

Introduction
to SNA

A. Žnidaršič

Islands

Line Islands

Vertex Islands

Cores

References

Introduction to Social Network Analysis with Pajek Day 2

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Outline

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Islands

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Islands

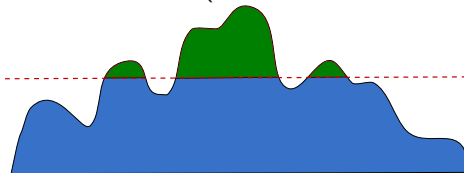
Line Islands

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If we represent a given or computed property of vertices(or lines as a height of vertices or lines and we immerse the network into a water up to selected property level we get **cuts**. Varying the level we get different **islands** (connected subnetworks).



An island is **simple** iff it has a single peak.

Commands in Pajek: Line Islands

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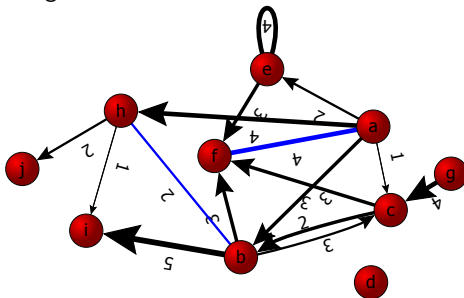
Commands in Pajek: Line Islands

If you mark first **Network/Create Partition/Islands/Generate Network With Islands** a new network with only lines constituting islands will be generated.

Network/Create Partition/Islands/Line Weights $[k, K]$

Draw a network: **Draw/Network+First Partition**

Weighted network:



Commands in Pajek: Line Islands

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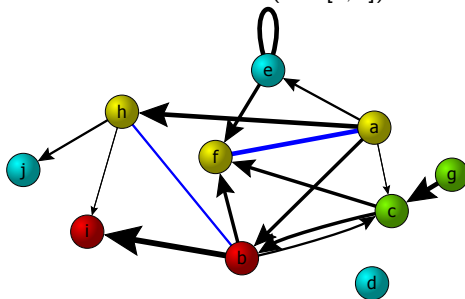
Commands in Pajek: Line Islands

If you mark first **Network/Create Partition/Islands/Generate Network With Islands** a new network with only lines constituting islands will be generated.

Network/Create Partition/Islands/Line Weights $[k, K]$

Draw a network: **Draw/Network+First Partition**

Network with line islands (size $[2, 5]$):



Commands in Pajek: Line Islands

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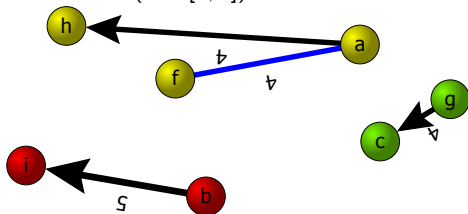
Commands in Pajek: Line Islands

If you mark first **Network/Create Partition/Islands/Generate Network With Islands** a new network with only lines constituting islands will be generated.

Network/Create Partition/Islands/Line Weights $[k, K]$

Draw a network: **Draw/Network+First Partition**

Line islands (size $[2, 5]$):



Commands in Pajek: Vertex Islands

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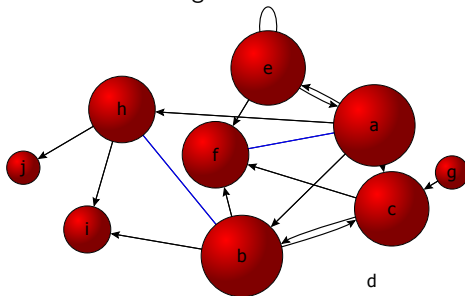
References

Commands in Pajek: Vertex Islands

First, vector of vertex weights (e.g. degree, betweenness scores,...) is needed.

Operations/Network+Vector/Islands/Vertex Weights $[k, K]$ Draw a network: Draw/Network+First Partition+First Vector

Network and alldegree values:



Commands in Pajek: Vertex Islands

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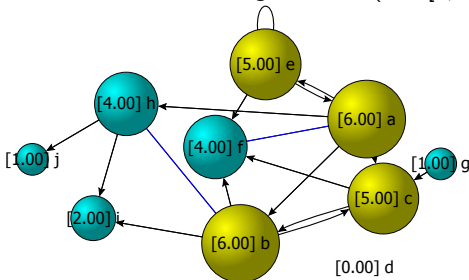
References

Commands in Pajek: Vertex Islands

First, vector of vertex weights (e.g. degree, betweenness scores,...) is needed.

