

Summary

This Knowledge Graph (KG) is an interactive, customizable, and intuitive visualization tool. It aims to streamline the ESG analysis workflow and provide quantified evidence for investment decisions. Users may devise risk mitigations plans based on the ESG performance of the single entity or multiple entities of their interest (benchmarked against peer(s)) in a designated time frame. This product's user base includes but is not limited to ESG analysts, asset managers, CSR & Sustainability managers, etc.

User Instructions

To best user experience and ensure quality outcomes, we strongly recommend users to go through the user instructions and familiarize themselves with our product and its workflow before diving into their analyses.

0. Setting Up

a. Open python code from Jupyter Notebook where data cleaning, exploratory data analysis and manipulation has been created for the schema of the Knowledge Graph

- a. Filters are created here
- b. Imputation is done here
- c. AVG Sentiments are calculated here
- d. Dimensions for Plotly is created here

b. Copy the latest iteration into Dash code (.py) set up using any Python IDE

(Dash is an open-source platform where the visualization of Plotly's output is created)

- e. Have the folders for KG_Images and dataset in the working directory
- f. Run the code

- g. Open the local URL(<http://127.0.0.1:8050/>) in your preferred browser
- h. To make certain edits to the code, stop the flask app and make the required edits and run again

1. Understanding the Graph

1.1 Node

1.1.1 Node Type

The node types in this product include “Entity_Name”, “Event”, and “Entity_Sector”.

Details on event group and event names are summarized in the table below -

Event Group	Event
Environment	Air Quality
	Ecological Impacts
	Energy Management
	GHG Emissions
	Water Management
Governance	Business Ethics
	Business Model Resilience
	Competitive Behavior
	Materials Sourcing & Efficiency
	Physical Impacts of Climate Change
	Product Design & lifecycle Management
	Supply Chain Management
	Systematic Risk management

Social	Access & Affordability
	Customer Privacy
	Customer Welfare
	Data Security
	Employee Health & Safety
	Human Rights & Community Relations
	Labor Practice
	Selling Practices & product Labeling

<Table 1>

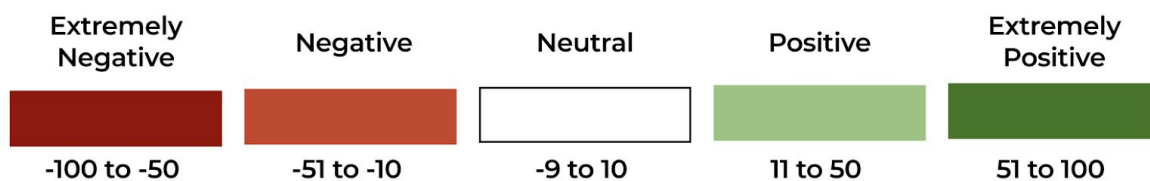
1.1.2 Node Size

The size of a node reflects the extent of discussion associated with the node over the selected observation period.

1.1.3 Node Color

The color of the nodes shows the overall / average sentiment on a given node type (i.e. sector or entity), mapped to the following color schema -

NODE COLORS (based on AVG Sentiment Score)



Note that the shades of the colors are on a spectrum and are calculated using the following formulas -

- **Average Entity Sentiment:**

$$= \text{Sum of Entity Sentiments} \div \text{Num of Docs in Selected Entities}$$

- **Average Event Sentiment:**

$$= \text{Sum of Event Sentiments} \div \text{Num of Docs in Selected Events}$$

- **Average Sector Sentiment:**

$$= \Xi(\text{Assigned Weight} * \text{Entity Sentiment}) \div \text{Num of Selected Entities}$$

1.1.4 Node Shape

Five shapes are representing the different node types. Refer to the table below for more information -

Shape	Node Type	Detail
Triangle (▲)	Entity Sector	
Circle (●)	Entity Name	
Plus Sign (+)	Event Group	Environment
Star (★)		Government
Cross (X)		Social

<Table 2>

2. Edge Width

The width of the edge connecting “entity_name” and “event” is directly proportional to the number of documents related to “entity_name” and “event”.

