would be an identification of hundreds of companies that might be linked with the Boeing, without reflecting relative importance of those relationships. This means that users (e.g., the portfolio manager in the above example) find it difficult to understand which of those relationships are more important or influential, and therefore determine the risk exposure of Boeing's supply chain. Many portfolio managers still solely rely on their intuition, experience and/or detailed analytics reports to make such determinations.

An aspect of the present disclosure provides a graph database computer-implemented method of determining relative importance of a company and a news story that does not explicitly mention the company based on a relationship between the news story and at least one entity in a plurality of entities in a supply chain of the company, wherein each of the company, the news story and the plurality of entities is associated with a discrete node in a graph database, the method comprising:

receiving a request associated with a company to determine the relevance of a news story with respect to the company via processor, the request identifying the news story, the company, and criteria to link the news story to the at least one entity in a supply chain of the company via processor using the graph database, wherein the news story does not explicitly mention the company;

responsive to the request, identifying, via processor, a plurality of entities in the supply chain of the company, wherein the company, the news story, and each entity in the plurality of entities is associated with a respective node of a plurality of nodes in the graph database, and wherein each entity in the plurality of entities is identified via processor by identifying connections in the graph database connecting the node corresponding to the company to each said node corresponding to each entity in the plurality of entities;

identifying at least one connection between the news story and said at least one of the entities in the supply chain of the company via processor based on the criteria;

retrieving from the graph database, via processor, business information identified during the identifying step regarding the plurality of entities;

determining the relative importance of each of the plurality of entities within the supply chain via processor by:

determining, for each respective entity in the plurality of entities, based on the business information obtained during the retrieving step:

a relative buying power of the entity as compared to other entities in a same industry as the respective entity;

a supplier revenue fraction of the entity as compared to competitors to the respective entity; and

an industry revenue exposure for the entity as compared to other industry segments to which the entity is exposed;

computing, via processor, a relative importance score for each respective entity in the plurality of entities, as a function of the determined buying power, supplier fraction, and industry revenue exposure for the respective entity, the relative importance score being indicative of the relative importance of the respective entity to the company through the connections identified during the identifying step; and

generating and sending a signal via processor to permit a user to display on a graphical user interface a graphic representation illustrating each respective entity in the plurality of entities and the respective relative importance score for each respective entity in the plurality of entities, and wherein the graphic representation further displays information that illustrates the impact of the news article on the company based on said at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

Another aspect of the present disclosure provides an apparatus to determine relative importance of a news story to a company not mentioned by the news story based on a relationship between the news story and at least one entity in a plurality of entities in a supply chain of the company, comprising:

a memory;

at least one graph database structured based on relationships between said plurality of entities, the news story, and the company, wherein the news story, the company and each entity in the plurality of entities is associated with a respective node of a plurality of nodes in the graph database; and

a processor in communication with the memory and the at least one graph database, said processor being configured to determine relative importance of entities in a supply chain of a company, wherein the processor executes instructions to:

receive a request associated with the company from a user to determine the relevance of a news story that does not explicitly mention the company with respect

to the company, the request identifying the news story, the company, and criteria to link the news story to at least one entity in a supply chain of the company;

responsive to the request, identify via the processor, the plurality of entities in the supply chain of the company, wherein each entity in the plurality of entities is identified by identifying connections in the graph database connecting the node corresponding to the company to each said node corresponding to each entity in the plurality of entities;

further responsive to the request, identify via the processor at least one connection between the news story and said at least one of the entities in the supply chain of the company based on the criteria provided by the user;

retrieve from said at least one graph database business information regarding competitive suppliers of each of the plurality of entities, revenue information for each of the plurality of entities, and industry segment information for each of the plurality of entities;

determine via the processor, for each respective entity in the plurality of entities using the received information from the graph database:

a relative buying power of the entity as compared to the competitive suppliers;

a supplier revenue fraction of the entity as compared to the competitive suppliers; and

an industry revenue exposure for the entity as compared to other industry segments to which the entity is exposed;

compute via the processor a relative importance score for each respective entity in the supply chain, as a function of the determined buying power, supplier fraction, and industry revenue exposure for the respective entity; and

generate and send a signal to the user to permit the user to display a graphic representation illustrating the impact of the news article on the company based on said at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

