Prueba Practica Sistemas Expertos Basados en casos.

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Enunciado:
Se desea generar un sistema de recomendación de películas, por tal motivo se va a utiliza una base de datos orientada a grafos para lograr esto se describe los pasos a seguir:

1) Con estos datos aplicar el algoritmo de KNN y Similitud de Coseno para la recomendación de películas, seguir el siguiente tutorial: https://www.markhneedham.com/blog/2018/09/28/neo4jgraph-algorithms-cosine-game-of-thrones/ o https://vladbatushkov.medium.com/one-month-graphchallenge-flags-5d30aec366a0.

2) Finalmente realizar alguna interfaz para poder acceder a la recomendación e ingreso de datos y resultados de los procesos en python.

3) Generar el Informe en PDF y subir los scripts al repositorio Git para su evaluación.

Scripts para la creación de la creación de las banderas con sus colores.

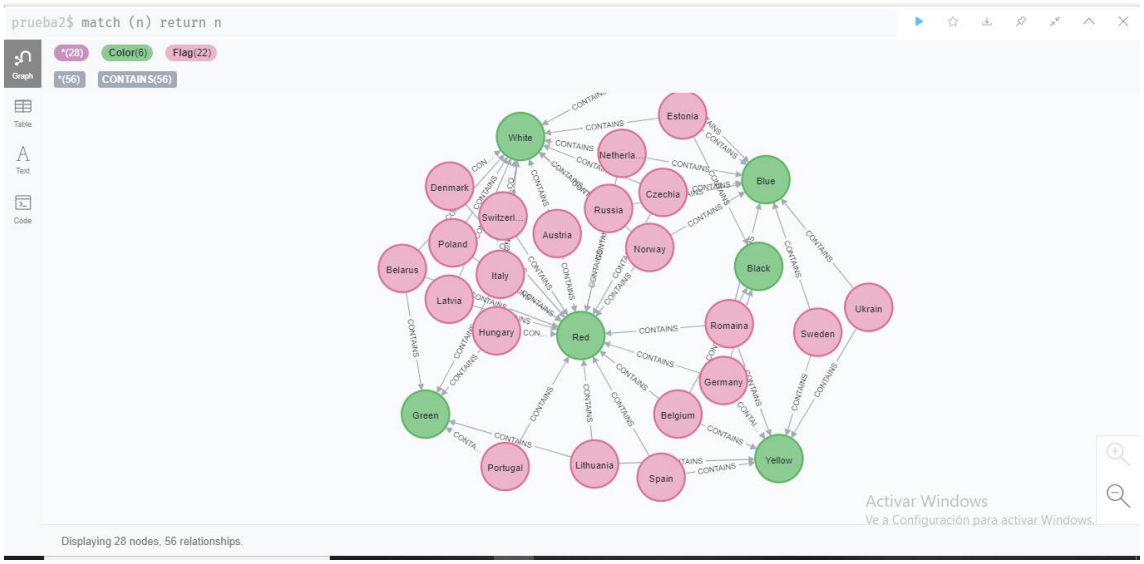
Desarrollo.
Creamos una base de datos en la cual creamos varios nodos para especificar el nombre de cada color

```
CREATE (red:Color { name: "Red" })
CREATE (white:Color { name: "White" })
CREATE (blue:Color { name: "Blue" })
CREATE (green:Color { name: "Green" })
CREATE (yellow:Color { name: "Yellow" })
CREATE (black:Color { name: "Black" })
CREATE (f1:Flag { name: "Belarus" })
CREATE (f1)-[:CONTAINS { weight: 60 }]->(red)
CREATE (f1)-[:CONTAINS { weight: 30 }]->(green)
CREATE (f1)-[:CONTAINS { weight: 10 }]->(white)
CREATE (f2:Flag { name: "Russia" })
CREATE (f2)-[:CONTAINS { weight: 33 }]->(red)
CREATE (f2)-[:CONTAINS { weight: 33 }]->(blue)
CREATE (f2)-[:CONTAINS { weight: 33 }]->(white)
CREATE (f3:Flag { name: "Ukrain" })
CREATE (f3)-[:CONTAINS { weight: 50 }]->(yellow)
CREATE (f3)-[:CONTAINS { weight: 50 }]->(blue)
CREATE (f4:Flag { name: "Finland" })
CREATE (f4)-[:CONTAINS { weight: 80 }]->(white)
CREATE (f4)-[:CONTAINS { weight: 20 }]->(blue)
CREATE (f5:Flag { name: "Sweden" })
CREATE (f5)-[:CONTAINS { weight: 20 }]->(yellow)
CREATE (f5)-[:CONTAINS { weight: 80 }]->(blue)
CREATE (f6:Flag { name: "Norway" })
```

```
CREATE (f6)-[:CONTAINS { weight: 70 }]->(red)
CREATE (f6)-[:CONTAINS { weight: 20 }]->(white)
