
Offshore Leaks

*An Exploration in
Graphs & Networks*

By Azin Faghihi

Problem statement:

How does the network of Offshore Leaks look like?

- *Making a platform to study similar data in future.*

Role: Researcher hired by journalists to develop offshore leaks visualization app

Data: [Offshore Leaks Database](#) by
The International Consortium of Investigative Journalists

Motivation

(breaking the fourth wall)



An ICIJ Investigation



PANDORA PAPERS

The largest investigation in journalism history
exposes a shadow financial system that benefits
the world's most rich and powerful.

About

Learn more about the data in the ICIJ Offshore Leaks database

This database contains information on more than 785,000 offshore entities that are part of the Paradise Papers, the Panama Papers, the Offshore Leaks and the Bahamas Leaks investigations. The data links to people and companies in more than 200 countries and territories.

The real value of the database is that it strips away the secrecy that cloaks companies and trusts incorporated in tax havens and exposes the people behind them. This includes, when available, the names of the real owners of those opaque structures. In all, the interactive application reveals more than 720,000 names of people and companies behind secret offshore structures. They come from leaked records and not a standardized corporate registry, so there may be duplicates. In some cases, companies are listed as shareholders for another company or a trust, an arrangement that often helps obscure the flesh-and-blood people behind offshore entities.

The International Consortium of Investigative Journalists obtained the data through four massive leaks:

Source: <https://offshoreleaks.icij.org/pages/about>

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General look at the **data**

offshore_leaks.edges.csv



offshore_leaks...des.entity.csv



offshore_leaks...des.officer.csv



offshore_leaks...s.address.csv



offshore_leaks...ermediary.csv



offshore_leaks.edges.csv



CSV



CSV



offshore_leaks...s.address.csv



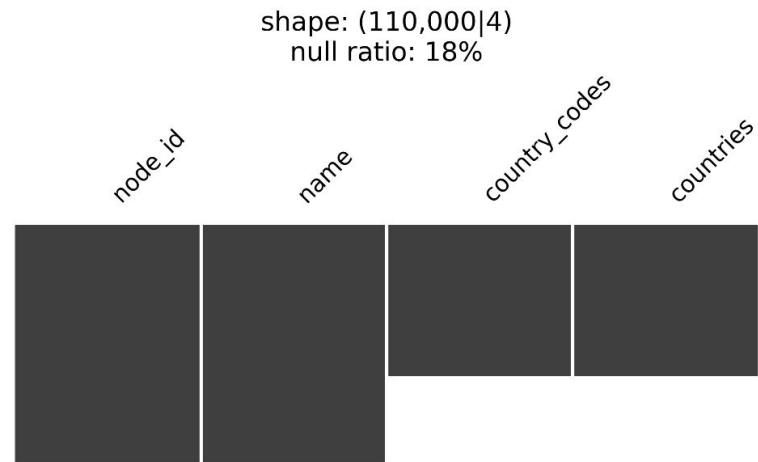
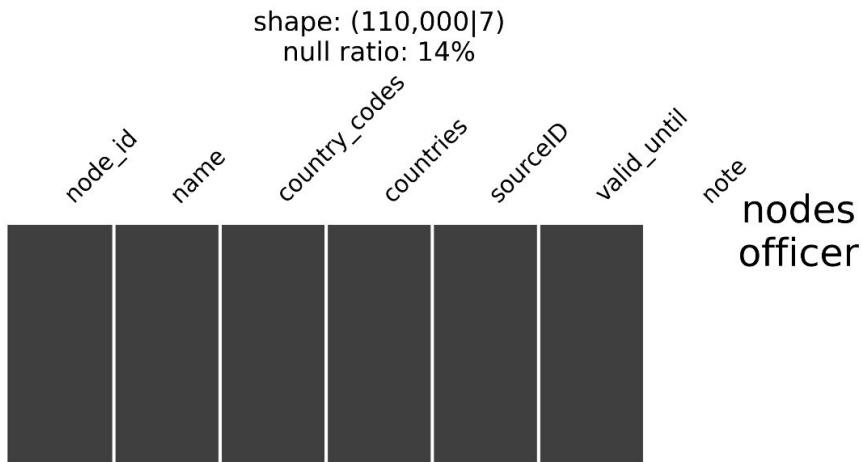
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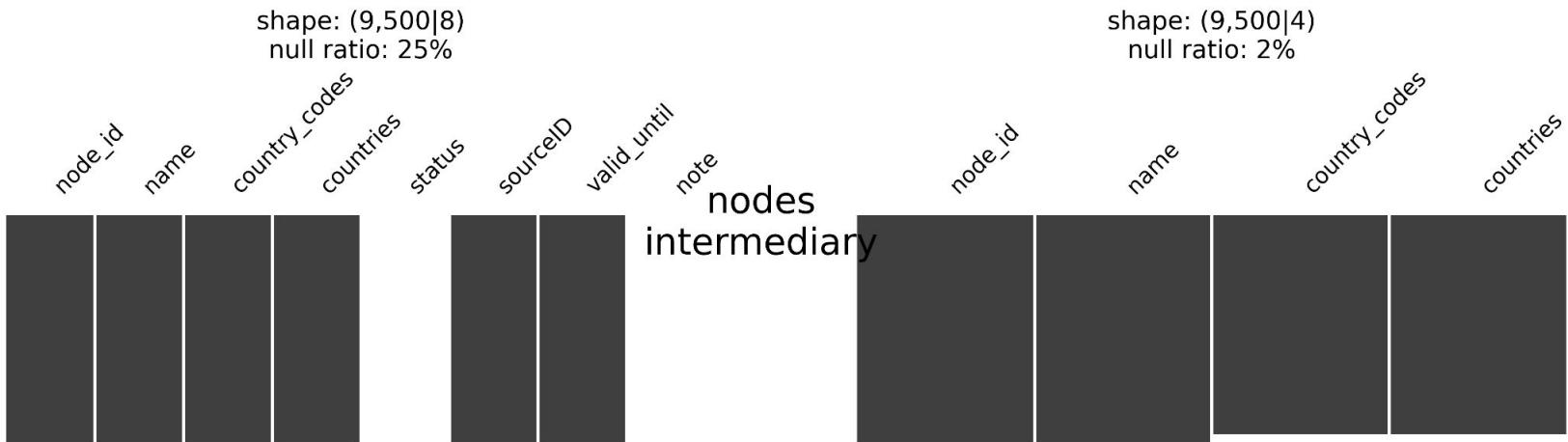
Tables:

