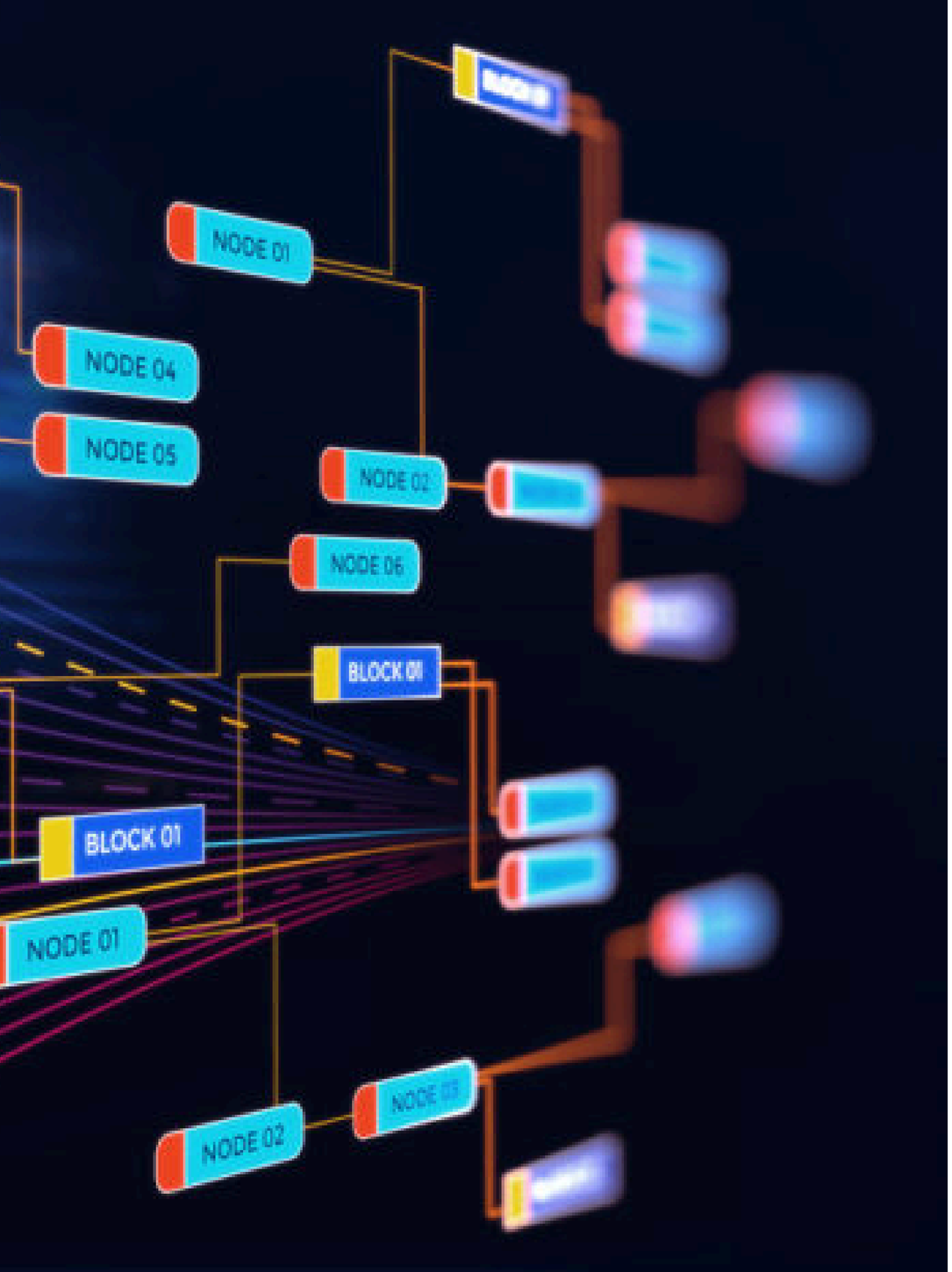


REDES BAYESIANAS

Phi

DESARROLLADO EN PYTHON

- itertools
- pyAgrum

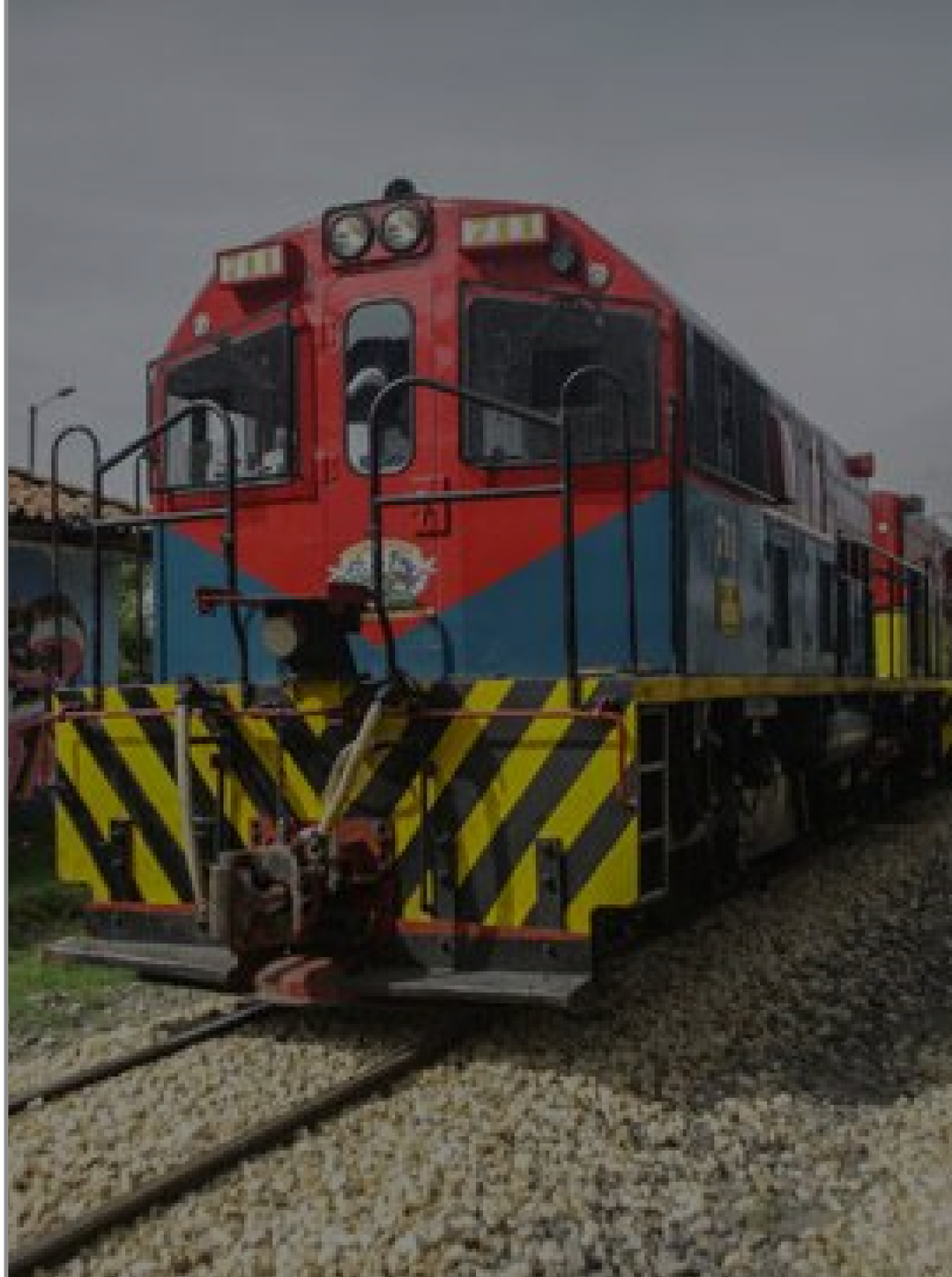
Se desarrollaron 2 códigos diferentes.
Uno por parte de análisis y otro por visualización.

REQUISITO

La red bayesiana debe estar en formato tipo JSON y ser un diccionario de nodos con sus probabilidades iniciales

Un diccionario es una estructura en python de llave: valor.

```
{
  "nodes": {
    "Rain": {
      "values": ["none", "light", "heavy"],
      "parents": [],
      "cpt": [
        {
          "when": {},
          "then": {
            "none": 0.7,
            "light": 0.2,
            "heavy": 0.1