CREATE (f6)-[:CONTAINS { weight: 10 }]->(blue)
CREATE (f7:Flag { name: "Denmark" })
CREATE (f7)-[:CONTAINS { weight: 80 }]->(red)
CREATE (f7)-[:CONTAINS { weight: 20 }]->(white)
CREATE (f8:Flag { name: "Estonia" })
CREATE (f8)-[:CONTAINS { weight: 33 }]->(white)
CREATE (f8)-[:CONTAINS { weight: 33 }]->(blue)
CREATE (f8)-[:CONTAINS { weight: 33 }]->(black)
CREATE (f9:Flag { name: "Latvia" })
CREATE (f9)-[:CONTAINS { weight: 66 }]->(red)
CREATE (f9)-[:CONTAINS { weight: 33 }]->(white)
CREATE (f10:Flag { name: "Lithuania" })
CREATE (f10)-[:CONTAINS { weight: 33 }]->(yellow)
CREATE (f10)-[:CONTAINS { weight: 33 }]->(green)
CREATE (f10)-[:CONTAINS { weight: 33 }]->(red)
CREATE (f11:Flag { name: "Poland" })
CREATE (f11)-[:CONTAINS { weight: 50 }]->(red)
CREATE (f11)-[:CONTAINS { weight: 50 }]->(white)
CREATE (f12:Flag { name: "Germany" })
CREATE (f12)-[:CONTAINS { weight: 33 }]->(red)
CREATE (f12)-[:CONTAINS { weight: 33 }]->(black)
CREATE (f12)-[:CONTAINS { weight: 33 }]->(yellow)
CREATE (f13:Flag { name: "Belgium" })
CREATE (f13)-[:CONTAINS { weight: 33 }]->(red)
CREATE (f13)-[:CONTAINS { weight: 33 }]->(black)
CREATE (f13)-[:CONTAINS { weight: 33 }]->(yellow)
CREATE (f14:Flag { name: "Czechia" })
CREATE (f14)-[:CONTAINS { weight: 33 }]->(red)
CREATE (f14)-[:CONTAINS { weight: 33 }]->(white)
CREATE (f14)-[:CONTAINS { weight: 33 }]->(blue)
CREATE (f15:Flag { name: "Hungary" })
CREATE (f15)-[:CONTAINS { weight: 33 }]->(red)
CREATE (f15)-[:CONTAINS { weight: 33 }]->(white)
CREATE (f15)-[:CONTAINS { weight: 33 }]->(green)
CREATE (f16:Flag { name: "Romaina" })
CREATE (f16)-[:CONTAINS { weight: 33 }]->(red)
CREATE (f16)-[:CONTAINS { weight: 33 }]->(yellow)
CREATE (f16)-[:CONTAINS { weight: 33 }]->(blue)
CREATE (f17:Flag { name: "Austria" })
CREATE (f17)-[:CONTAINS { weight: 66 }]->(red)
CREATE (f17)-[:CONTAINS { weight: 33 }]->(white)
CREATE (f18:Flag { name: "Italy" })
CREATE (f18)-[:CONTAINS { weight: 33 }]->(red)
CREATE (f18)-[:CONTAINS { weight: 33 }]->(white)
CREATE (f18)-[:CONTAINS { weight: 33 }]->(green)
CREATE (f19:Flag { name: "Switzerland" })
CREATE (f19)-[:CONTAINS { weight: 90 }]->(red)
CREATE (f19)-[:CONTAINS { weight: 10 }]->(white)
```

