

Project

No. :

Date:

- VIP dan Enterprise nunggu komplain ban di handle.
 Saat ini masih ~~reactif~~ (nunggu komplain → ban di respon). Proaktif! sebelum komplain, sistem tau potensi IN & tasi early warning.

level Target (?)

- Komungkinan komplain di site tertentu dalam 24 jam?
 Yes / No.

kategori komplain ?

- internet lemot, coverage singal, wa call issue,
voice call issue, sms issue, gaming lag.

SRC recommendation?

Wa singal → High ~~ppr~~ latency

Voice calls → High UL Interference

Internet lemot → High PRRB

1) data features (x)

<input checked="" type="checkbox"/> kpi-time series	active user	wa access ratio
<input type="checkbox"/> time stamp	Max user	voice drop rate
<input type="checkbox"/> site id	UL Interference	SMS access ratio
<input type="checkbox"/> factor	CCS r	gaming latency N
<input type="checkbox"/> TSGP	packet loss	http dc
<input type="checkbox"/> Rsg	latency	
<input type="checkbox"/> SINR	CPR alarm	
<input type="checkbox"/> PRB dl	VS user alarm	
<input type="checkbox"/> PRB UL	avail	

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(2)	alarms	(5) events
	alarm id	event id
	timestamp	date
	site id	site id
	severity	type
	alarm type	description
	description	
(3)	tickers	date
	ticker id	lat
	timestamp	lon
	customer id	weather
	tip	rain nm
	site id	temperature c
	category label	
	text	
	severity reported	
(4)	topology	
	site id	
	lat	
	lon	
	azimuth	
	tilt	
	antenna type	
	band	
	sector count	

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	Thold EPI
	PL > 0.1 dB
	TNL > 500
	VL > -100 dBm
	RJRP > -105 dBm
	RJRD > -15 dB
	PRB DL / UL > 90%
	Max User > 150
	Active User > 20
	KPI asli → level 1 & 2
	Binary Thold → level 3
	Step - Step
(1)	load semua CSV
(2)	Handle missing value & duplicate.
(3)	EPI + Topology + Events + Weather + alarms + Thold
	• Site Id • Site Id • nearest • Sector • date lat/lon • date • date • Sector • time lag
	Total = 50-52 kowm.
(4)	label - 24 jam
	category - label
	root - cause.

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✓ 5 Train-test input

✓ 6 Modeling.

level 1 : binary classification

level 2 : multiclass classification

level 3 : rules-based

✓ 7 Output

timestamp

site id

sector

pred. binary

✓ original or light modeling

pred. category

✓

root cause

✓

✓ 8 Dashboards

PPT + dashboard + data + report + presentation

✓ 9 Video (in English)

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Nearest long lat

(1) filter weather di ML yg sama

weather

features

Date

Date

1

1 → Yes

2

2 → Yes

4

3 → No

5

4 → Yes

weather = features

(2) konversi derajat → radian.

$$\text{Rad} = \frac{\text{derajat} \cdot \pi}{180}$$

features & long & lat

Weather - long & lat Radian

$$\text{ex : } \text{lat} = 90 \rightarrow \frac{90 \cdot \pi}{180} = \frac{\pi}{2} = 1.5708 \text{ rad.}$$

$$\text{long} = 180 \rightarrow \frac{180 \cdot \pi}{180} = \pi = 3.1416 \text{ rad}$$

why radian? library haversine-distance hanya
ngerti radian.

Radius bumi = 6371 km.

(3) Hitung jarak.

Pakai library haversine-distance.



Hitung jarak 2 titik di permukaan bumi.

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ex: Site A. lat = 0° , lon = 0°

Weather station B : lat = 0° , lon = 1°

$$A = (0, 0)$$

$$B = \left(0, 1^\circ \cdot \frac{\pi}{180} \right) = (0, 0.01745 \text{ rad})$$

Central Angle = haversine distance $(0, 0), (0, 0.01745)$
= 0.01745 rad

$$\begin{aligned} \text{konverti ke km} &= 0.01745 \cdot 6371 \\ &= 111 \text{ km} \end{aligned}$$



$$\Delta \text{lon} = |\text{lon}_1 - \text{lon}_2| = |0 - 0.01745| = 0.01745$$

$$\begin{aligned} \text{Rumus } \theta &= \arccos (\sin(\text{lat}_1) \cdot \sin(\text{lat}_2) + \cos(\text{lat}_1) \cdot \cos(\text{lat}_2)) \\ &= \arccos (\sin 0 \cdot \sin 0 + \cos 0 \cdot \cos 0 \cdot \cos 0.01745) \\ &= \arccos (0 + 1 \cdot 1 \cdot 0.99985) \\ &= \arccos (0.99985) \\ &= 0.01745 \text{ rad.} \end{aligned}$$

④

Car index weather terdekat.

$\arg \min()$ → ambil jarak terkecil

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ex: site A lat = 0° , long 0° pada 2025-09-16

weather di tsb yg sama

ws 1 lat 0° , long 1° \rightarrow 111 km

ws 2 0° 2° \rightarrow 222 km

ws 3 0° 3° \rightarrow 333 km

$$\text{dist} = \begin{pmatrix} \checkmark & (111, 222, 333) \\ 0 & 1 & 2 \end{pmatrix}$$

indeks terkecil = 0. \rightarrow ambil data bns ke 0

$\Delta(\text{lon}_1 - \text{lon}_2)$)

6 file

CSV → SQLite → .db

Prototype of server perusahaan.

file utama = app.py

Streamlit import .db

connect

Jalankan preprocessing (features) ← .py

Import Model (.pkl)

Prediksi ← level 1
level 2

~~Decod~~ Decode

Dapat data frame final

Visualisasi.

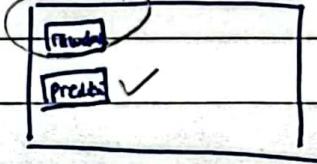
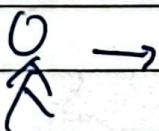
Table

Chart

Filter site, tanggal, kategori

Tombol save.

Visualisasi



→ No need to import anything!