Another aspect of the present disclosure provides a non-transitory machine readable medium storing instructions executable by a processor to determine relative importance of a news story to a company not mentioned by the news story based on a hidden relationship between the news story and at least one entity in a

plurality of entities in a supply chain of a company which, when executed by the processor, cause the processor to:

responsive to a user request associated with the company to determine the relevance of a news story with respect to the company, wherein the news story does not explicitly mention the company, the request identifying the news story, the company, and criteria to link the news story to at least one entity in a supply chain of the company:

identify via processor, the plurality of entities in the supply chain of the company, wherein the news story, the company, and each entity in the plurality of entities is associated with a respective node of a plurality of nodes in a graph database, and wherein each entity in the plurality of entities is identified via said processor by identifying connections in the graph database between the node corresponding to the company and each said node corresponding to each entity in the plurality of entities;

identify via processor at least one connection between the news story and said at least one of the entities in the supply chain of the company based on the criteria provided by the user;

retrieve from the graph database, via processor, business information identified during the identifying step regarding the plurality of entities;

determine the relative importance of each of the plurality of entities within the supply chain via processor by determining, for each respective entity in the plurality of entities:

a relative buying power of the entity as compared to other entities in a same industry as the respective entity;

a supplier fraction of the entity as compared to competitors to the respective entity; and

an industry revenue exposure for the entity as compared to other industry segments to which the entity is exposed;

compute a relative importance score for each respective entity in the supply chain, as a function of the determined buying power, supplier fraction, and industry revenue exposure for the respective entity; and

generate and send a signal to the user to permit the user to display a graphic representation illustrating the impact of the news article on the company, visually

illustrating said at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

Examples of the present disclosure allow users to determine, using at least one database structured to recognize relations between various companies, how much of a company's revenue may be exposed to each of the customers and/or suppliers within the company's supply chain. In accordance with one aspect, the present disclosure is directed to determining relative importance of a plurality of entities in a supply chain of a company. One way of determining the relative importance of each of the entities, is by identifying for the company, a plurality of entities in the supply chain, and determining the relative importance of each of the plurality of entities within the supply chain via at least one processor circuit. Each of the plurality of entities in the supply chain may be a customer of the company or a supplier of goods or services to the company. In such example, the processor circuit is programmed to determine for each respective entity in the supply chain: a relative buying power of the entity as compared to other entities in a same industry as the respective entity, a supplier revenue fraction of the entity as compared to competitors to the respective entity, and an industry revenue exposure for the entity as compared to other industry segments to which the entity is exposed. The at least one processor circuit is further programmed to compute the relative importance score for each respective entity in the supply chain, as a function of the determined buying power, supplier fraction, and industry revenue exposure for the respective entity. In some implementations, each of the plurality of entities in the supply chain are a customer of the company or a supplier of goods or services to the company, which are written to at least one database structured to recognize relations between the entities and the company. In some implementations, the database is a graph database, and the method includes identifying connections between the company and a plurality of nodes in the graph database, wherein each respective node among the plurality of nodes are associated with an entity within the supply chain of the company.

CLAIMS

What is claimed is:

1. A graph database computer-implemented method of determining relative importance of a company and a news story that does not explicitly mention the company based on a relationship between the news story and at least one entity in a plurality of entities in a supply chain of the company, wherein each of the company, the news story and the plurality of entities is associated with a discrete node in a graph database, the method comprising:

receiving a request associated with a company to determine the relevance of a news story with respect to the company via processor, the request identifying the news story, the company, and criteria to link the news story to the at least one entity in a supply chain of the company via processor using the graph database, wherein the news story does not explicitly mention the company;

responsive to the request, identifying, via processor, a plurality of entities in the supply chain of the company, wherein the company, the news story, and each entity in the plurality of entities is associated with a respective node of a plurality of nodes in the graph database, and wherein each entity in the plurality of entities is identified via processor by identifying connections in the graph database connecting the node corresponding to the company to each said node corresponding to each entity in the plurality of entities;

identifying at least one connection between the news story and said at least one of the entities in the supply chain of the company via processor based on the criteria;

retrieving from the graph database, via processor, business information identified during the identifying step regarding the plurality of entities;

determining the relative importance of each of the plurality of entities within the supply chain via processor by:

determining, for each respective entity in the plurality of entities, based on the business information obtained during the retrieving step:

a relative buying power of the entity as compared to other entities in a same industry as the respective entity;

a supplier revenue fraction of the entity as compared to competitors to the respective entity; and

an industry revenue exposure for the entity as compared to other industry segments to which the entity is exposed;

computing, via processor, a relative importance score for each respective entity in the plurality of entities, as a function of the determined buying power, supplier fraction, and industry revenue exposure for the respective entity, the relative importance score being indicative of the relative importance of the respective entity to the company through the connections identified during the identifying step; and

generating and sending a signal via processor to permit a user to display on a graphical user interface a graphic representation illustrating each respective entity in the plurality of entities and the respective relative importance score for each respective entity in the plurality of entities, and wherein the graphic representation further displays information that illustrates the impact of the news article on the company based on said at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

2. The computer-implemented method of claim 1, wherein each of the plurality of entities in the supply chain is a customer of the company or a supplier of goods or services to the company.