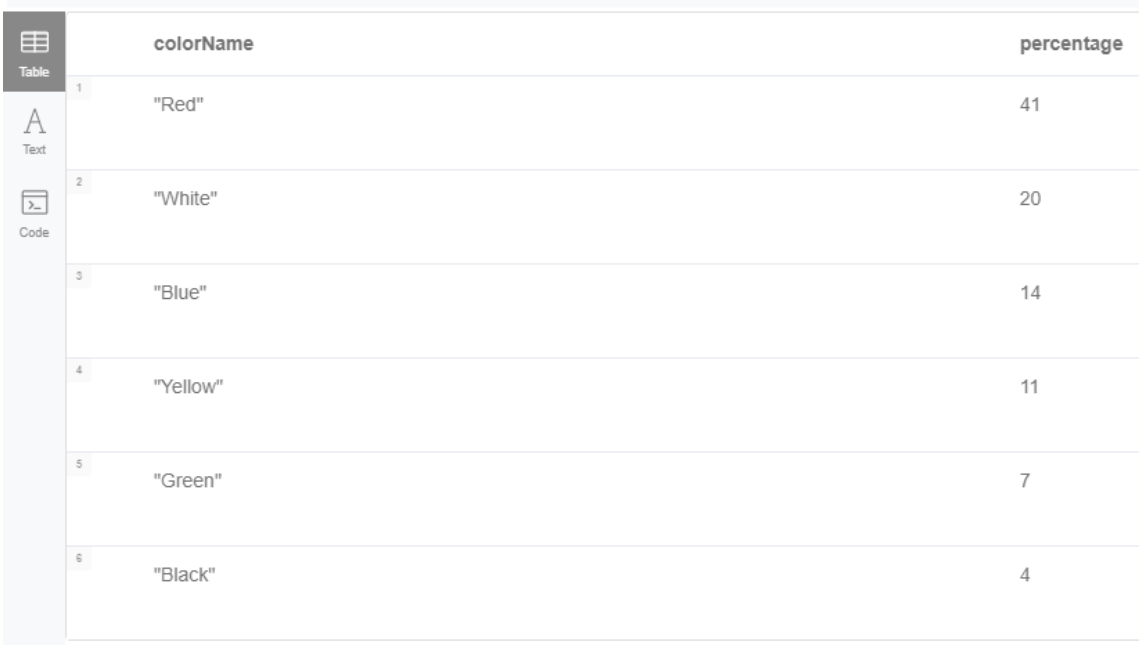
```
CREATE (f20:Flag { name: "Spain" })
CREATE (f20)-[:CONTAINS { weight: 60 }]->(red)
CREATE (f20)-[:CONTAINS { weight: 40 }]->(yellow)
CREATE (f21:Flag { name: "Portugal" })
CREATE (f21)-[:CONTAINS { weight: 60 }]->(red)
CREATE (f21)-[:CONTAINS { weight: 40 }]->(green)
CREATE (f22:Flag { name: "Netherlands" })
CREATE (f22)-[:CONTAINS { weight: 33 }]->(red)
CREATE (f22)-[:CONTAINS { weight: 33 }]->(white)
CREATE (f22)-[:CONTAINS { weight: 33 }]->(blue)
```

Una vez creada los nodos mandamos a visualizar los colores que se han creado de acorde al script



Hacemos un filtrado para buscar el color más usado

```
MATCH (:Flag)-[c1:CONTAINS]->(:Color)
WITH sum(c1.weight) as total
MATCH (:Flag)-[c2:CONTAINS]->(cl:Color)
WITH cl.name as colorName, sum(c2.weight) as colorUsed, total
RETURN colorName, colorUsed * 100 / total as percentage
ORDER BY percentage DESC
LIMIT 10
```