Operations/Network+Vector/Islands/Vertex Weights $[k, K]$ Draw a network: Draw/Network+First Partition+First Vector

Network with vertex weight islands (size $[3, 4]$):



Commands in Pajek: Vertex Islands

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Commands in Pajek: Vertex Islands

If you want to draw only vertex island, the partition (and vector) have to be extracted first.

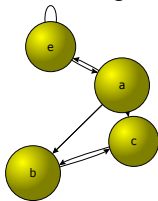
`Operations/Network+Partition/Extract SubNetwork/ [1-*`

Select partition with islands (and vector).

`Operations/Vector+Partition/Extract Subvector/ [1-*`

Draw islands:`Draw/Network+First Partition+First Vector`

Vertex weight islands (size [3, 4]):



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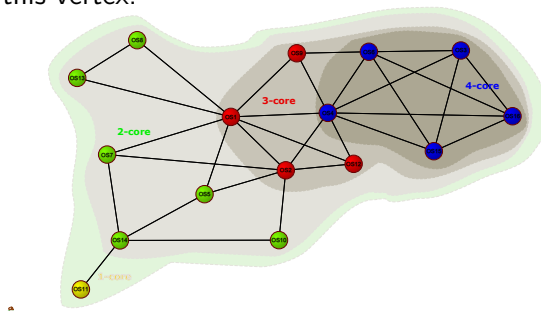
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A subset of the set of vertices is called a **k-core** if every vertex from the subset is connected to at least **k** vertices from the same set.

The **core number** of vertex **v** is the highest order of a core that contains this vertex.



By cores we can efficiently determine dense groups in the network.

Commands based on alldegree

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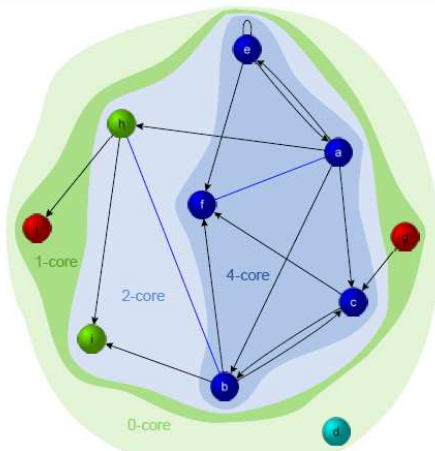
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Example network: k -cores based on all-degree



4-core:

$$C_4 = \{a, b, c, e, f\}$$

2-core:

$$C_2 = \{a, b, c, e, f, h, i\}$$

1-core:

$$C_1 = \{a, b, c, e, f, g, h, i, j\}$$

0-core:

$$C_0 = \{a, b, c, d, e, f, g, h, i, j\}$$

$$C_4 \subseteq C_2 \subseteq C_1 \subseteq C_0$$

Commands based on indegree

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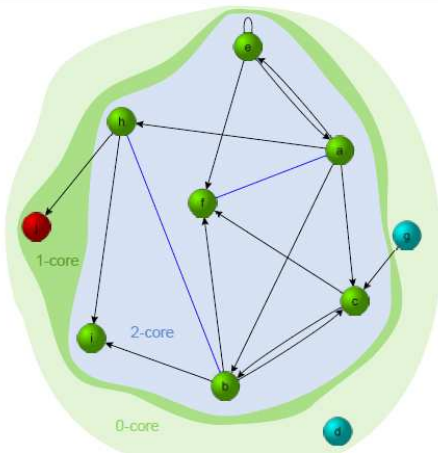
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Example network: k -cores based on in-degree



2-core:

$$C_2^{in} = \{a, b, c, e, f, h, i\}$$

1-core:

$$C_1^{in} = \{a, b, c, e, f, h, i, j\}$$

0-core:

$$C_0^{in} = \{a, b, c, d, e, f, g, h, i, j\}$$

$$C_2^{in} \subseteq C_1^{in} \subseteq C_0^{in}$$

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$$C_1^{out} = \{a, b, c, e, f, g, h\}$$
$$C_0^{out} = \{a, b, c, d, e, f, g, h, i, j\}$$

$$C_1^{\text{out}} \subseteq C_0^{\text{out}}$$

Commands in Pajek: Cores

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Commands in Pajek: k-Cores

k-Cores based on alldegree:

`Network/Create Partition/k-Core/All`

k-Cores based on indegree:

`Network/Create Partition/k-Core/Indegree`

k-Cores based on outdegree:

`Network/Create Partition/k-Core/Outdegree`

Draw network:`Draw/Network+First Partition`