Nodes & Edges

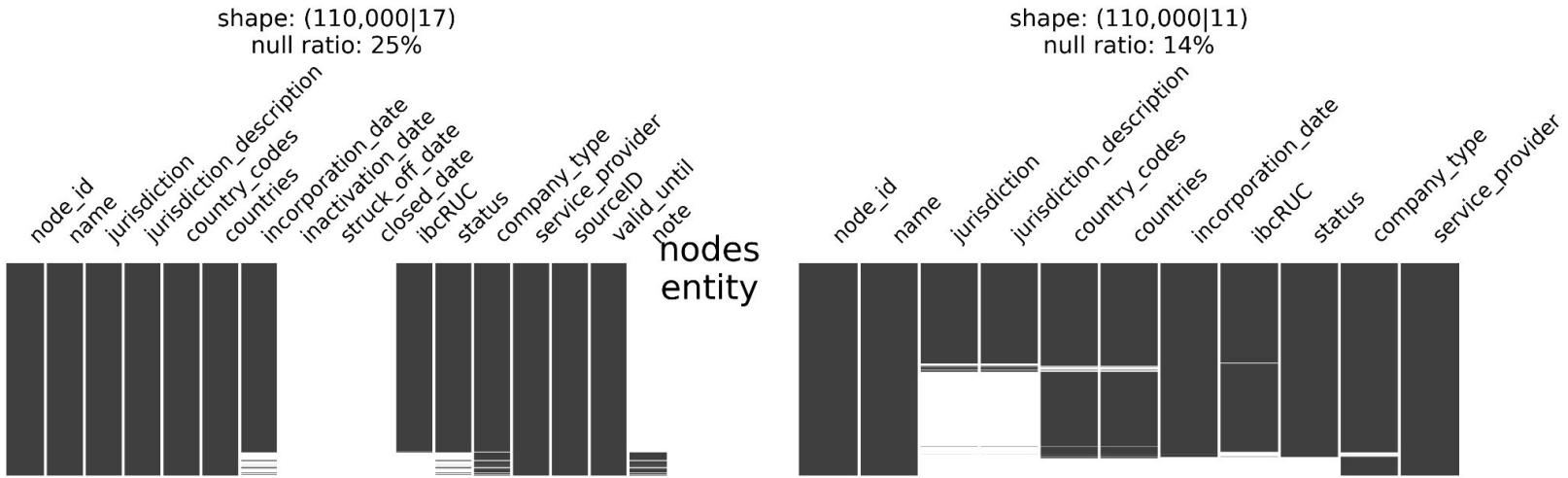
Nodes



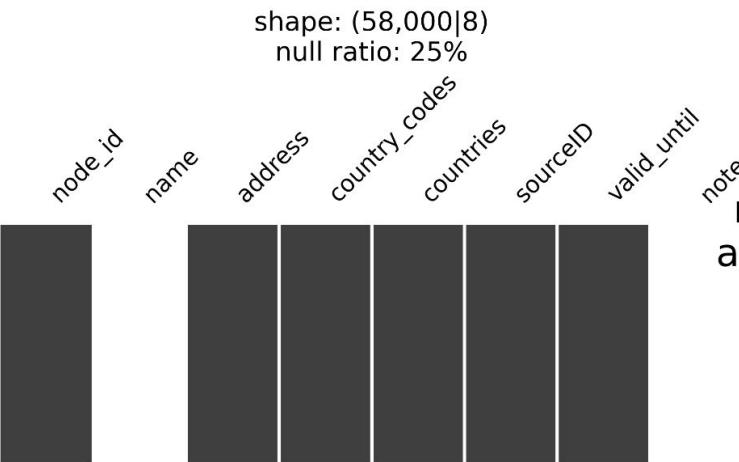
Nodes



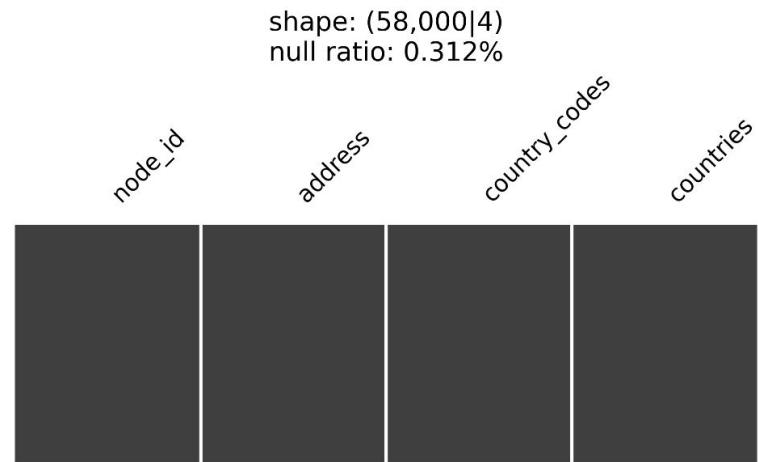
Nodes



Edges



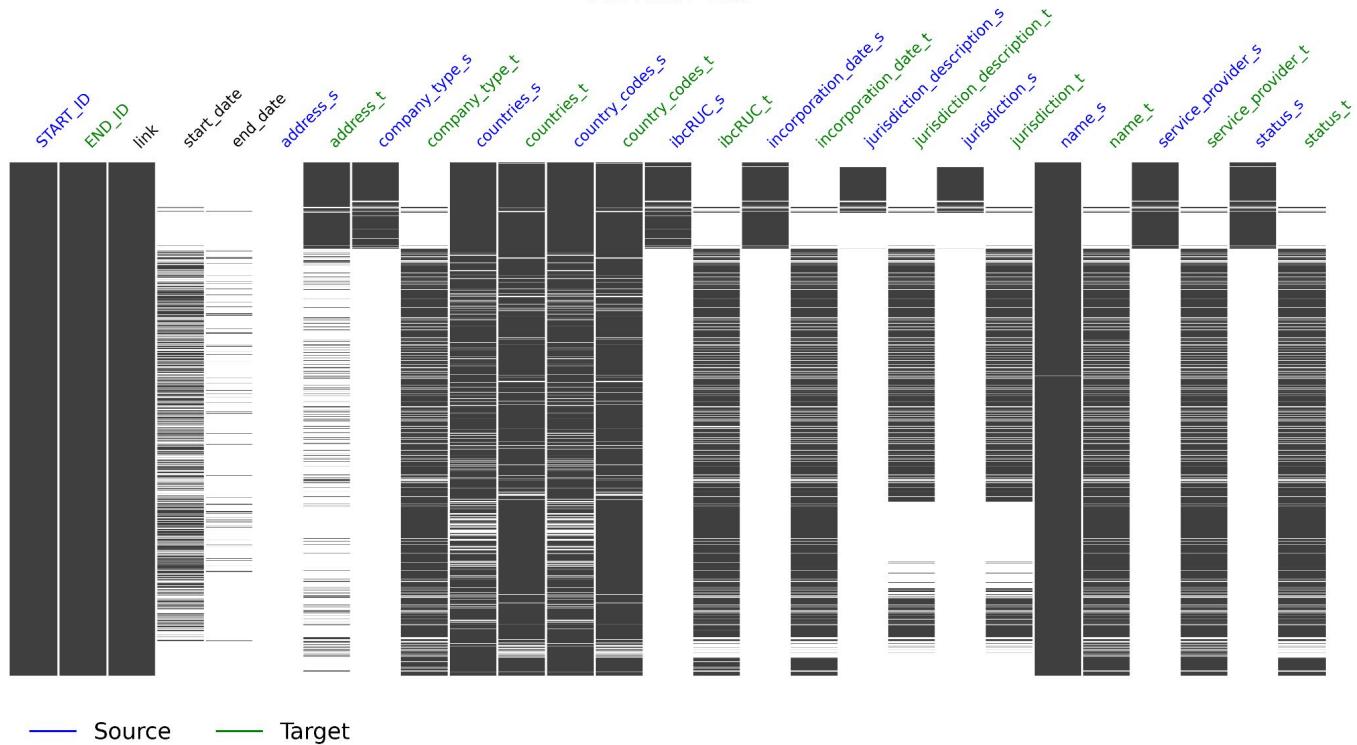
nodes
address



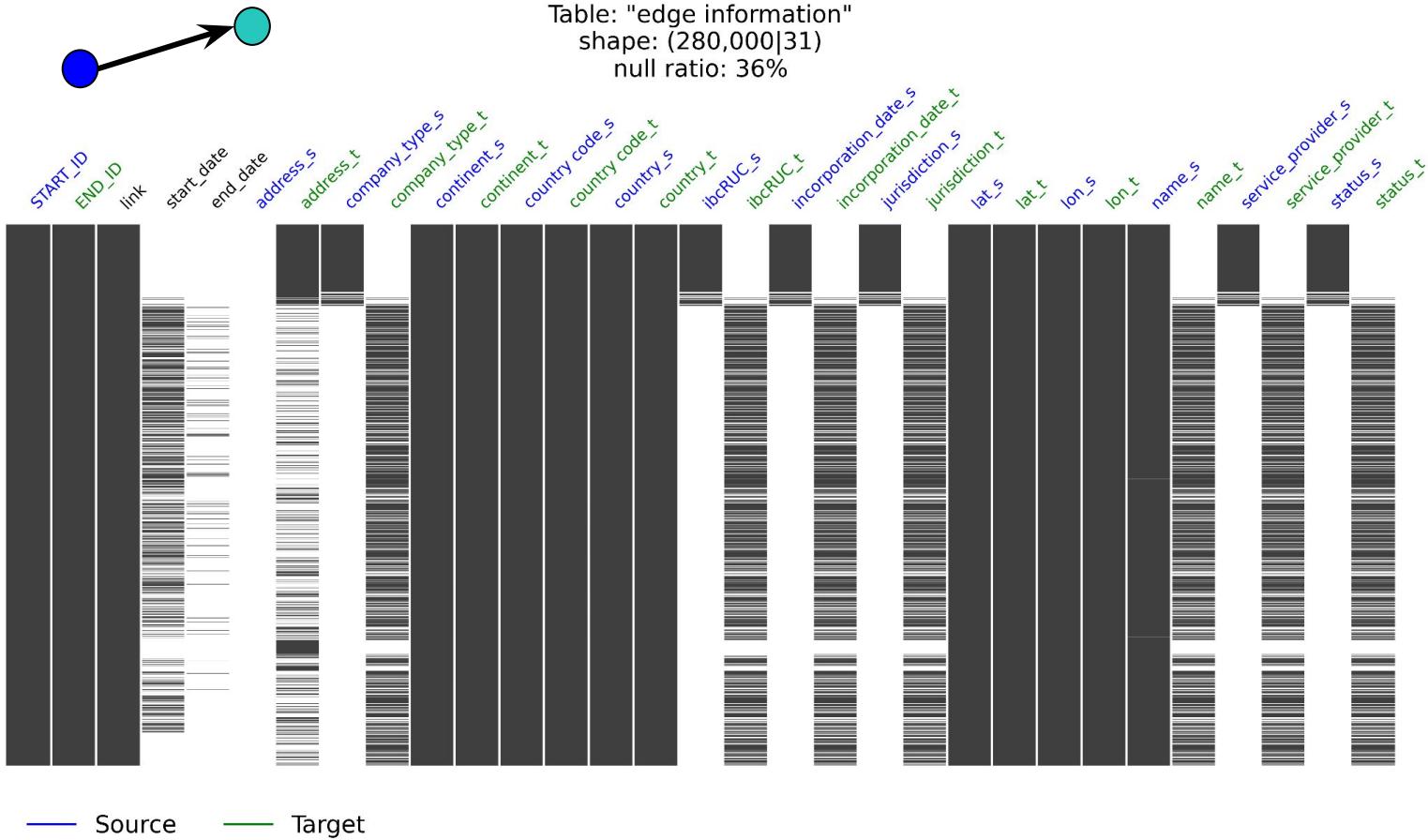
Combine Tables

Nodes & Edges

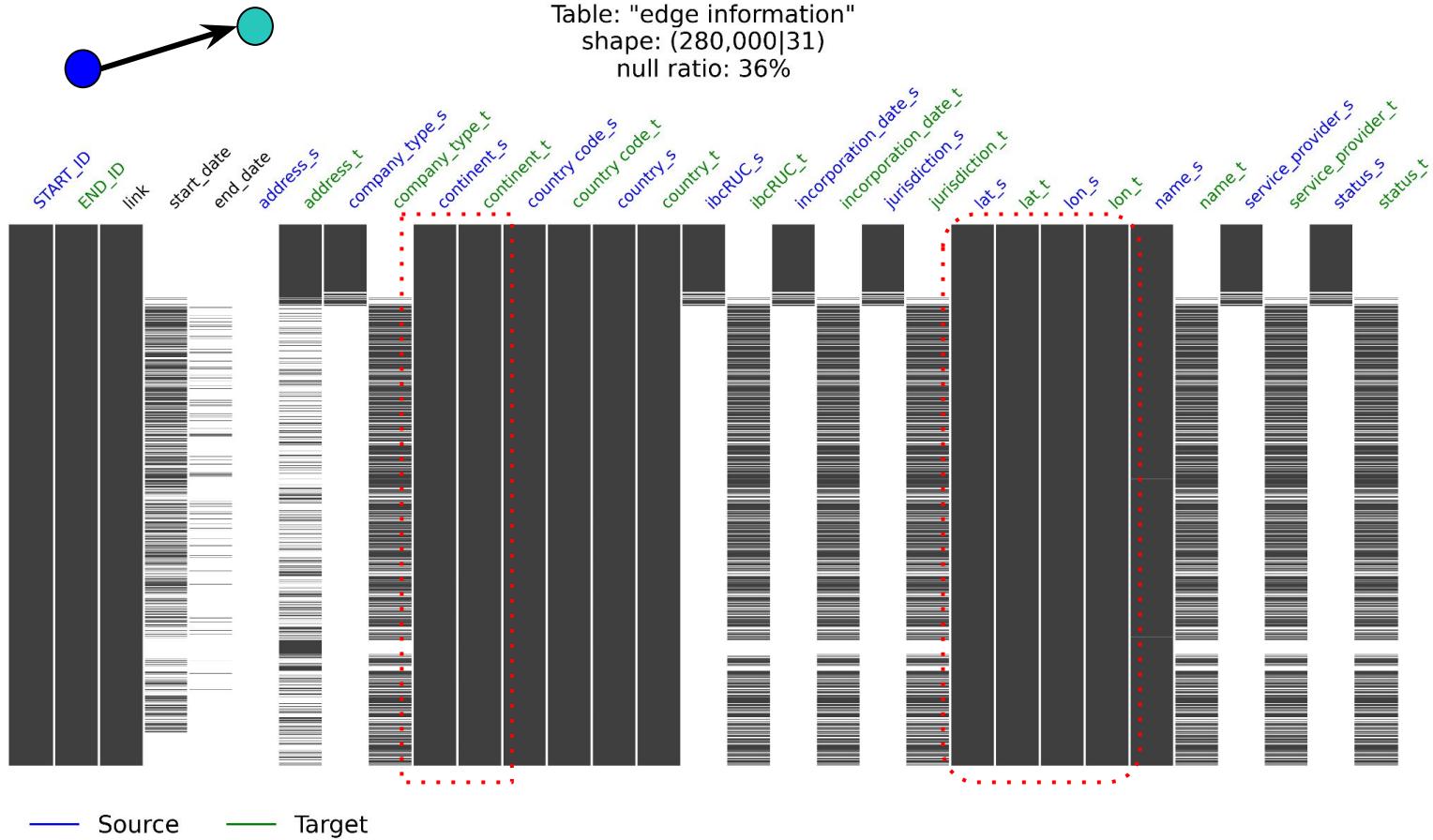
Edges & Nodes
shape: (560,000|27)
null ratio: 46%



Add Geographic Attributes



Add Geographic Attributes

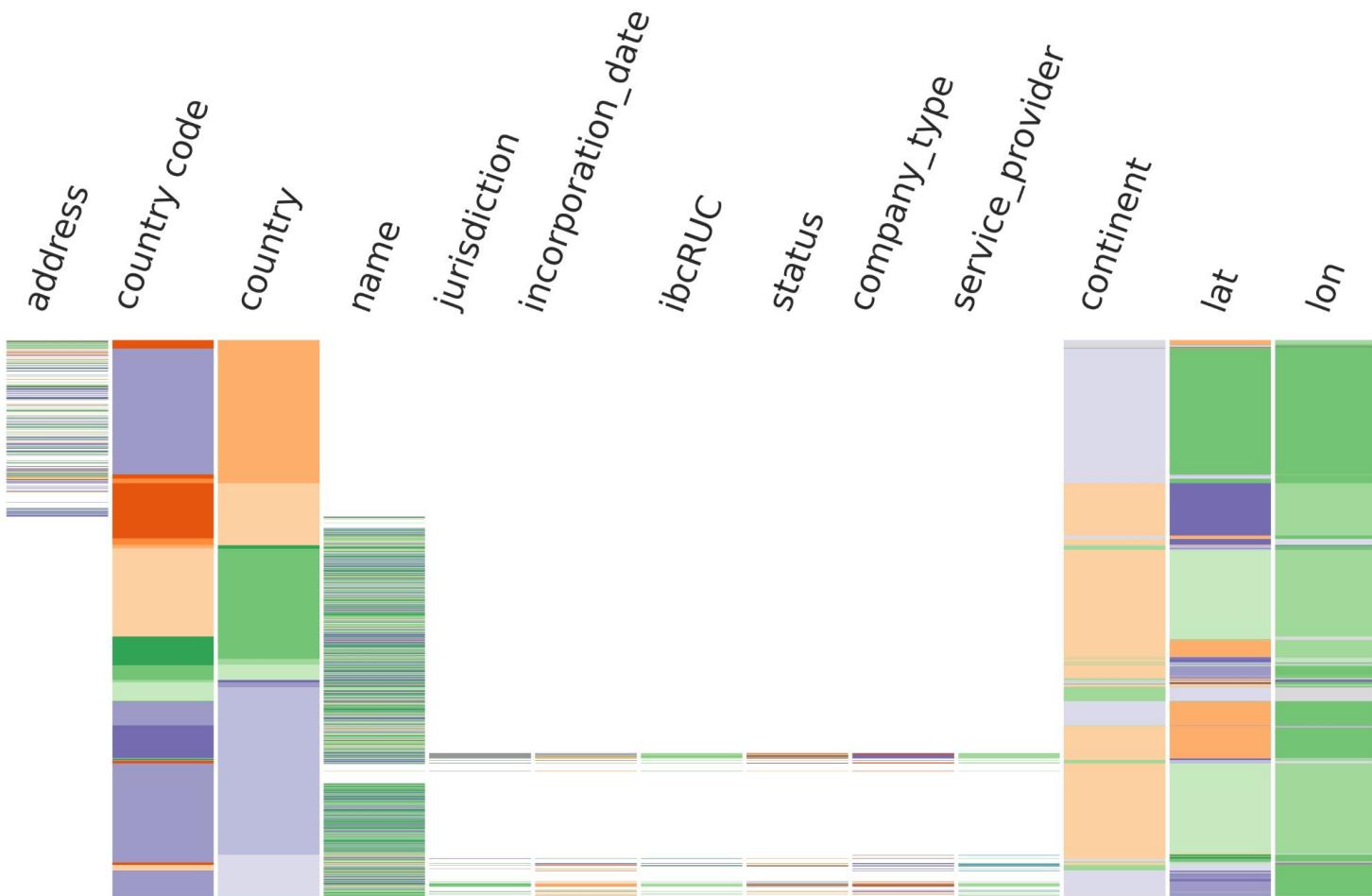




Edges Table Columns



Nodes Columns



Edges Columns



Graph Components:

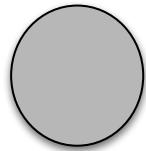
Nodes & Edges

Node Properties

status

name

service provider

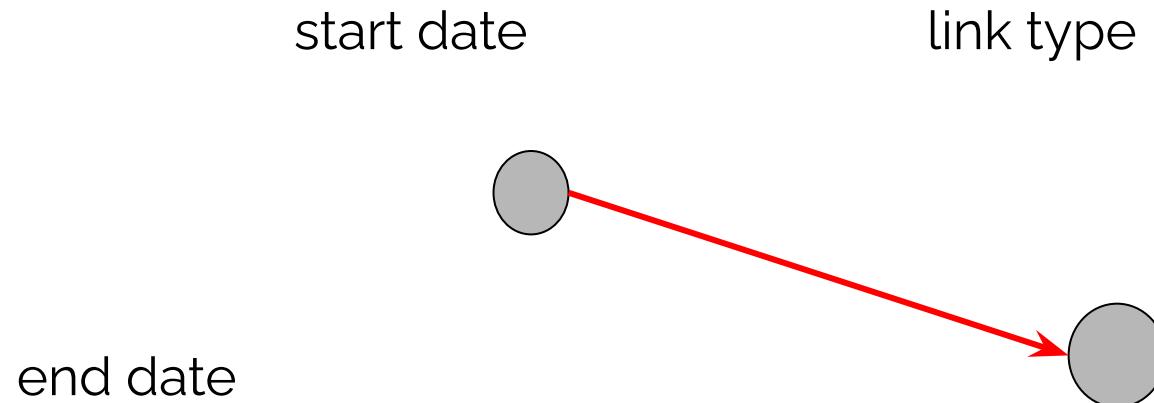


address

company type

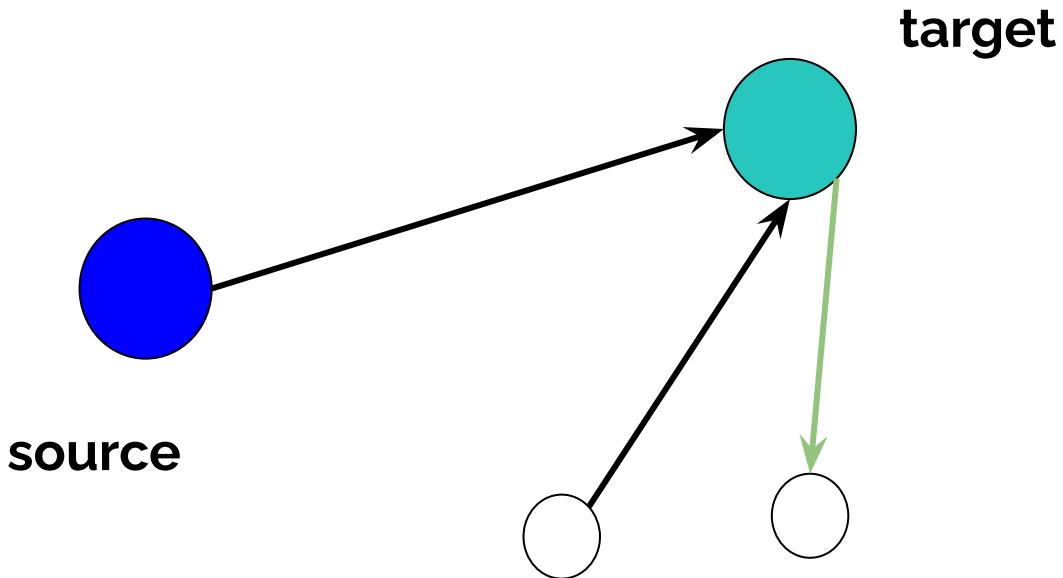
status

Edge Properties



Graph properties: *Degrees*

Degrees in a Directed Graph

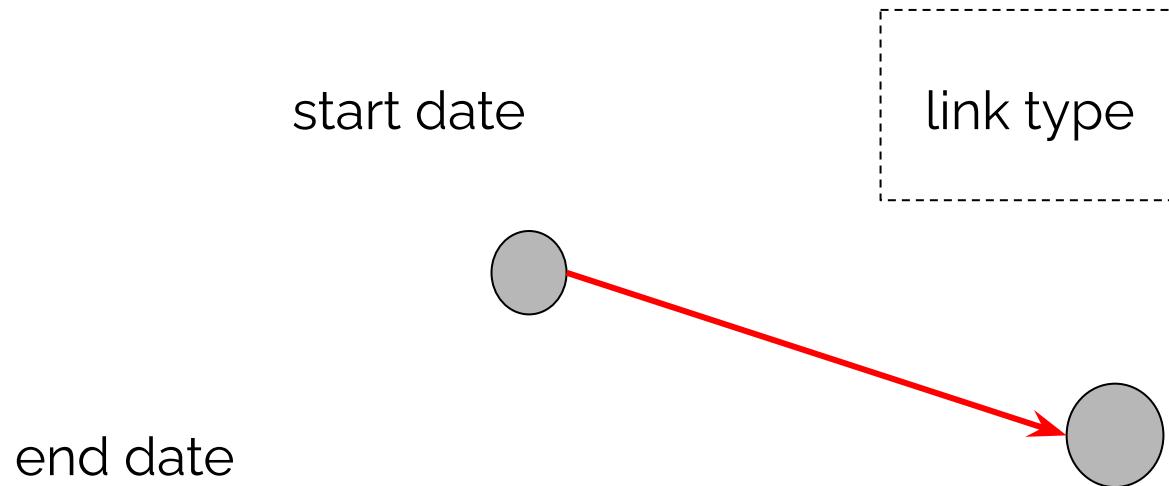


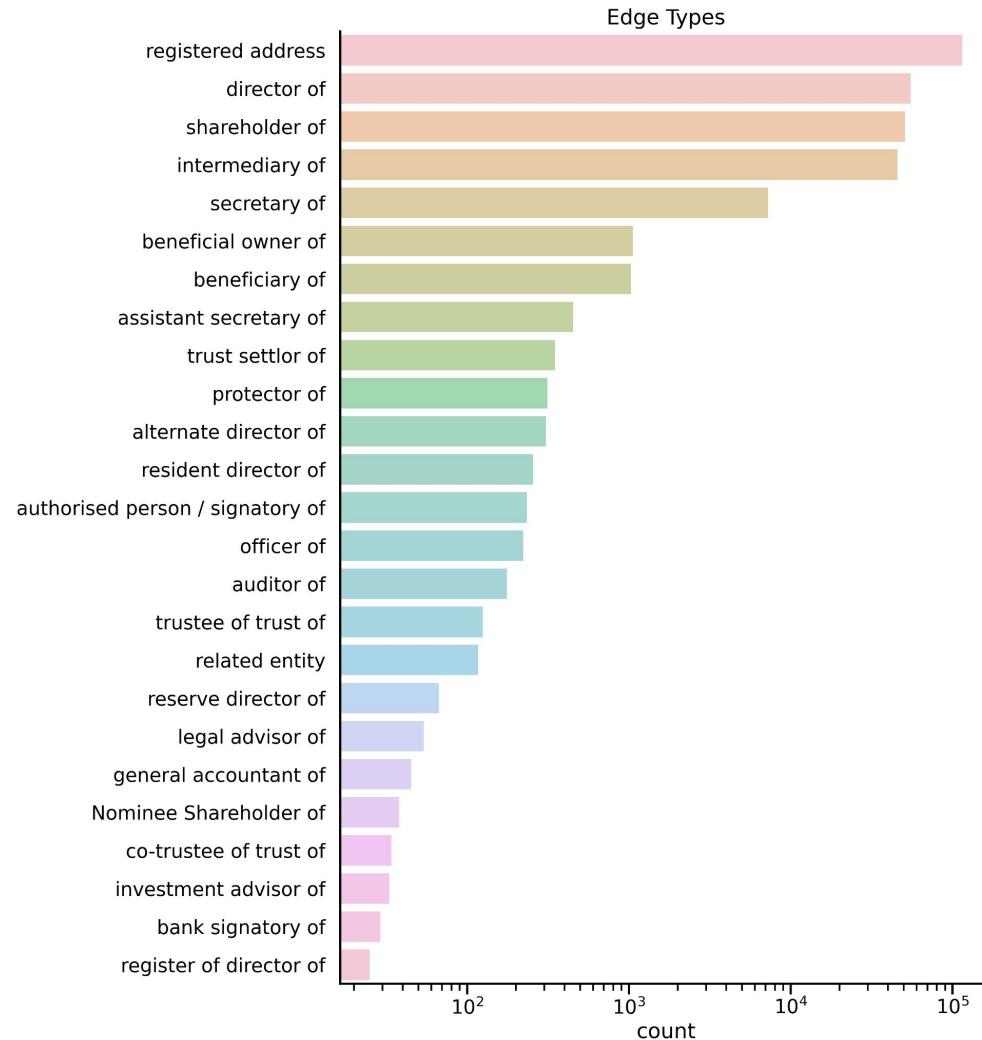
Graph Properties

| | |
|----------------------------------|-----|
| Is the graph bipartite? | No |
| Is the graph strongly-connected? | No |
| Is the graph weakly-connected? | No |
| Is the graph directed? | Yes |

Edge Properties: “*link*” type

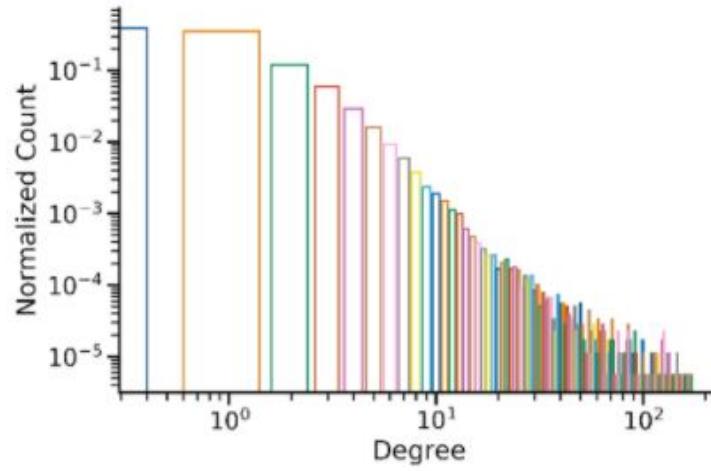
Edge Properties

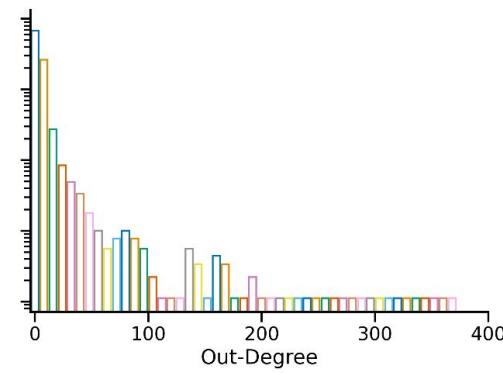
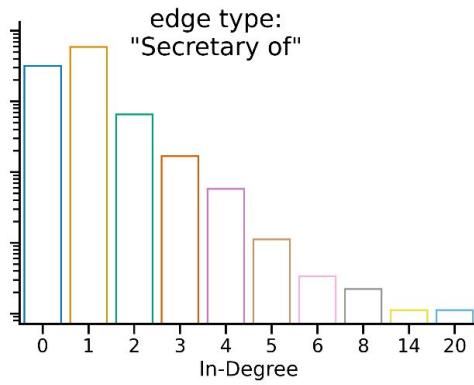
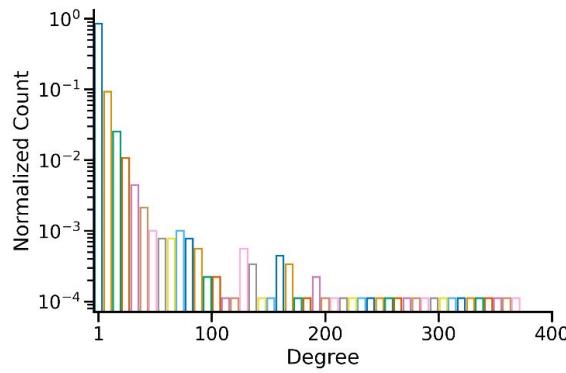