          }
        }
      ]
    },
```



none	light	heavy
0,7	0,2	0,1

PRIMERA CONDICIÓN

none	light	heavy	heavy
0,7	0,2	0,1	0,1

SEGUNDA CONDICIÓN

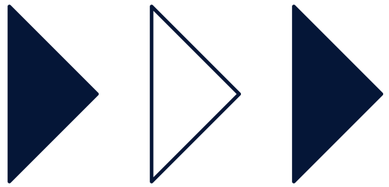
TERCERA CONDICIÓN

```
"Maintenance": {
  "values": ["yes", "no"],
  "parents": ["Rain"],
  "cpt": [
    { "when": { "Rain": "none" }, "then": { "yes": 0.4, "no": 0.6 } },
    { "when": { "Rain": "light" }, "then": { "yes": 0.2, "no": 0.8 } },
    { "when": { "Rain": "heavy" }, "then": { "yes": 0.1, "no": 0.9 } }
  ]
},
```

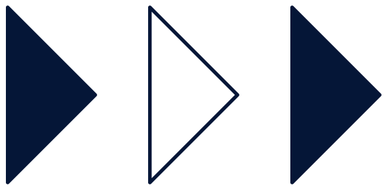
Rain	`none`, `light`, `heavy`
Maintenance	`yes`, `no`
Train	`on time`, `delayed`
Appointment	`attend`, `miss`