3. Tool Tip

When nodes are hovered over by the mouse tip, users will see complementary information depending on the type of nodes, as listed below -

Nodes	Tool Tip
Entity_Name	<ul style="list-style-type: none">• Region• Countries• Sector• AVG Sentiment
Event	<ul style="list-style-type: none">• Number of documents• AVG Sentiment
Entity_Sector	<ul style="list-style-type: none">• Number of documents• AVG Sentiment

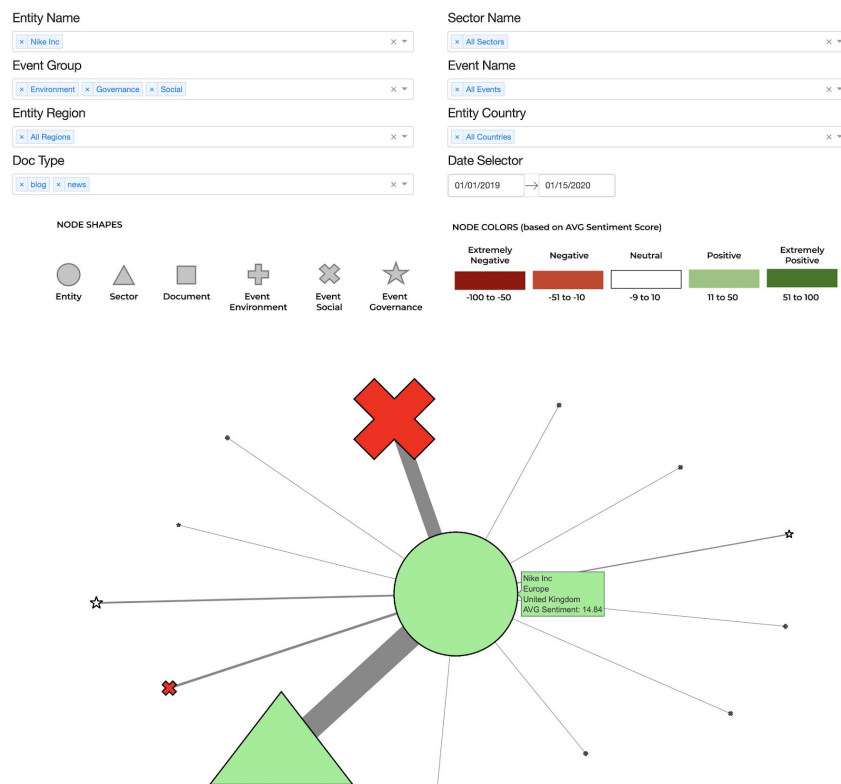
<Table 3>

2. Suggested Workflow & Filter Manipulation

Step 1: To ensure the graph's readability, we recommend the users to **start lean** (e.g. with one entity at a time), and then build up incrementally as they see fit. Further, we recommend users to **keep** the Sector, Event, and Event Group fields that came by default “as is” once they have the Knowledge Graph page open.