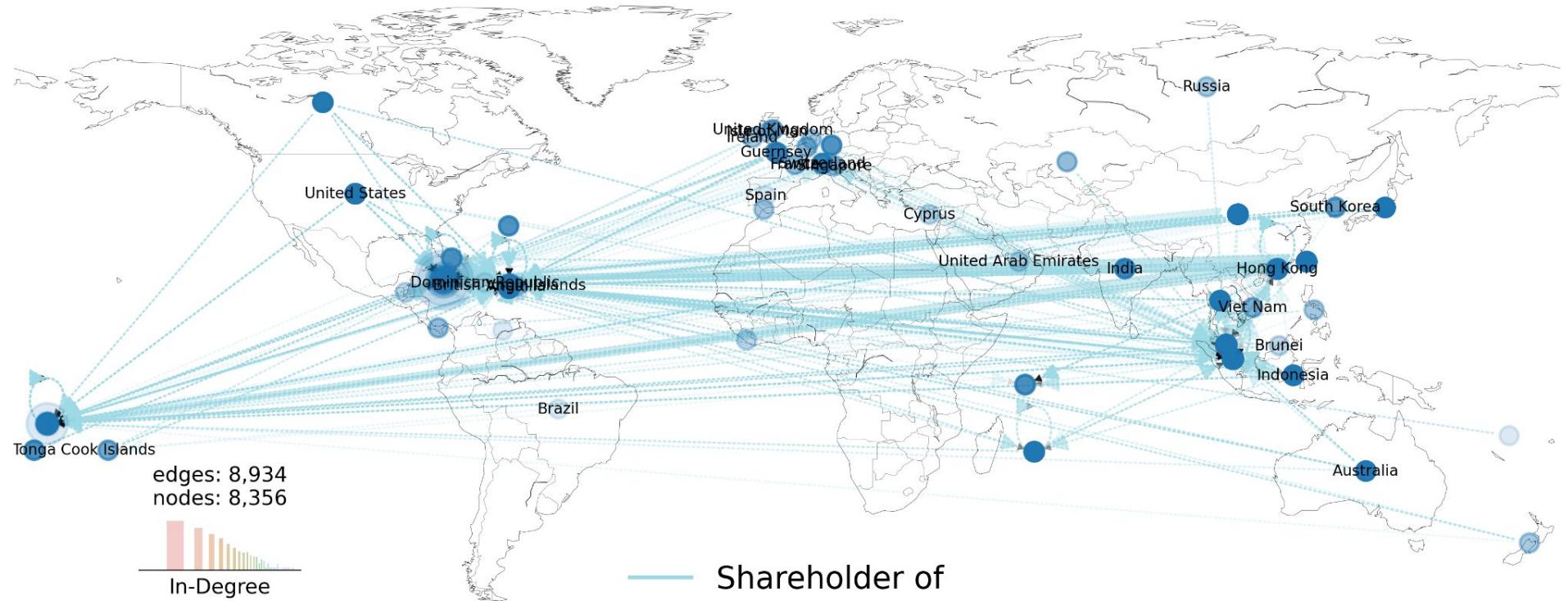
Subgraphs

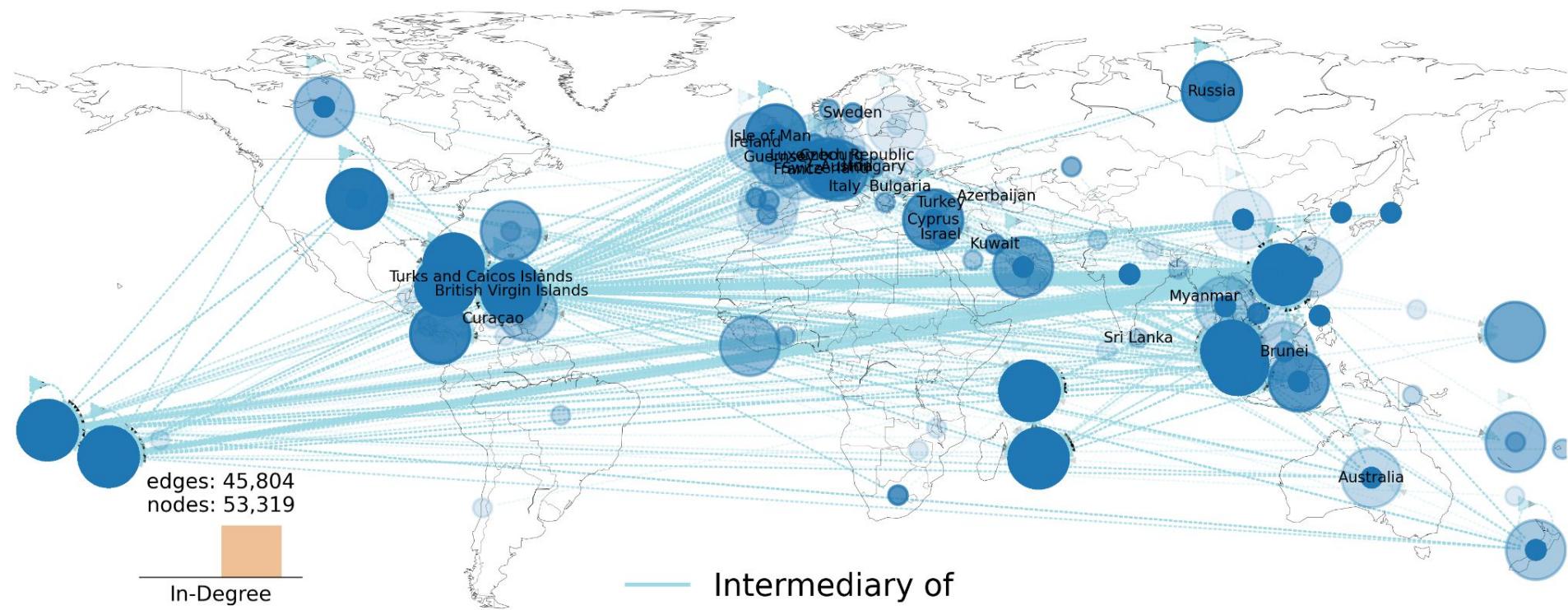
Degrees

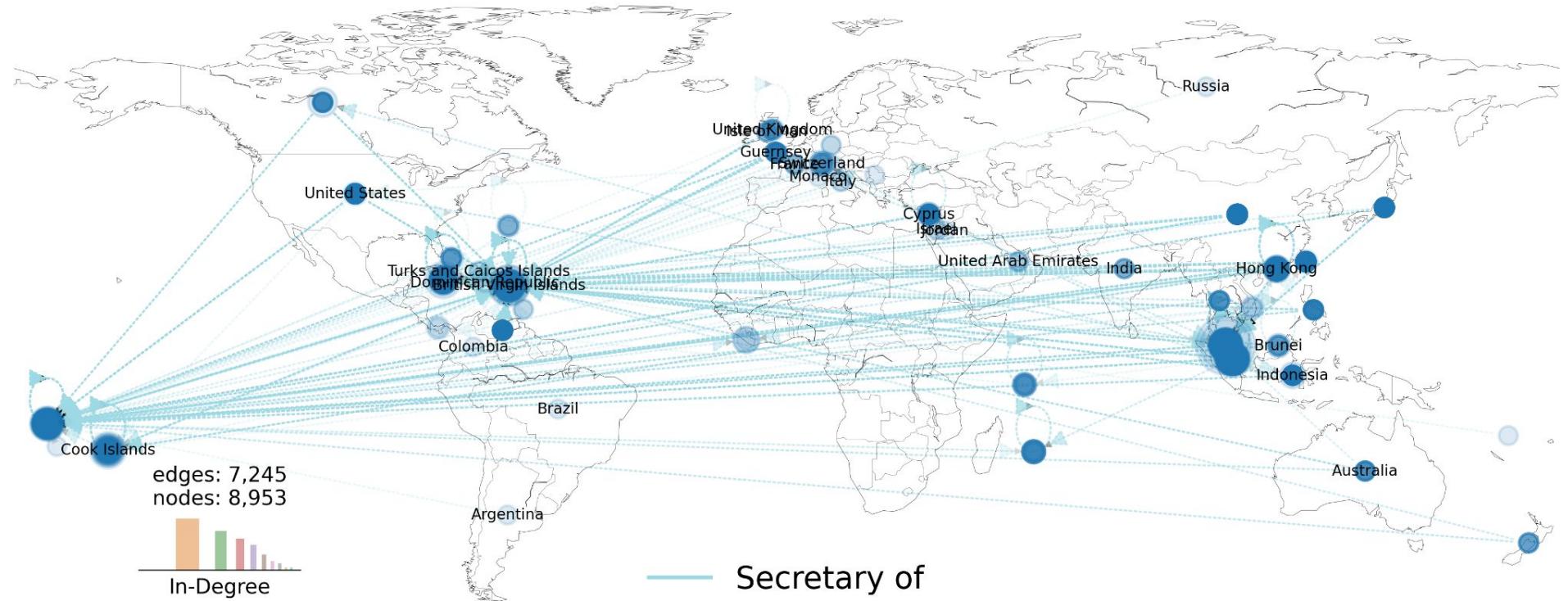


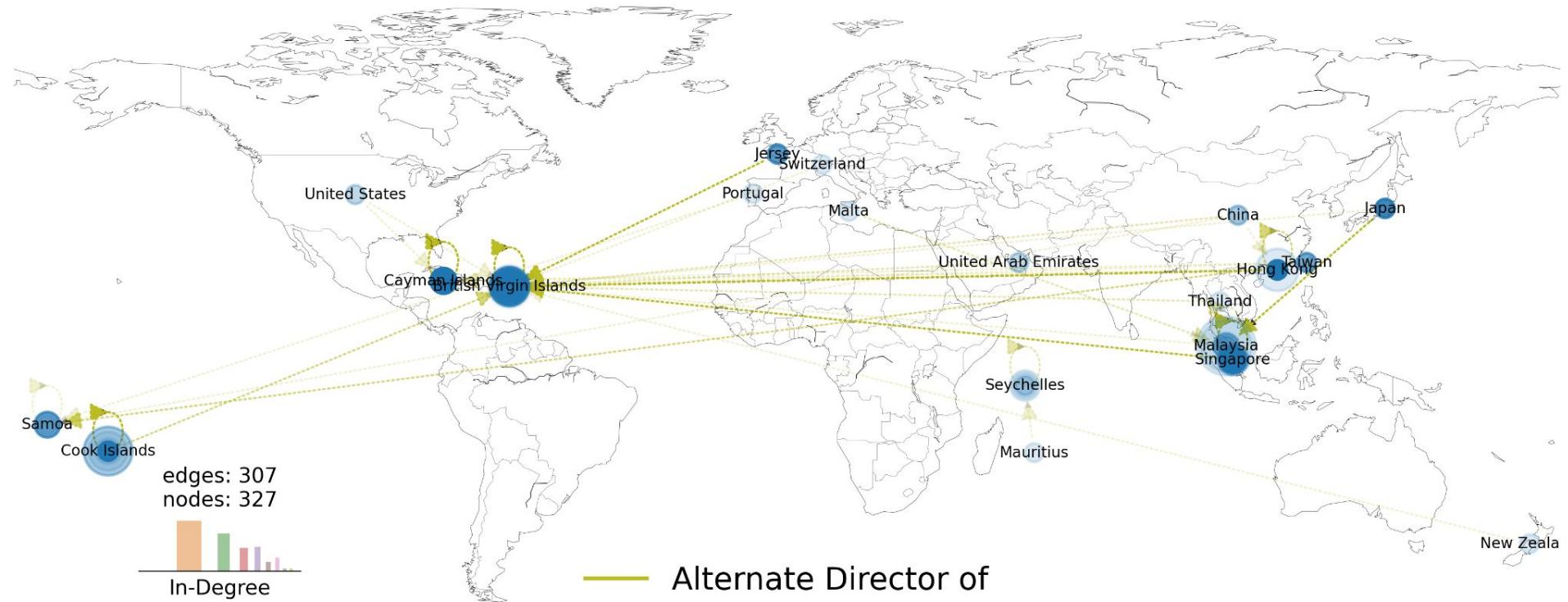


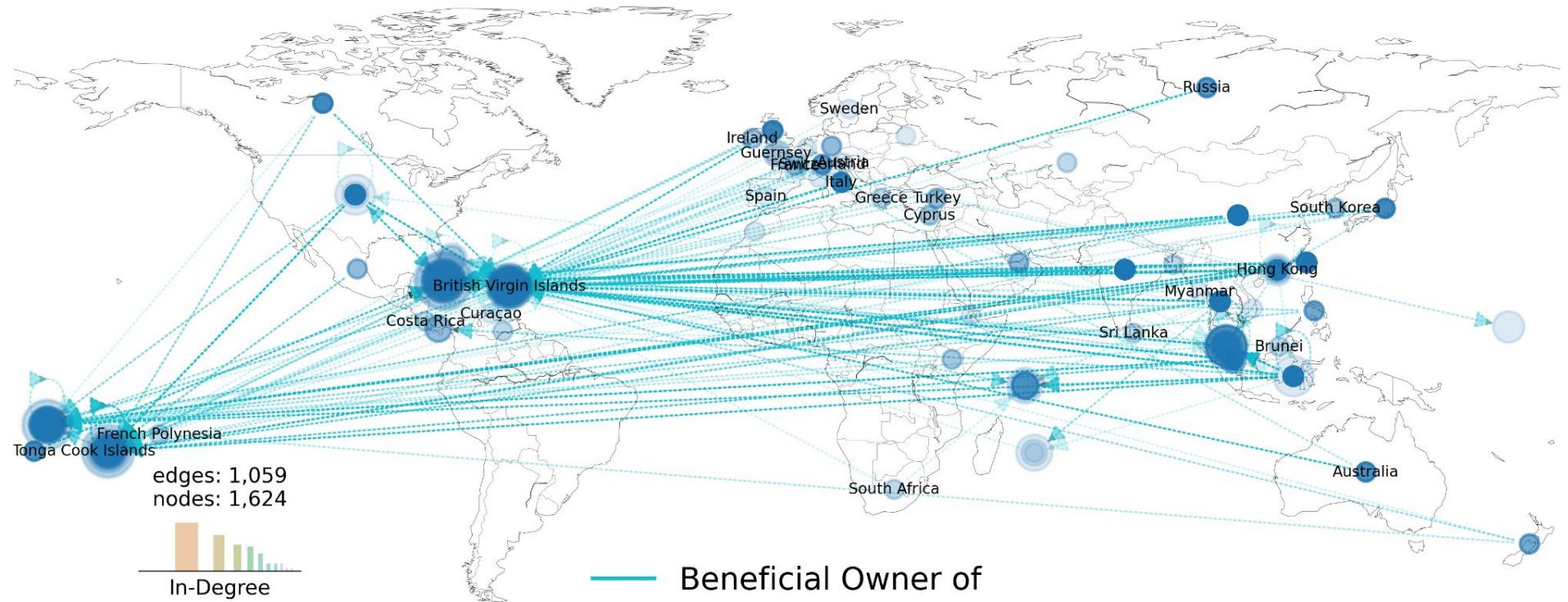




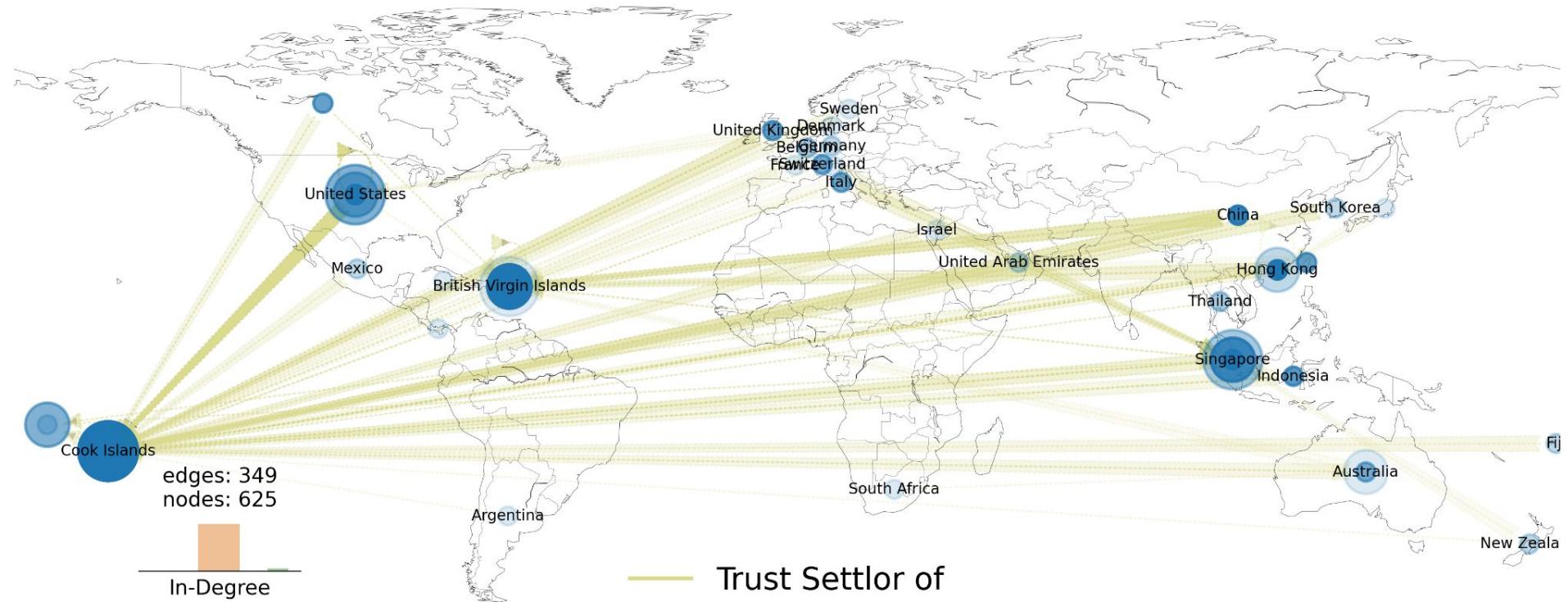


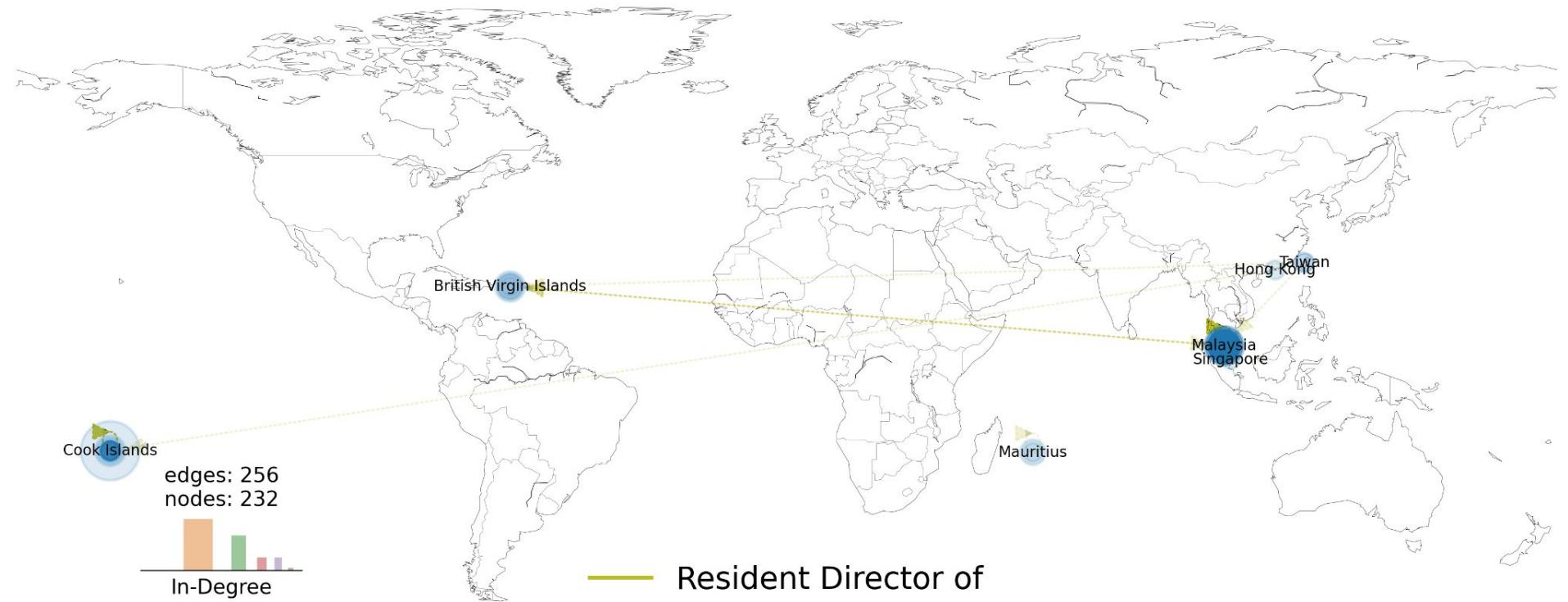


