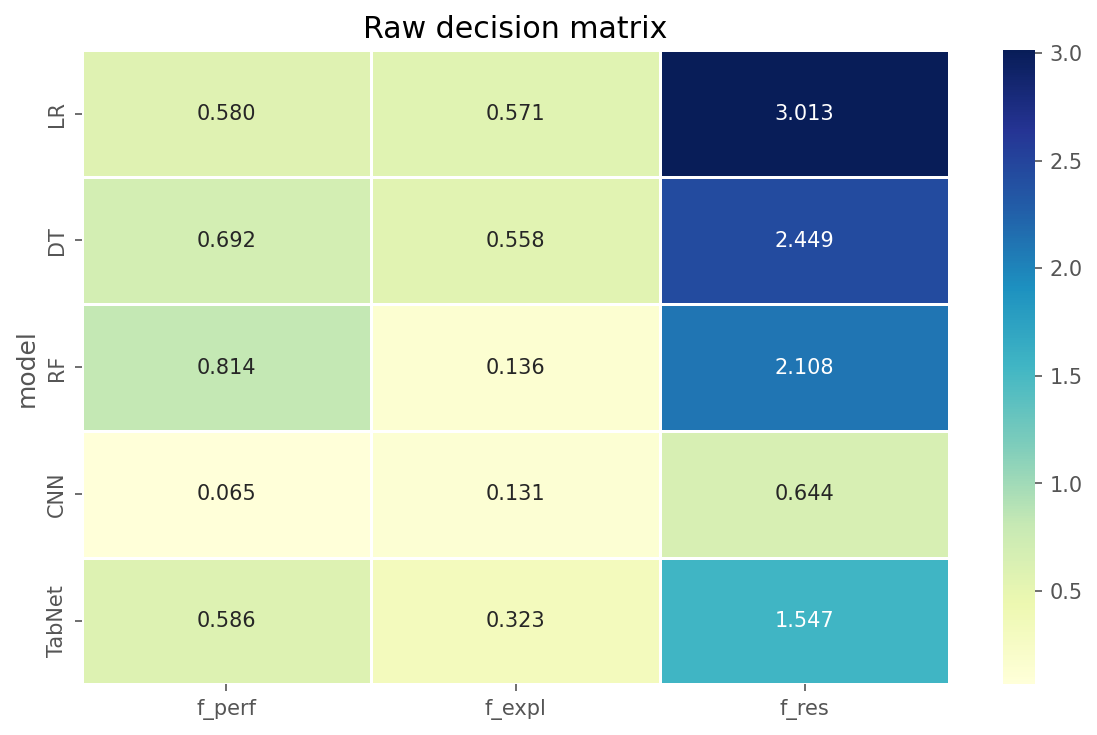
03\_data\_split\_pie.png

Chart generated by the pipeline.