3. The computer-implemented method of claim 1, wherein the processor is programmed to:

identify for each of the plurality of entities in the supply chain:

a plurality of competitors for the entity; and

an estimated revenue for the entity and each of the plurality of competitors; and

calculate the supplier revenue fraction for each respective entity as a function of the estimated revenue.

4. An apparatus to determine relative importance of a news story to a company not mentioned by the news story based on a relationship between the news story and at least one entity in a plurality of entities in a supply chain of the company, comprising:

a memory;

at least one graph database structured based on relationships between said plurality of entities, the news story, and the company, wherein the news story, the company and each entity in the plurality of entities is associated with a respective node of a plurality of nodes in the graph database; and

a processor in communication with the memory and the at least one graph database, said processor being configured to determine relative importance of entities in a supply chain of a company, wherein the processor executes instructions to:

receive a request associated with the company from a user to determine the relevance of a news story that does not explicitly mention the company with respect to the company, the request identifying the news story, the company, and criteria to link the news story to at least one entity in a supply chain of the company;

responsive to the request, identify via the processor, the plurality of entities in the supply chain of the company, wherein each entity in the plurality of entities is identified by identifying connections in the graph database connecting the node corresponding to the company to each said node corresponding to each entity in the plurality of entities;

further responsive to the request, identify via the processor at least one connection between the news story and said at least one of the entities in the supply chain of the company based on the criteria provided by the user;

retrieve from said at least one graph database business information regarding competitive suppliers of each of the plurality of entities, revenue information for each of the plurality of entities, and industry segment information for each of the plurality of entities;

determine via the processor, for each respective entity in the plurality of entities using the received information from the graph database:

a relative buying power of the entity as compared to the competitive suppliers;

a supplier revenue fraction of the entity as compared to the competitive suppliers; and

an industry revenue exposure for the entity as compared to other industry segments to which the entity is exposed;

compute via the processor a relative importance score for each respective entity in the supply chain, as a function of the determined buying power, supplier fraction, and industry revenue exposure for the respective entity; and

generate and send a signal to the user to permit the user to display a graphic representation illustrating the impact of the news article on the company based on said at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

5. The apparatus of claim 4, wherein receiving the request associated with the company from the user includes receiving via a web API a request for a graphical user interface to access said relative importance of a plurality of entities in the supply chain of the company, and, responsive to said request, said processor being further configured to execute via a web server coupled to the graph database a web based application to generate for display on the graphical user interface:

a first rendering including a list of competitors of each of the plurality of entities in the supply chain;

a second rendering including a list of the industries of each of the plurality of entities in the supply chain;

a third rendering including a supplier industry activity display including information on industry segments to which the entity is exposed;

a fourth rendering including the relative importance score for each respective entity in the supply chain; and

a fifth rendering illustrating the impact of the news article on the company based on said at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

6. The apparatus of claim 4, wherein the processor is further configured to execute instructions to receive as data input, a list of the entities, and retrieve the competitive supplier information, revenue information, and industry segment information responsive to the received data input.

7. The apparatus of claim 4, wherein the processor is further configured to execute instructions to retrieve from at least one database structured to recognize relations between the entities and the company, information regarding competitive suppliers of each of the plurality of entities, revenue information for each of the plurality of entities, and industry segment information for each of the plurality of entities.

8. The apparatus of claim 4, wherein the processor is further configured to execute instructions to generate a rendering including the relative importance score for each respective entity in the supply chain, wherein each of the entities is color coded to illustrate a respective importance with regard to the other entities in the supply chain.