3 (Rain) × 2 (Maintenance) × 2 (Train) × 2 (Appointment) =
24 combinaciones

```
{
  "Rain": "light",
  "Maintenance": "no",
  "Train": "delayed",
  "Appointment": "miss"
}
```

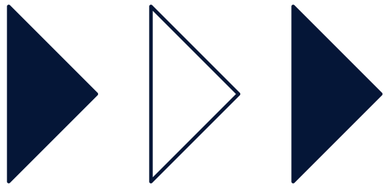


```
"Rain": {
  "when": {},
  "then": { "none": ⊙.7, "light": ⊙.2, "heavy": ⊙.1 }
}
```



```
"Maintenance": {
  "when": { "Rain": "light" },
  "then": { "yes": ⊙.2, "no": ⊙.8 }
}
```

"Train": {
  "when": { "Rain": "light", "Maintenance": "no" },
  "then": { "on time": ⊙.7, "delayed": ⊙.3 }
}



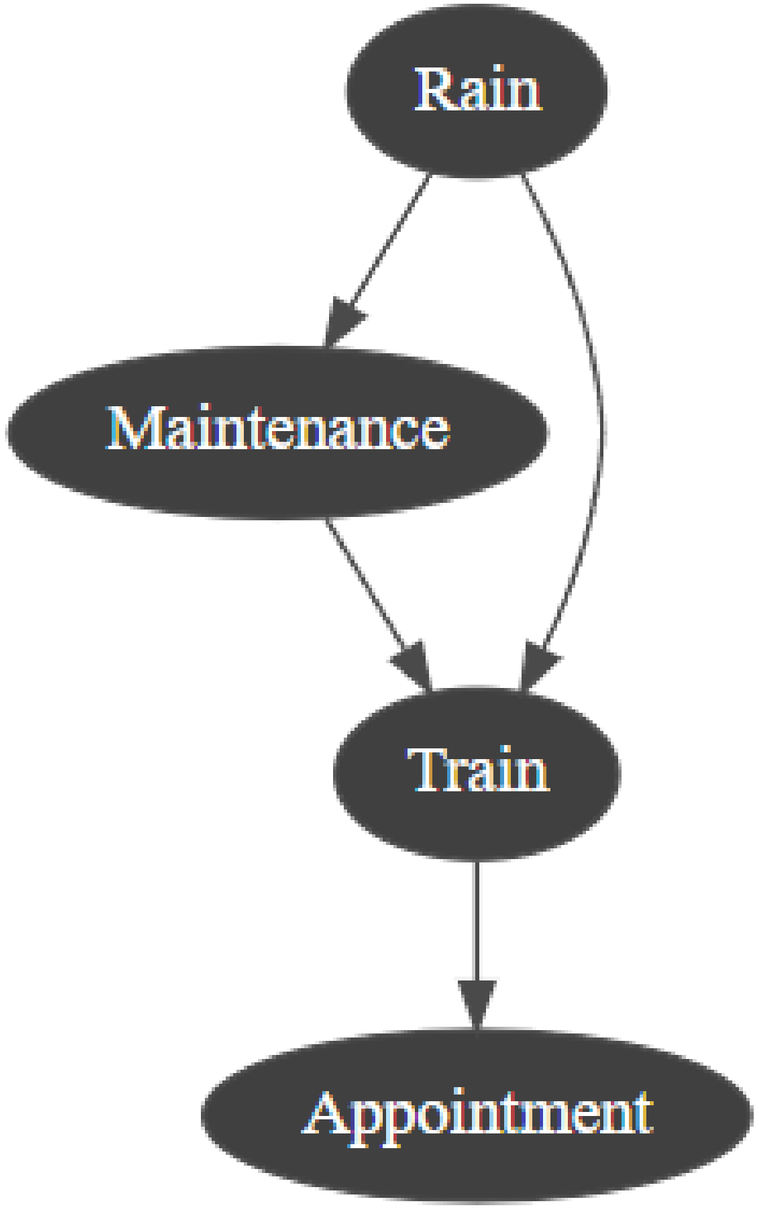
"Appointment": {
  "when": { "Train": "delayed" },
  "then": { "attend": ⊙.6, "miss": ⊙.4 }
}

RESULTADO

$$P = P(\text{Rain}) \times P(\text{Maintenance} \mid \text{Rain}) \times P(\text{Train} \mid \text{Rain, Maintenance}) \times P(\text{Appointment} \mid \text{Train})$$

$$P = 0.2 \times 0.8 \times 0.3 \times 0.4 = 0.0192$$

```
{
  "assignment": {
    "Rain": "light",
    "Maintenance": "no",
    "Train": "delayed",
    "Appointment": "miss"
  },
  "probability": 0.0192
}
```


Rain
Maintenance
Train
Appointment