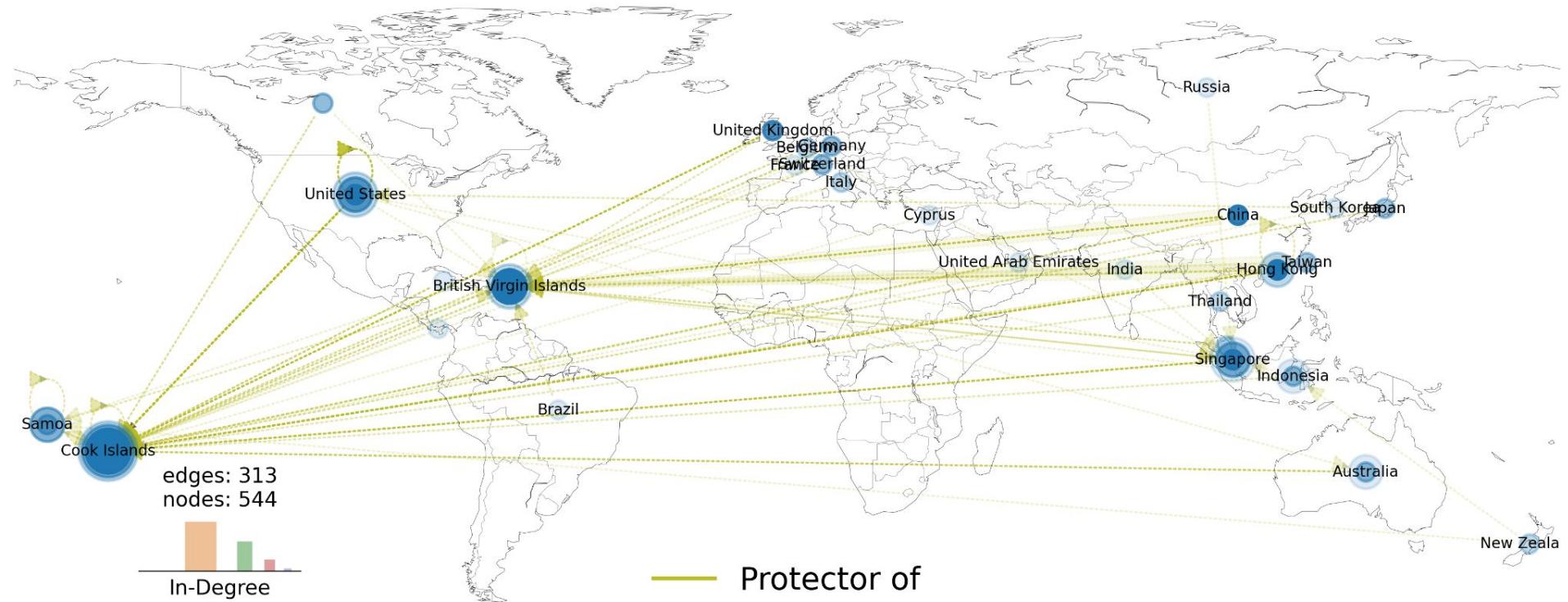


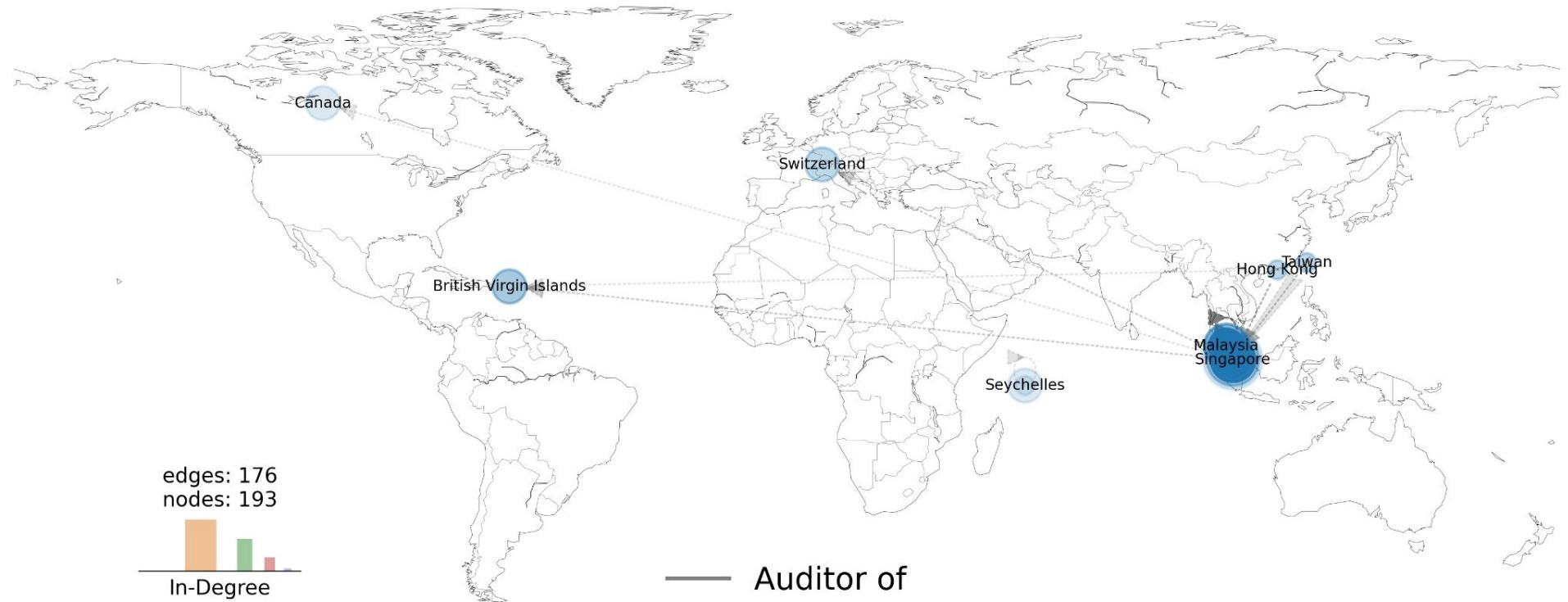


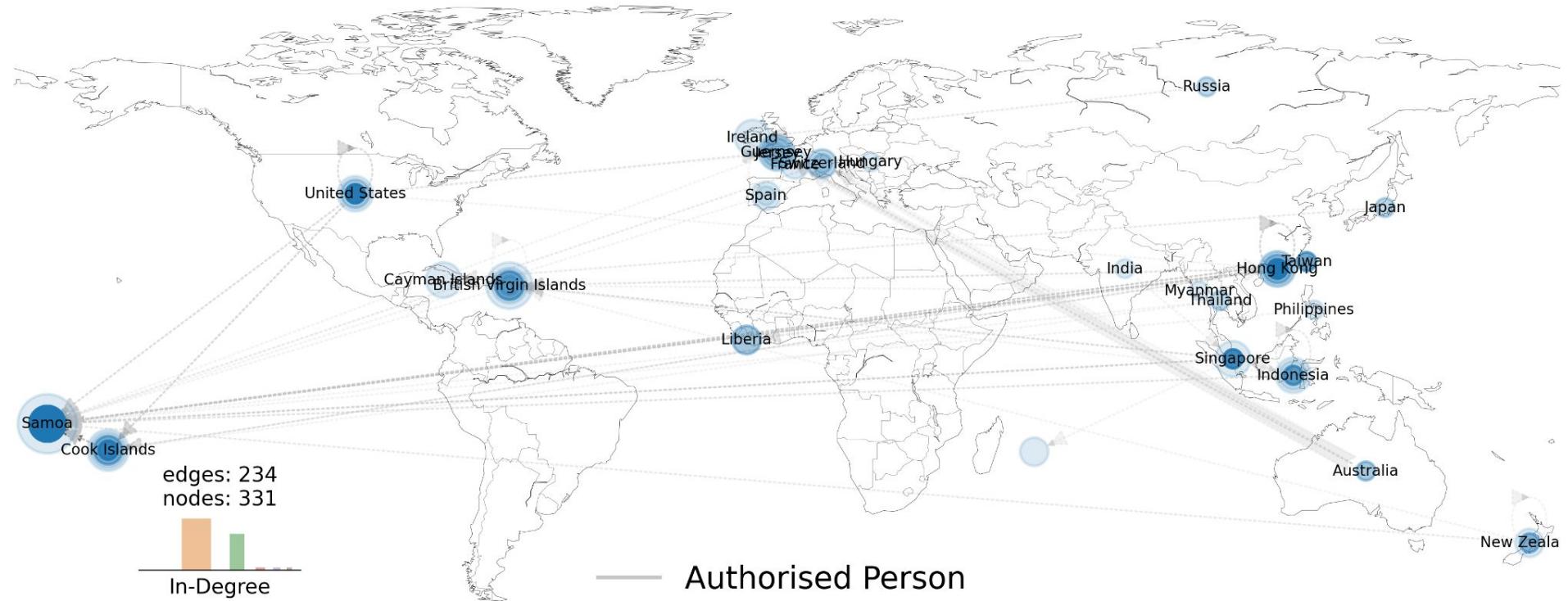


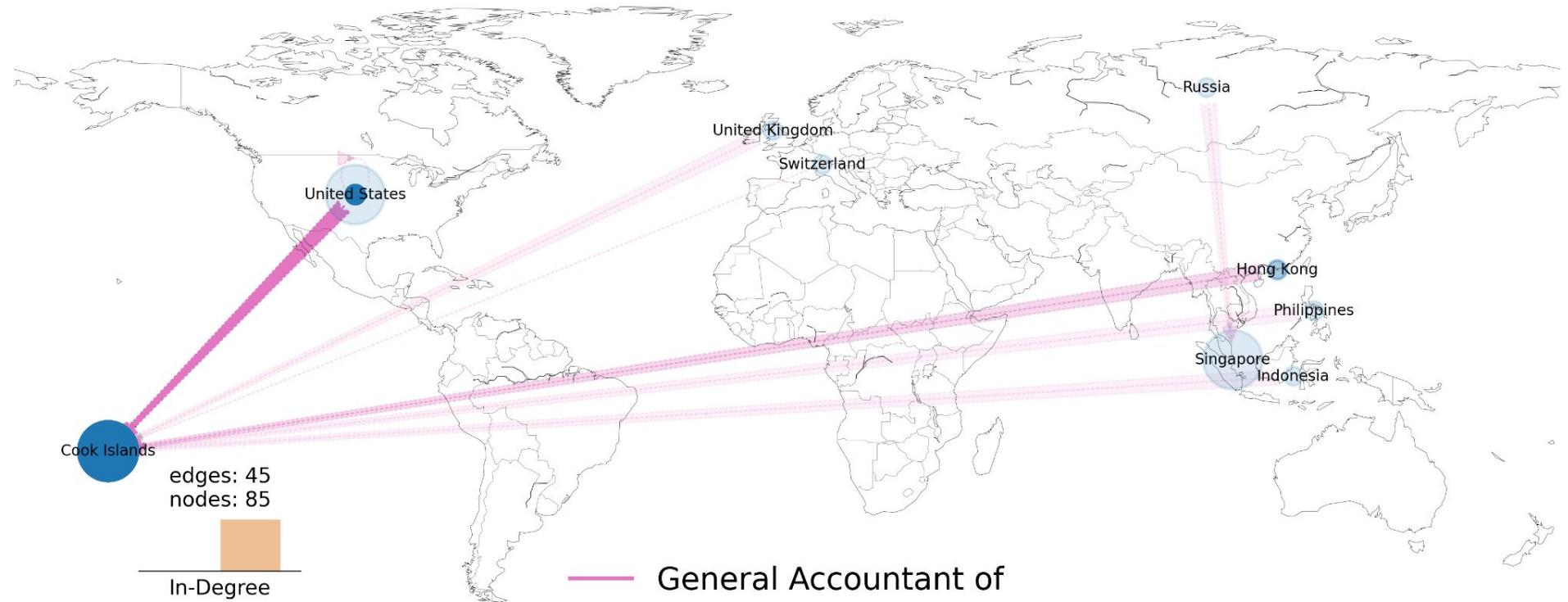


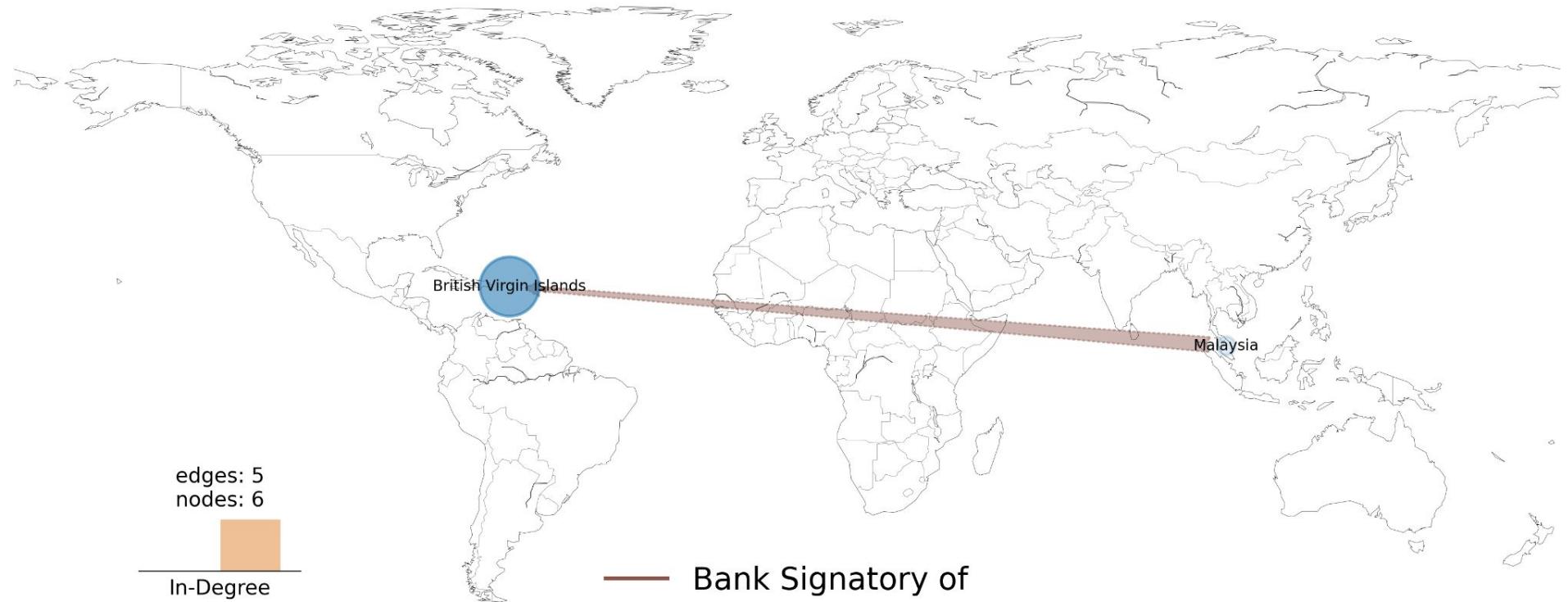


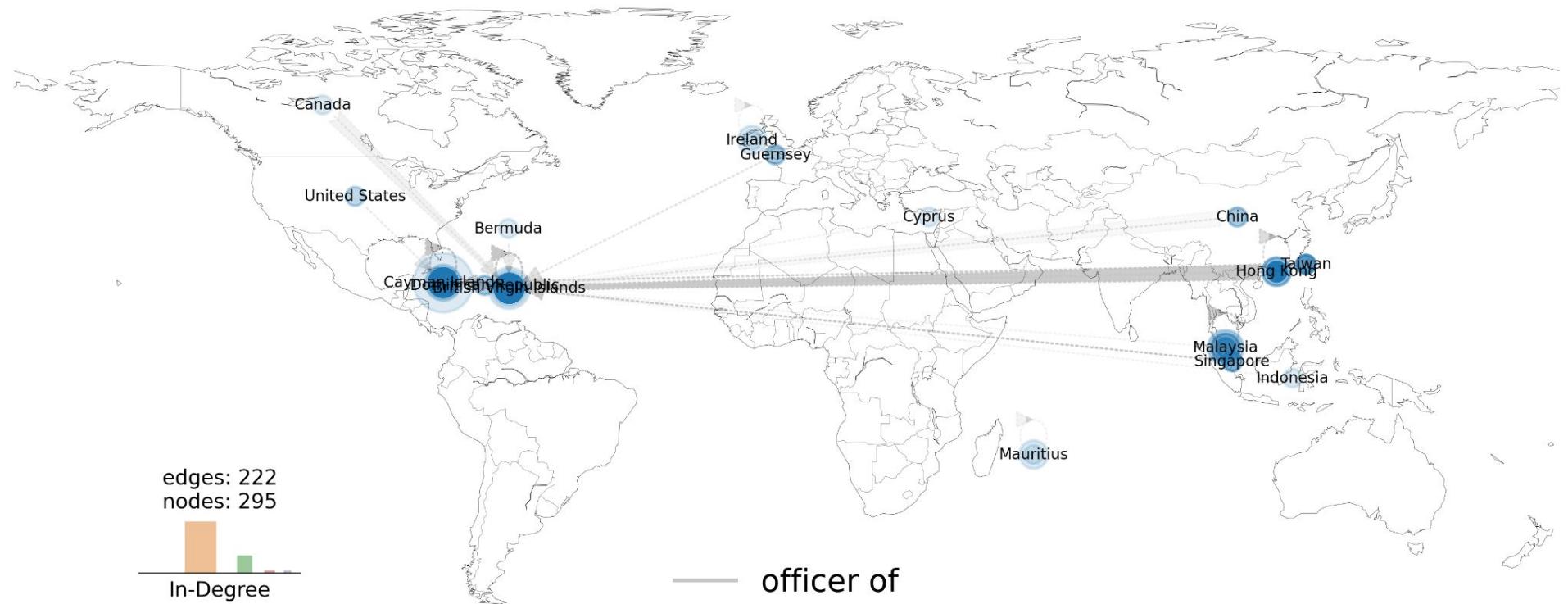






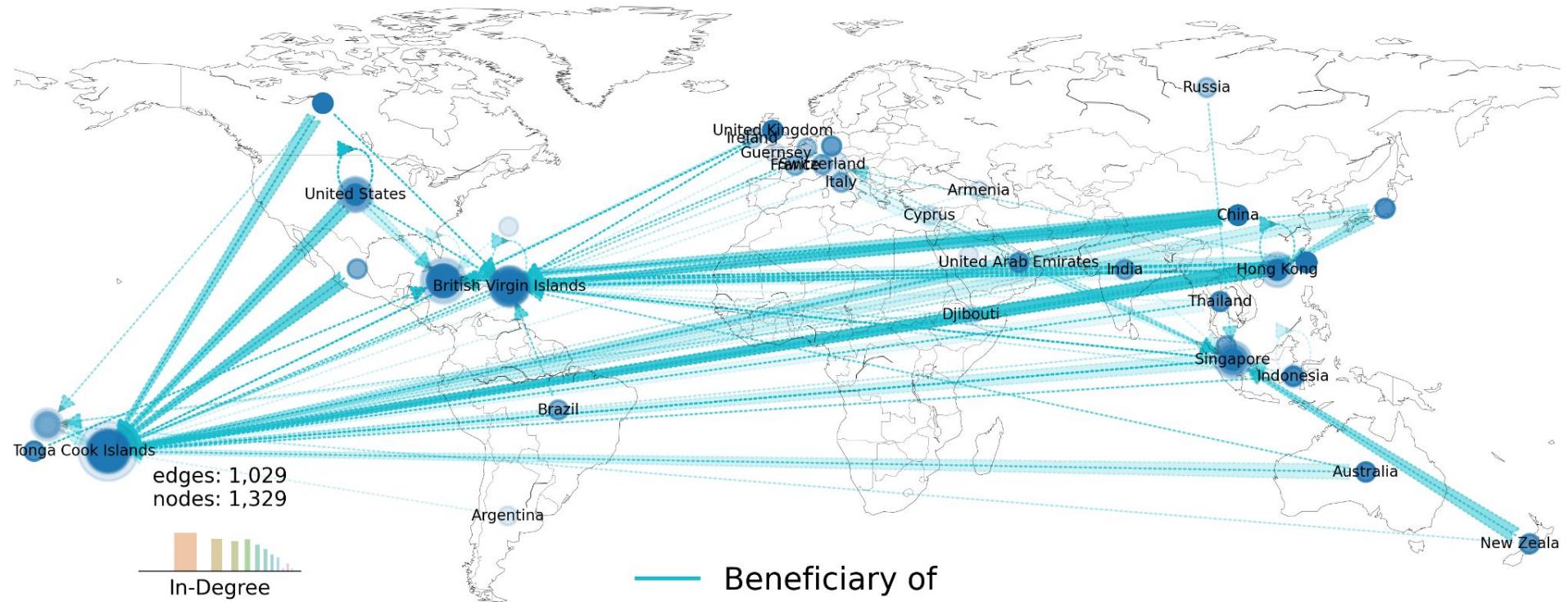


