



STEVENS
INSTITUTE *of* TECHNOLOGY
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Systemic Risk Analysis and Visualization

Weekly Update #4

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Project Overview

Main Objective:

- Produce information visualization of systemic risk dynamics as it grows in a financial network
- Apply financial complex network analysis to construct a systemic risk indicator for the network

Since Last Week:

- Created correlation matrices and calculated distances between 5 variables for each time period
- Researched packages and tools for network analysis and visualization

Plan for Next Week:

- Initial stages of constructing our model



Pre-Crisis

Correlation Matrix

	GSPC	VIX	3-month Treasury	Real Estate	Dollar Index
GSPC	1.0000000	0.35656729	0.56180376	0.86393978	-0.65373923
VIX	0.3565673	1.00000000	-0.08137371	0.05854364	-0.62599872
3-month Treasury	0.5618038	-0.08137371	1.00000000	0.80168737	-0.01036254
Real Estate	0.8639398	0.05854364	0.80168737	1.00000000	-0.40390067
Dollar Index	-0.6537392	-0.62599872	-0.01036254	-0.40390067	1.00000000

Distances

	GSPC	VIX	3-month Treasury	Real Estate	Dollar Index
GSPC	0.0000000	1.134401	0.9361584	0.5216517	1.818647
VIX	1.1344009	0.000000	1.4706282	1.3721927	1.803330
3-month Treasury	0.9361584	1.470628	0.0000000	0.6297819	1.421522
Real Estate	0.5216517	1.372193	0.6297819	0.0000000	1.675650
Dollar Index	1.8186474	1.803330	1.4215221	1.6756495	0.000000



US Financial Crisis

Correlation Matrix

	GSPC	VIX	3-month Treasury	Real Estate	Dollar Index
GSPC	1.0000000	-0.6736855	0.8705991	0.9755149	-0.8440189
VIX	-0.6736855	1.0000000	-0.4459645	-0.6268937	0.8000884
3-month Treasury	0.8705991	-0.4459645	1.0000000	0.8089889	-0.5474821
Real Estate	0.9755149	-0.6268937	0.8089889	1.0000000	-0.8417300
Dollar Index	-0.8440189	0.8000884	-0.5474821	-0.8417300	1.0000000

Distances

	GSPC	VIX	3-month Treasury	Real Estate	Dollar Index
GSPC	0.0000000	1.8295822	0.5087257	0.2212923	1.9204264
VIX	1.8295822	0.0000000	1.7005673	1.8038258	0.6323157
3-month Treasury	0.5087257	1.7005673	0.0000000	0.6180795	1.7592510
Real Estate	0.2212923	1.8038258	0.6180795	0.0000000	1.9192342
Dollar Index	1.9204264	0.6323157	1.7592510	1.9192342	0.0000000



EU Financial Crisis

Correlation Matrix

	GSPC	VIX	3-month Treasury	Real Estate	Dollar Index
GSPC	1.0000000	-0.59032984	-0.1729715	0.93896118	-0.15738116
VIX	-0.5903298	1.00000000	-0.2784967	-0.42725109	0.05443804
3-month Treasury	-0.1729715	-0.27849670	1.0000000	-0.15725232	0.57766160
Real Estate	0.9389612	-0.42725109	-0.1572523	1.00000000	-0.03694157
Dollar Index	-0.1573812	0.05443804	0.5776616	-0.03694157	1.00000000

Distances

	GSPC	VIX	3-month Treasury	Real Estate	Dollar Index
GSPC	0.0000000	1.783440	1.531647	0.3493961	1.521434
VIX	1.7834404	0.000000	1.599060	1.6895272	1.375181
3-month Treasury	1.5316472	1.599060	0.000000	1.5213496	0.919063
Real Estate	0.3493961	1.689527	1.521350	0.0000000	1.440098
Dollar Index	1.5214343	1.375181	0.919063	1.4400983	0.000000