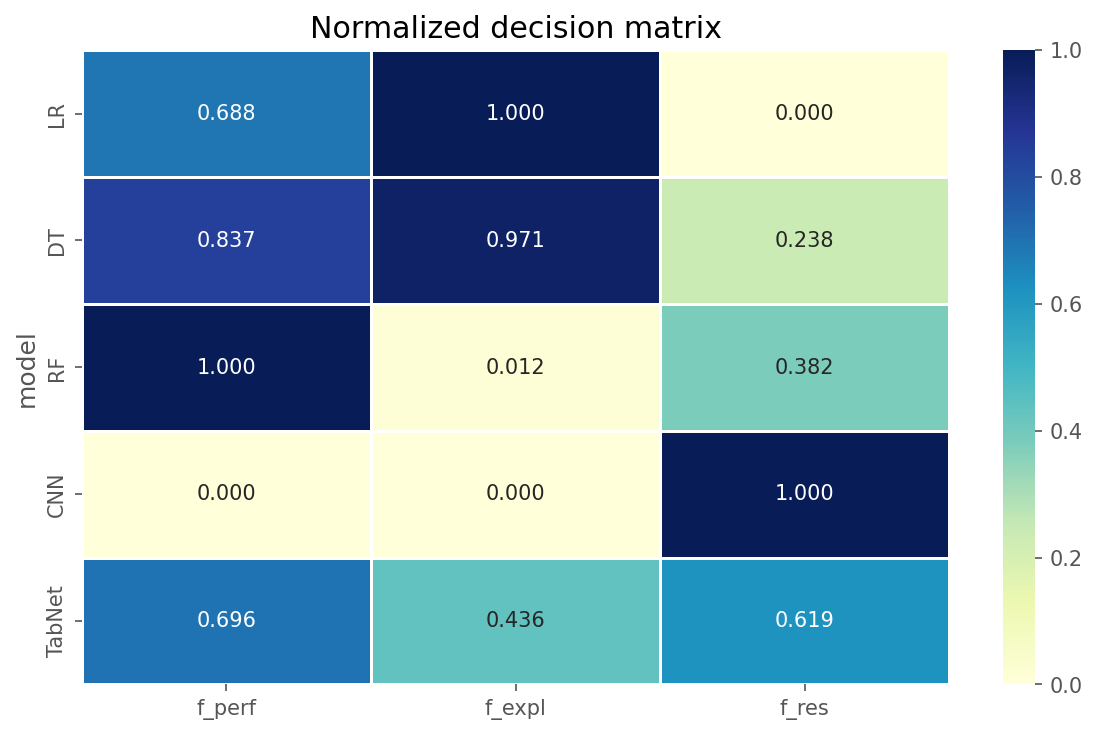
04\_raw\_matrix\_heatmap.png

Raw decision matrix heatmap (before normalization).



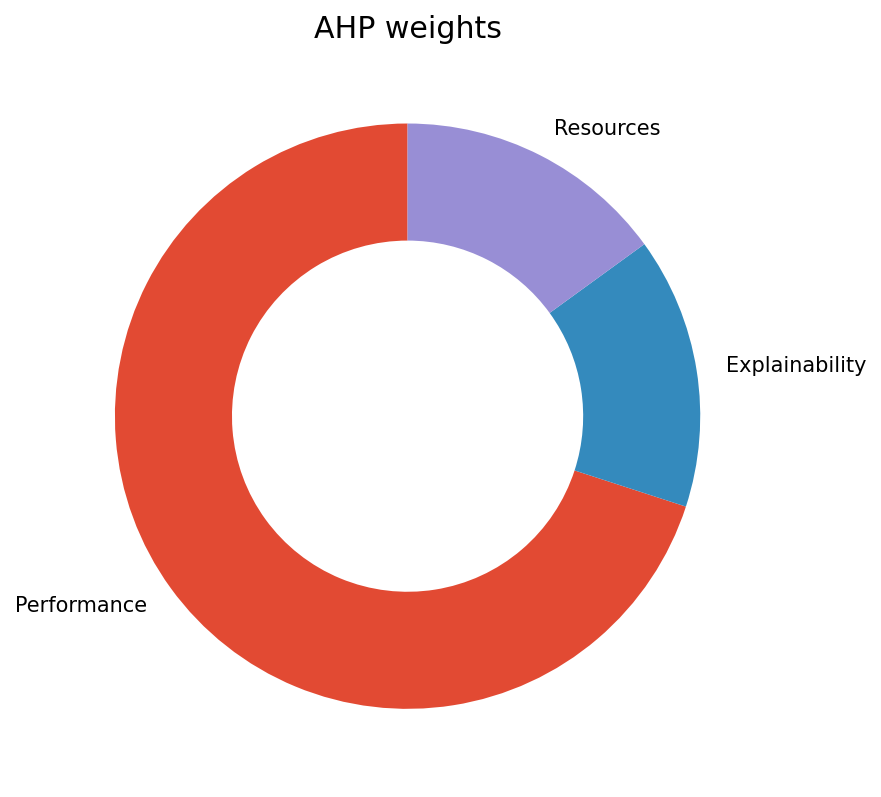
05\_normalized\_matrix\_heatmap.png

Normalized decision matrix heatmap.



06\_ahp\_weights\_donut.png

AHP weights used for TOPSIS.