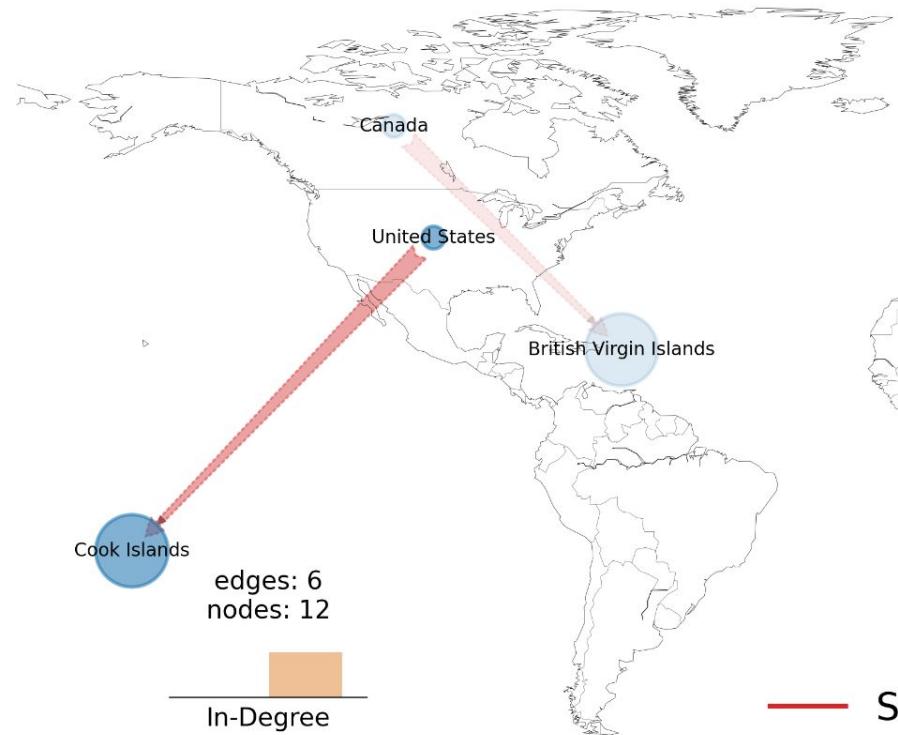






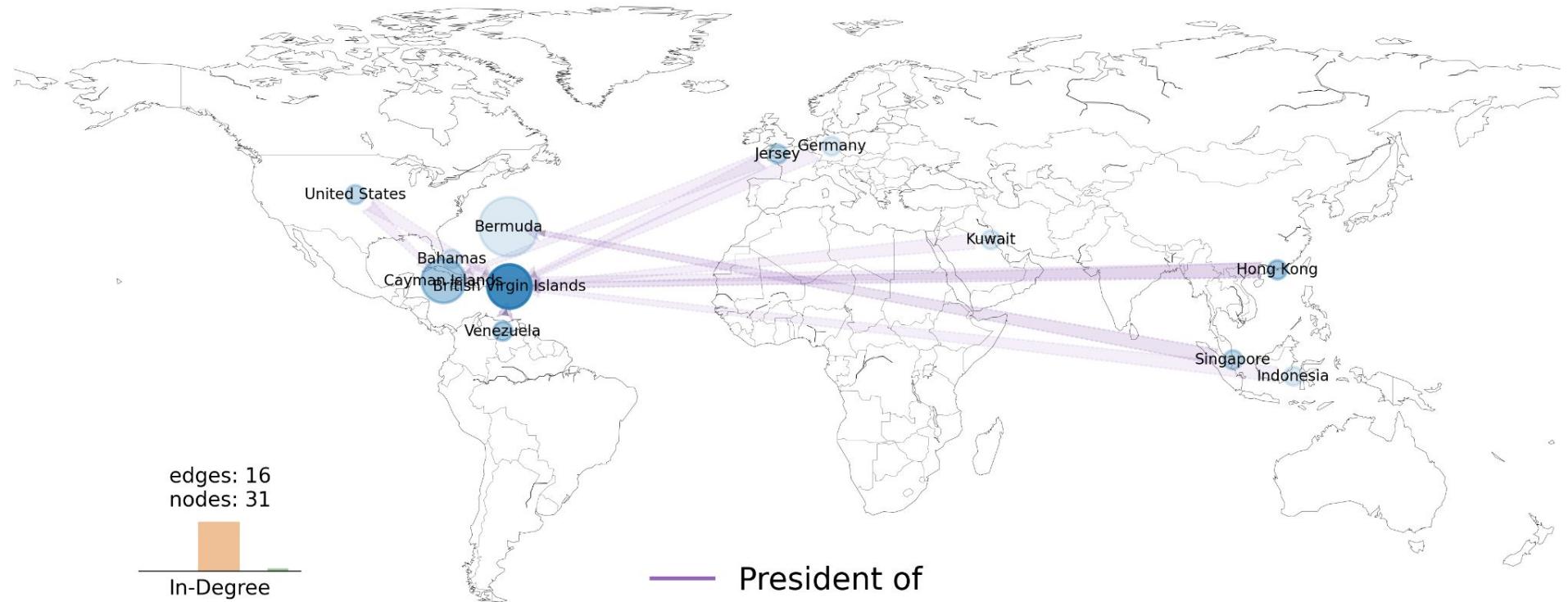


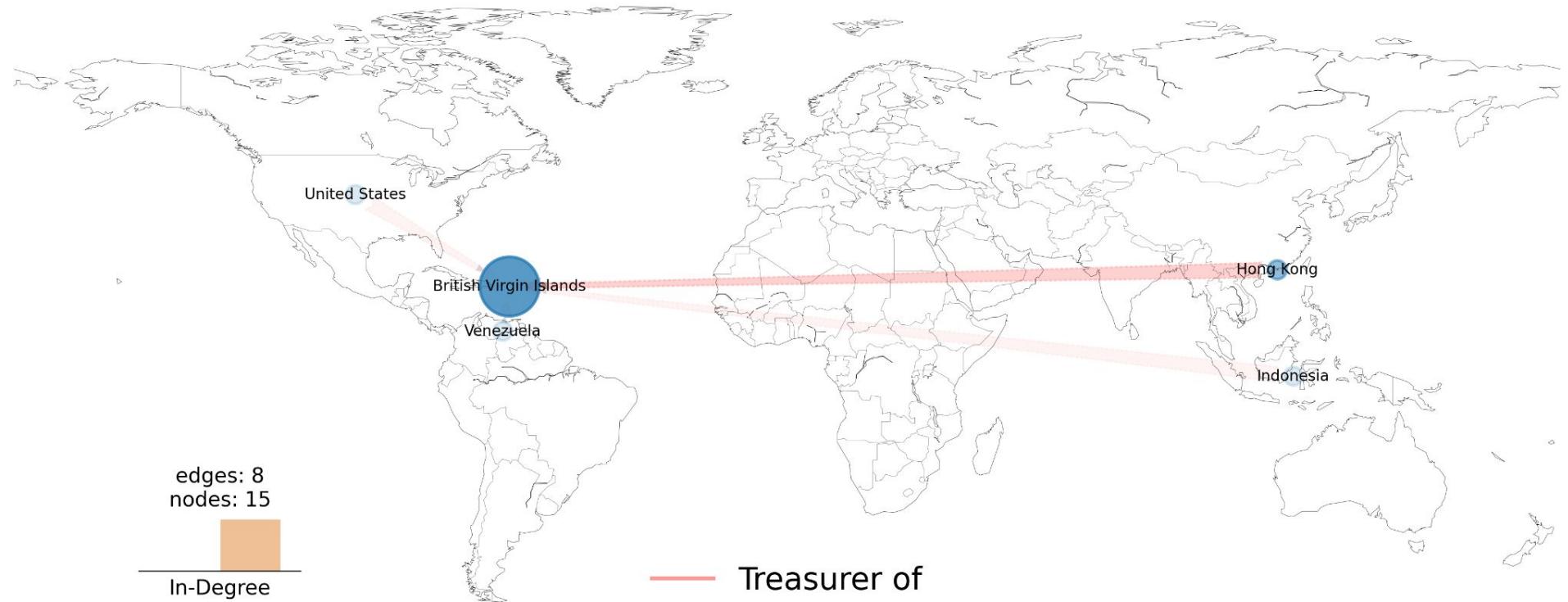




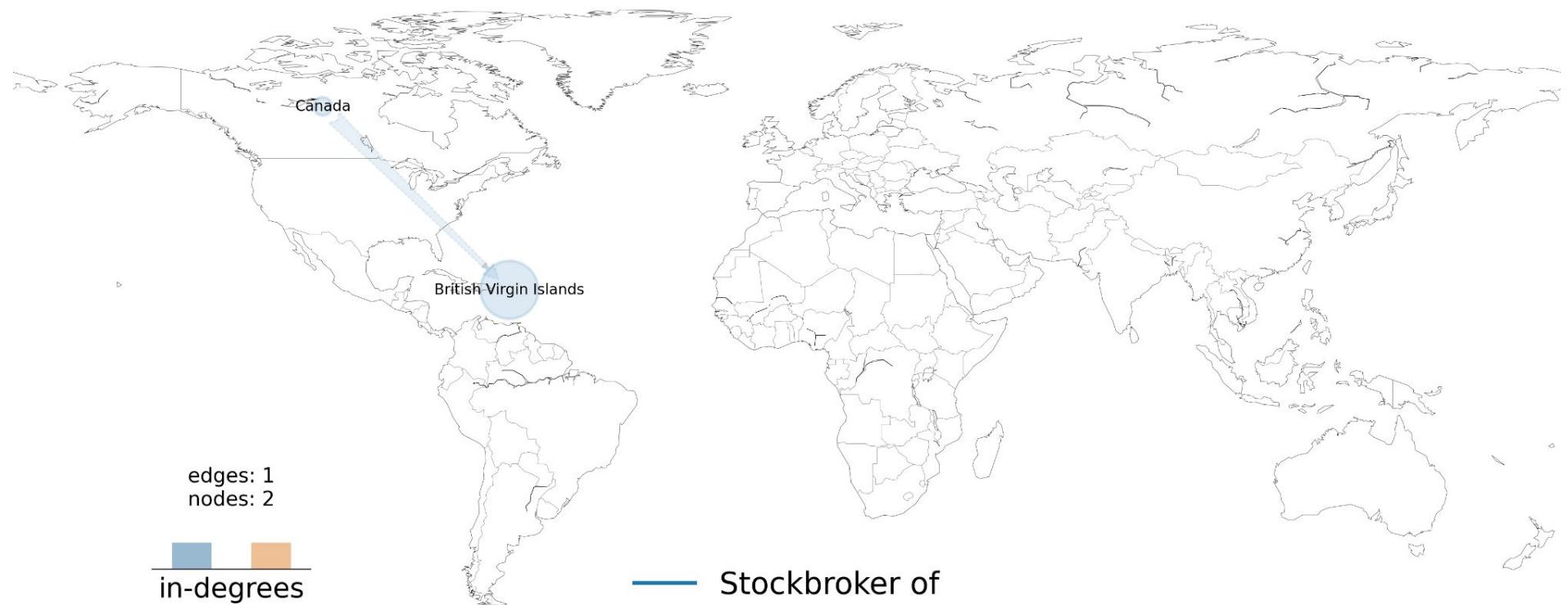
— Stockbroker of





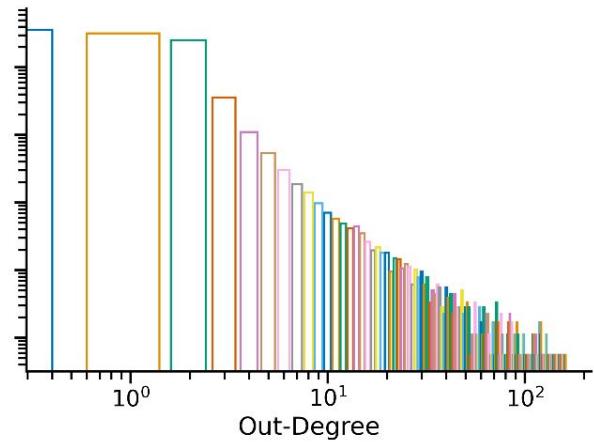
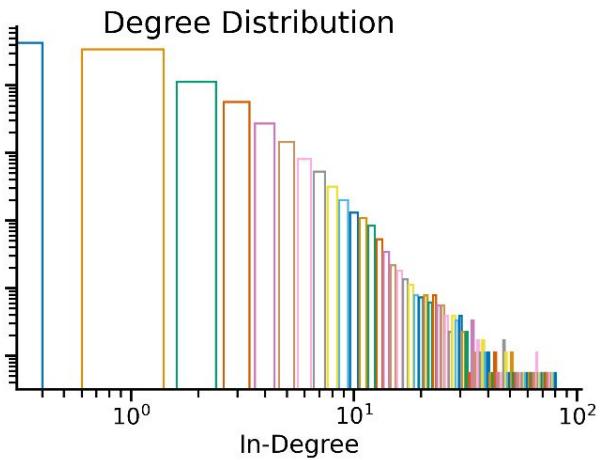