9. A non-transitory machine readable medium storing instructions executable by a processor to determine relative importance of a news story to a company not mentioned by the news story based on a hidden relationship between the news story and at least one entity in a plurality of entities in a supply chain of a company which, when executed by the processor, cause the processor to:

responsive to a user request associated with the company to determine the relevance of a news story with respect to the company, wherein the news story does not explicitly mention the company, the request identifying the news story, the company, and criteria to link the news story to at least one entity in a supply chain of the company:

identify via processor, the plurality of entities in the supply chain of the company, wherein the news story, the company, and each entity in the plurality of entities is associated with a respective node of a plurality of nodes in a graph database, and wherein each entity in the plurality of entities is identified via said processor by identifying connections in the graph database between the node corresponding to the company and each said node corresponding to each entity in the plurality of entities;

identify via processor at least one connection between the news story and said at least one of the entities in the supply chain of the company based on the criteria provided by the user;

retrieve from the graph database, via processor, business information identified during the identifying step regarding the plurality of entities;

determine the relative importance of each of the plurality of entities within the supply chain via processor by determining, for each respective entity in the plurality of entities:

a relative buying power of the entity as compared to other entities in a same industry as the respective entity;

a supplier fraction of the entity as compared to competitors to the respective entity; and

an industry revenue exposure for the entity as compared to other industry segments to which the entity is exposed;

compute a relative importance score for each respective entity in the supply chain, as a function of the determined buying power, supplier fraction, and industry revenue exposure for the respective entity; and

generate and send a signal to the user to permit the user to display a graphic representation illustrating the impact of the news article on the company, visually illustrating said at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

10. The non-transitory machine readable medium of claim 9, wherein each of the plurality of entities in the supply chain is a different respective supplier of goods or services to the company.

11. The non-transitory machine readable medium of claim 9, wherein each of the plurality of entities in the supply chain is a different respective customer of the company.

12. The non-transitory machine readable medium of claim 9, further comprising instructions which, when executed by the processor, cause the processor to:

identify for each respective entity, a plurality of industry segments served by the respective entity;

identify a revenue for each of the plurality of industry segments served by the respective entity; and

calculate the industry revenue exposure as a function of the identified revenue for each of the plurality of industry segments.

13. The non-transitory machine readable medium of claim 9, further comprising instructions which, when executed by the processor, cause the processor to:

generate a display on a graphical user interface including the relative importance score for each respective entity as compared to the other entities in the supply chain and indicating the impact of the news article on the company based on the at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

14. The non-transitory machine readable medium of claim 9, further comprising instructions which, when executed by the processor, cause the processor to:

identify for the company, a list of the plurality of entities in the supply chain and metadata linking the plurality of entities, including an industry classification and a relationship confidence; and

generate a display on a graphical user interface including the list of the plurality of entities and the metadata linking the plurality of entities.

15. The non-transitory machine readable medium of claim 9, further comprising instructions which, when executed by the processor, cause the processor to:

generate a display on a graphical user interface including, for each respective entity in the supply chain, the relative importance score, the determined relative buying power, the determined supplier fraction, and the determined industry revenue exposure and indicating the impact of the news article on the company based on the at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

16. The computer implemented method of claim 1, wherein receiving the request associated with the company from the user includes receiving via a web API a request for a graphical user interface to access said relative importance of a plurality of entities in the supply chain of the company, and wherein the method further includes, responsive to said request, executing via a web server coupled to the graph database, a web based application to generate for display on the graphical user interface:

a first rendering including a list of competitors of each of the plurality of entities in the supply chain;

a second rendering including a list of the industries of each of the plurality of entities in the supply chain;

a third rendering including a supplier industry activity display including information on industry segments to which the entity is exposed;

a fourth rendering including the relative importance score for each respective entity in the supply chain; and

a fifth rendering illustrating the impact of the news article on the company based on said at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

17. The non-transitory machine readable medium of claim 9, further comprising instructions which, when executed by the processor, cause the processor to:

receive via a web API a request for a graphical user interface to access said relative importance of a plurality of entities in the supply chain of the company;

responsive to said request, execute via a web server coupled to the graph database, a web based application to generate for display on the graphical user interface:

a first rendering including a list of competitors of each of the plurality of entities in the supply chain;

a second rendering including a list of the industries of each of the plurality of entities in the supply chain;

a third rendering including a supplier industry activity display including information on industry segments to which the entity is exposed;

a fourth rendering including the relative importance score for each respective entity in the supply chain; and

a fifth rendering illustrating the impact of the news article on the company based on said at least one connection identified between the news story and said at least one of the entities in the supply chain of the company.

18. The method of claim 1, wherein the criteria to link the news story to an entity in the supply chain of the company includes whether a company referenced in the news story is related to the company and whether a person mentioned in the news story is or was associated with the company.

19. The method of claim 1, wherein the graphic representation permits the user to quantify the impact of an event described in the news article on operations of the company based on the connection identified between the news article and said at least one of the entities in the supply chain of the company.