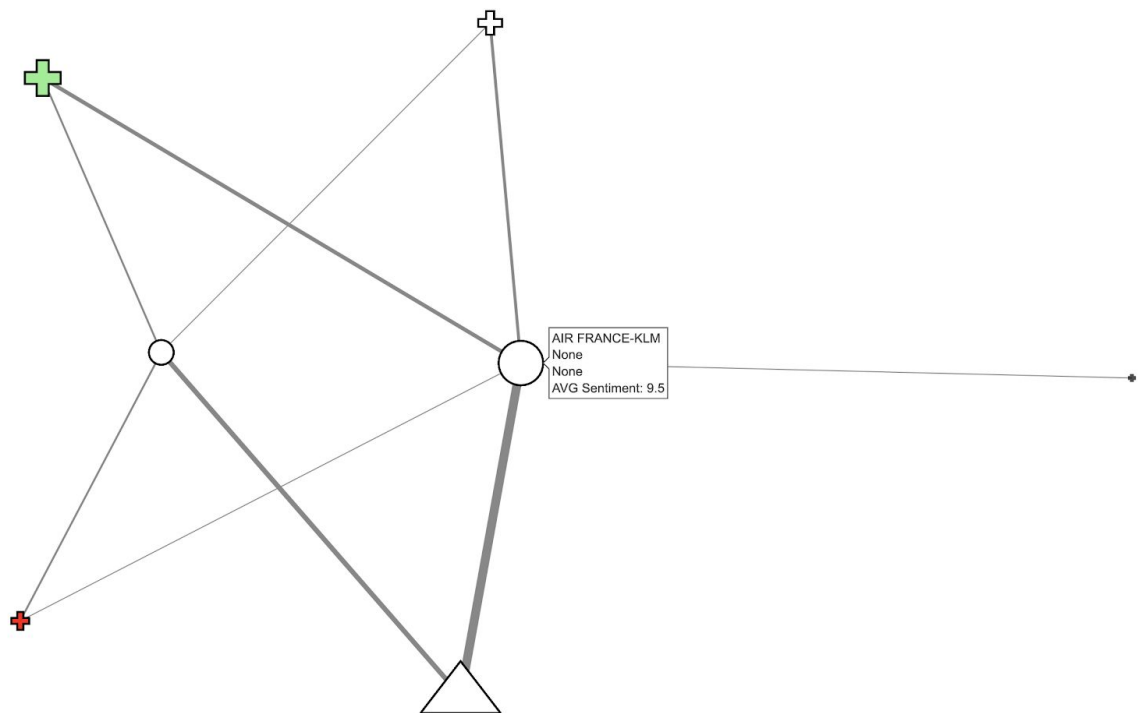
Step 2: Users may enter the entity name(s) and time frame of their interest. Then they may advance to the event group. Users could also manipulate the event name filter.

Step 3: Likely, that the graph is still hard to read with just one entity and one event group. *Figure 1* demonstrates such a situation, with the “Entity Name” and “Event Group” fields being filled as “Nike Inc.” and “Social”, respectively.



<Figure 1>

Step 4: If the user wishes to decluster and fine-tune their query even further, they may clear up the “Event Name” filter, and then add back the specific event names under a certain group (e.g. Social - Customer Welfare). *Figure 2* demonstrates how declustering could work by manipulating the “Event” field for “Air France”. See *Table 1* for more details on “Event Names”.



<Figure 2>

Step 5: Make conclusions. E.g. company X has a good performance in X vertical, number of positive docs and negative docs

3. Extracting Insights

The core power of Knowledge Graph lies in the fact that it enables us to easily observe *indirect relationships* that would have otherwise been impossible to see in other formats (e.g. tables, Excel sheet, etc.).

Here we provide four KG **example uses** to kick off our users' analysis journey as part of the ESG analysis cycle -

- *Use #1:* KG could be used to understand and measure an entity's ESG exposure and performance.
- *Use #2:* KG could be used to compare an entity against a benchmark or peer(s).
- *Use #3:* KG could help users gather evidence (e.g. document URLs) for verification and further investigation.
- *Use #4:* Decisions and actions are made to mitigate ESG risks and address performance gaps.

We also provide a set of **tips** for drawing meaningful conclusions.

- *Tip #1:* look for the extremes (e.g. dark red, largest ESG event group).
- *Tip #2:* look for “counter-intuitive findings” (e.g. same docs being assigned with different scores to different companies)

Consider this is only as a beginner's guideline. Users are encouraged to get creative and nuanced, depending on the specific queries they are making - so long as they use the graph correctly (for more information, please refer to the next section, *Caveats*).

4. Caveats

- Over inferring
- Some NA values in the dataset which are replaced with NA might be misleading
- Avoid having blank fields in the KG
- Avoid making unnecessary correlations and validate the connections between the entity-entity and its events if it exists (forced relationships)