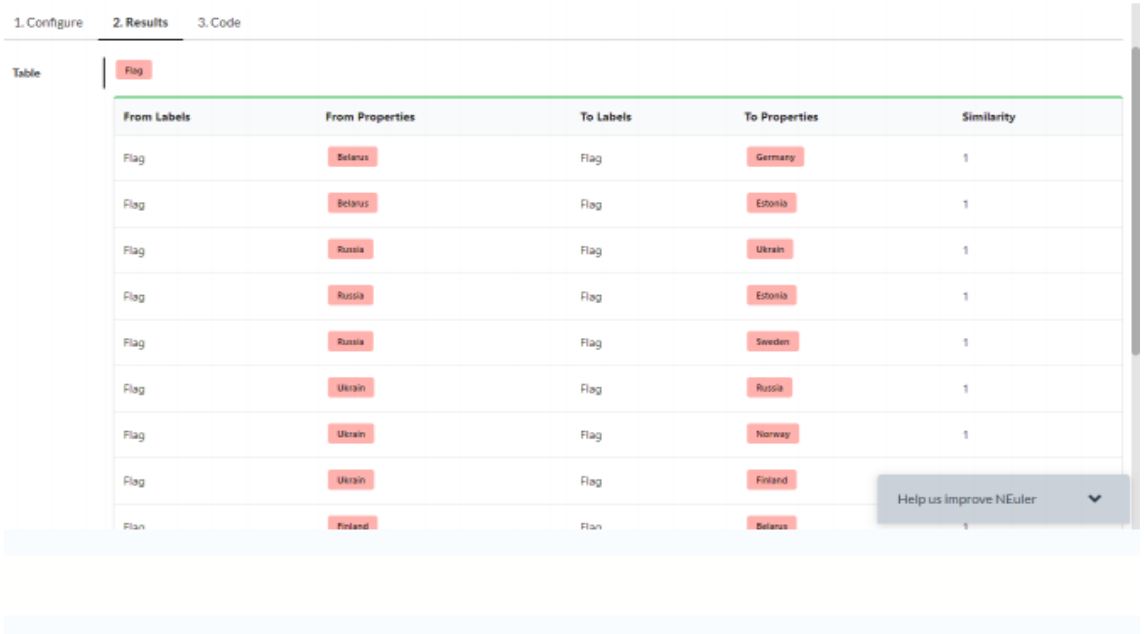
	colorName	percentage
1	"Red"	41
2	"White"	20
3	"Blue"	14
4	"Yellow"	11
5	"Green"	7
6	"Black"	4

A continuación, hacemos la comparación de las banderas mas similares de acuerdo al color.

```
MATCH (item:`Flag`), (category:`Color`)
OPTIONAL MATCH (item:`Flag`)-[rel:`CONTAINS`]->(category:`Color`)
WITH {item:id(item), weights: collect(coalesce(rel.`weight`, gds.util.NaN()))} as userD
ata
WITH collect(userData) as data
WITH $config AS config, data
WITH config { .*, data: data} as config
CALL gds.alpha.similarity.cosine.stream(config)
YIELD item1, item2, similarity
RETURN gds.util.asNode(item1) AS from, gds.util.asNode(item2) AS to, similarity
ORDER BY similarity DESC
LIMIT toInteger($limit)
```

"from"	"to"	"similarity"
{"name":"Belarus"}	{"name":"Germany"}	1.0
{"name":"Belarus"}	{"name":"Estonia"}	1.0
{"name":"Russia"}	{"name":"Ukrain"}	1.0
{"name":"Russia"}	{"name":"Estonia"}	1.0
{"name":"Russia"}	{"name":"Sweden"}	1.0
{"name":"Ukrain"}	{"name":"Russia"}	1.0
{"name":"Ukrain"}	{"name":"Norway"}	1.0
{"name":"Ukrain"}	{"name":"Finland"}	1.0
{"name":"Finland"}	{"name":"Belarus"}	1.0
{"name":"Finland"}	{"name":"Sweden"}	1.0
{"name":"Finland"}	{"name":"Ukrain"}	1.0
{"name":"Sweden"}	{"name":"Russia"}	1.0
{"name":"Sweden"}	{"name":"Norway"}	1.0
{"name":"Sweden"}	{"name":"Finland"}	1.0
{"name":"Belarus"}	{"name":"Finland"}	1.0

Como resultado tenemos



Conclusiones

Se ha desarrollado la prueba basados en casos de manera satifactoria.