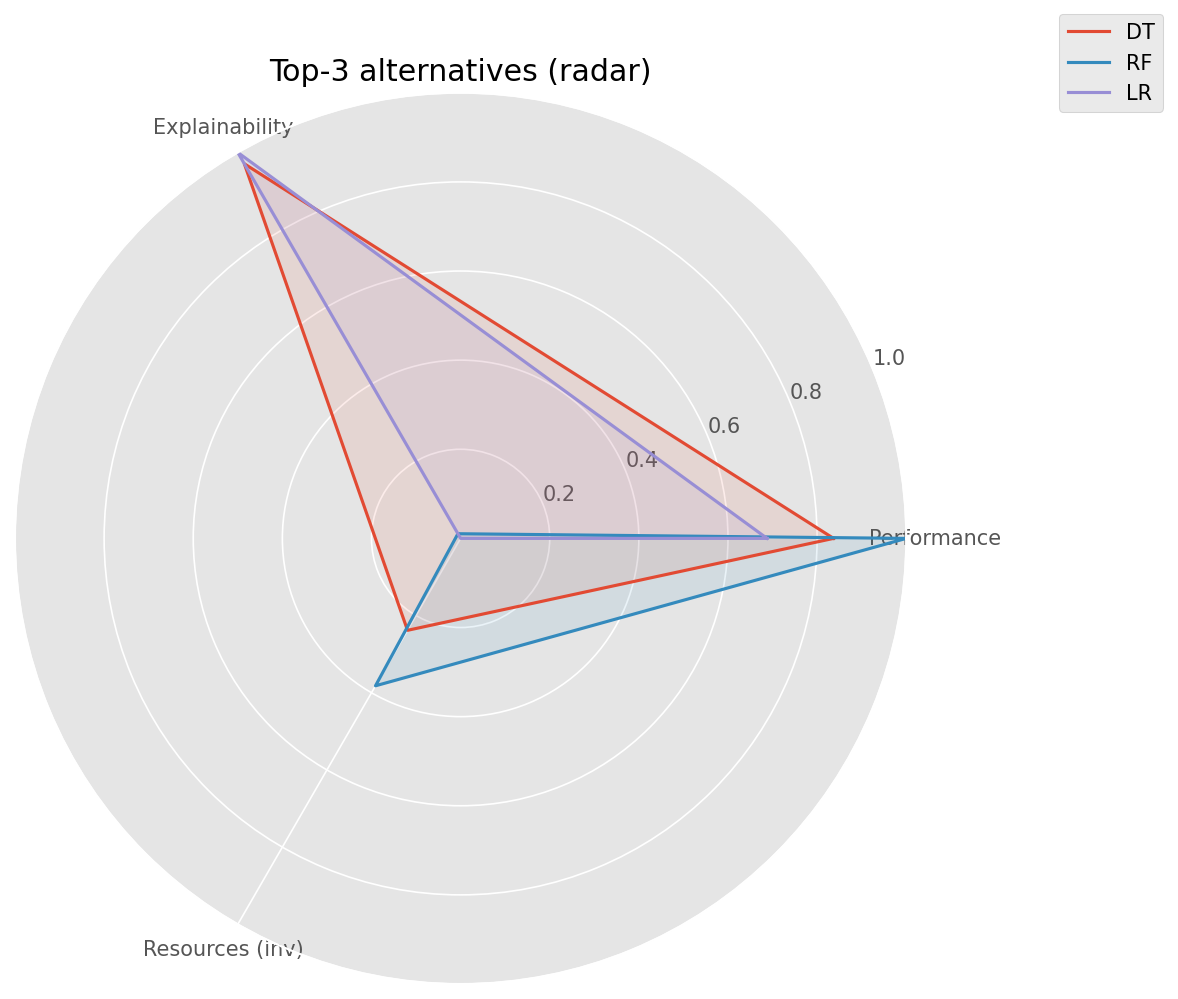
07\_topsis\_closeness.png

TOPSIS closeness coefficients for each alternative.



08\_top3\_radar.png

Radar comparison of top alternatives.



09\_pipeline\_overview.png

Pipeline flow diagram for MCDA steps.