Research Of Visualization Packages and Tools

Programming Language Options

- **R**

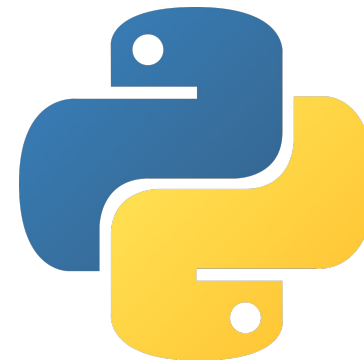
Pros: Consistent with rest of project, simple to implement, good packages

Cons: less resources available than python

- **Python**

Pros: Many visualization packages, lots of resources, simple to implement

Cons: inconsistent with rest of project



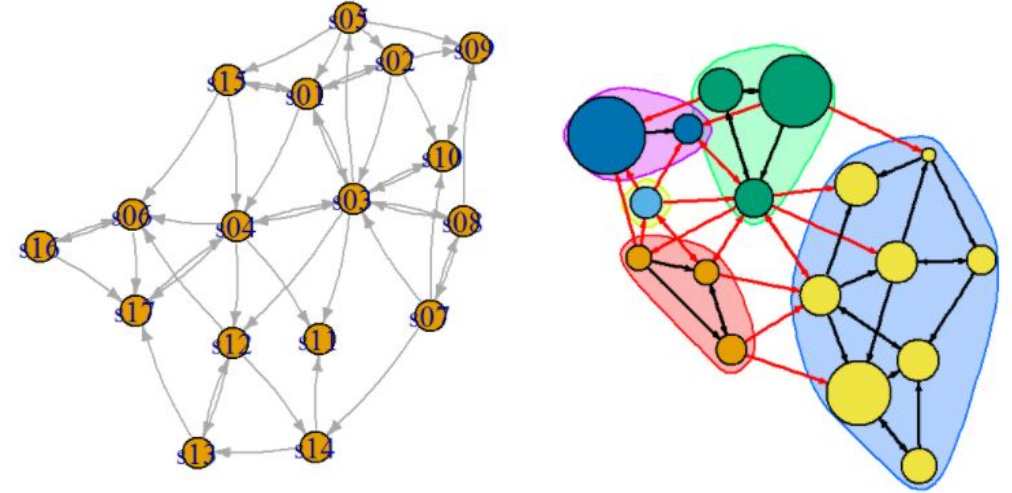
Research Of Visualization Packages and Tools (cont.)

Package Options - Both available in R and Python

- **igraph**

Pros: intuitive functions, efficient, easy to use

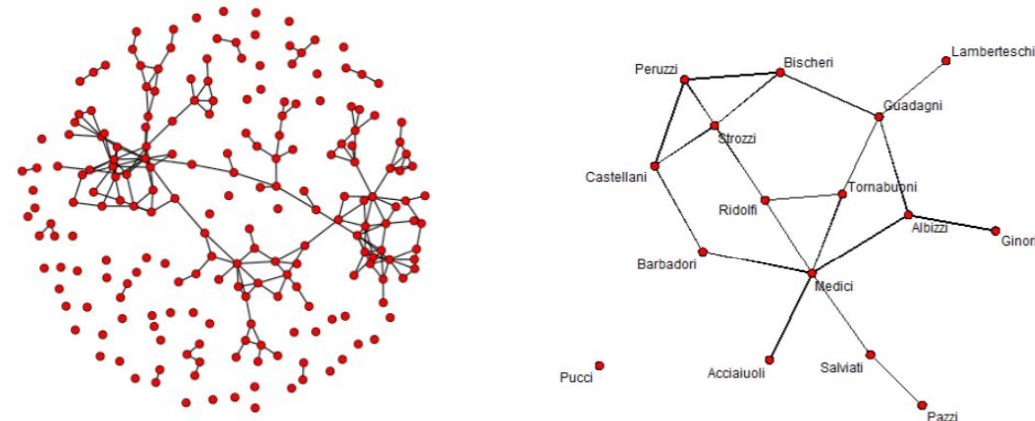
Cons: somewhat basic functionality, could have many requirements



- **statnet**

Pros: very extensive, suite of packages

Cons: higher learning curve





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Thank You!

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