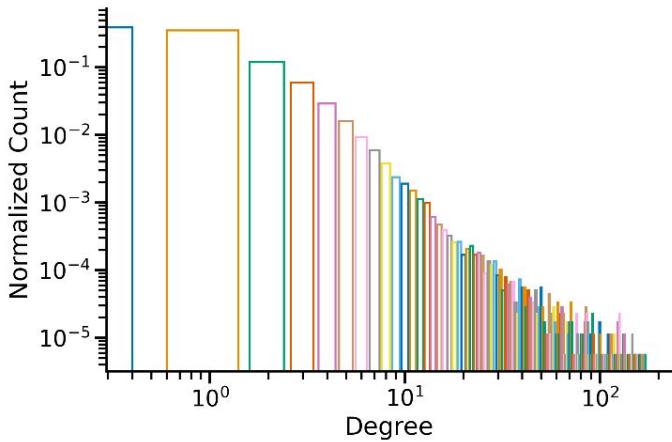




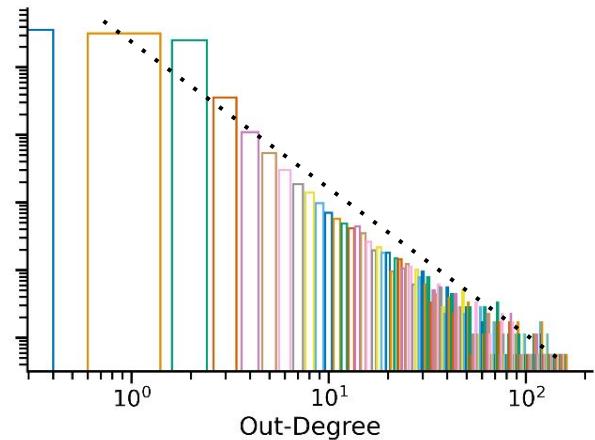
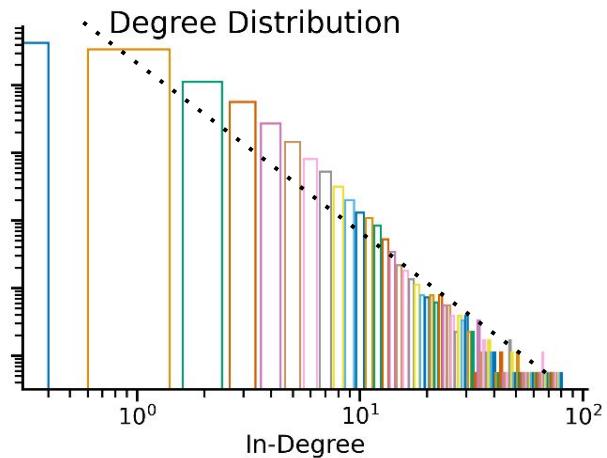
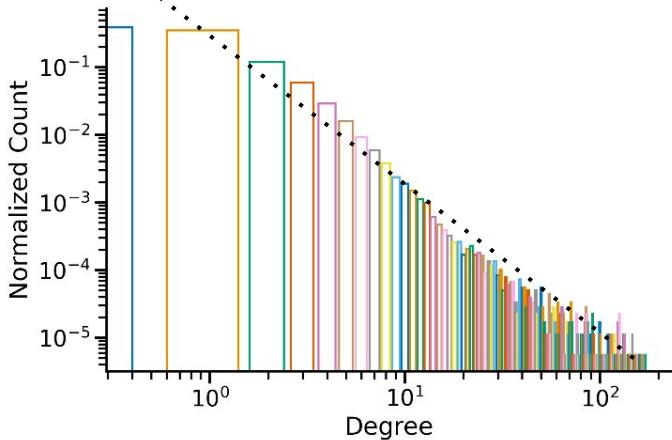


Degree Distribution

Degrees

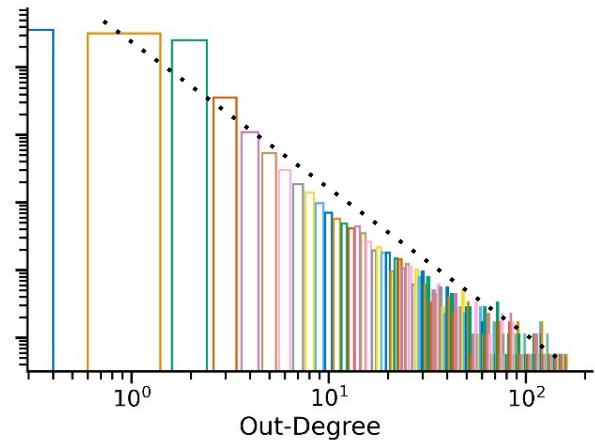
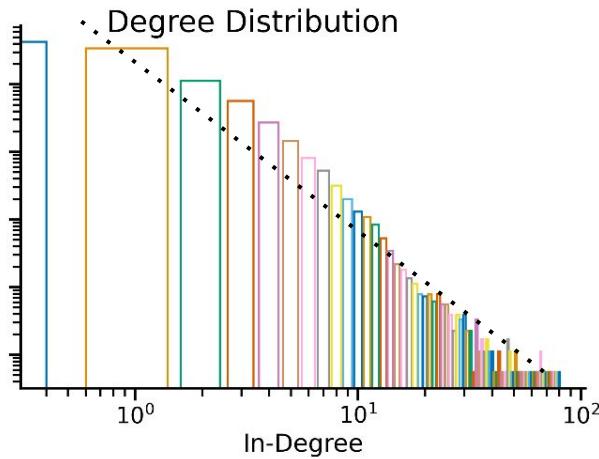
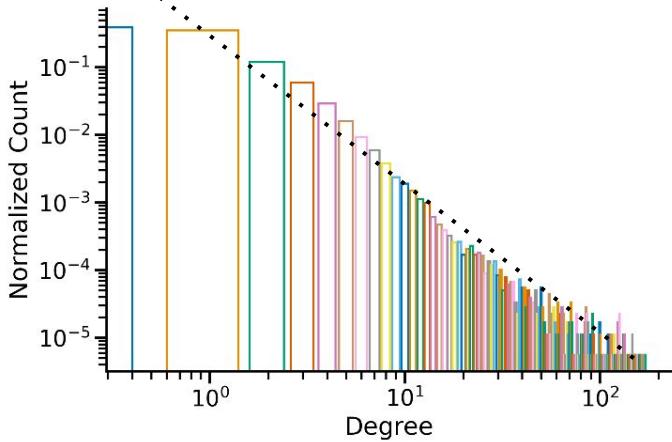


Degrees



Power Law

Degrees



Preferential attachment model

Interactive App:

Offshore Leaks Exploration [App](#)

Future Work:

- Use preferential attachment model assumption to predict future links between nodes
- Find pattern in network development in time
- Measure the robustness in the network

