

Step 1: Data Acquisition and Quality Control	Step 2: Exploratory Network Analysis	Step 3: Attribute Analysis
<ol style="list-style-type: none"> <li>1. Acquire Enron email network data with timestamps</li> <li>2. Check data quality by examining time stamps for errors and checking data shape</li> <li>3. Discard data with incorrect time stamps from the analysis</li> <li>4. Segment data into yearly and monthly chunks</li> </ol>	<ol style="list-style-type: none"> <li>5. From the segmented data create networks without temporal aggregation from the yearly and monthly data</li> <li>6. On these yearly and monthly networks derive centrality and network statistics</li> <li>7. Use the centrality and assortativity statistics to establish a signal for the graph time series.</li> <li>8. Derive network visualisations using clustered indices sorted adjacency matrices, node link and waveform diagrams</li> </ol>	<ol style="list-style-type: none"> <li>9. Using the Hilbert to derive a complex trace derive attributes commonly used in seismic data analysis</li> <li>10. Using the Fourier Transform to derive real frequency components to derive an audio signal derive Music Information Retrieval Attributes</li> <li>11. Derive additional novel attributes and those from literature</li> <li>12. For all the attributes above determine which graph matrix gives the best attributes by looking at the Normalised Laplacian, Modularity and Adjacency Matrix</li> <li>13. Use Entropy and Signal to Noise Ratio in addition to comparison with the signal of the benchmark measures in Step 2 to determine the best attribute set</li> </ol>
Step 4: Attribute Volume Derivation	Step 5: Attribute Volume Analysis	Step 6: Node Level Analysis
<ol style="list-style-type: none"> <li>14. Aggregate by averaging the Normalised Laplacian attributes derive an attribute volume for the graph time series at the monthly and yearly level scaling to [-1,1] interval</li> <li>15. From the monthly attribute volume explore aggregation measures such as the RMS, NRMS and Emergence</li> <li>16. Add these aggregation measures to the attribute volume to derive a final attribute volume</li> </ol>	<ol style="list-style-type: none"> <li>17. Use the attribute volume to compare signal of derived attributes to benchmark measures noting anomalies</li> <li>18. From the attribute volume derive Pearson correlation matrix, Correlation Network, Correlation Network degree Histograms</li> <li>19. Explore attribute similarity through additional techniques such as MDS and TSNE</li> <li>20. Using the Average Degree as a predictive target perform Regression Analysis to derive feature ranking of attributes using a 50/50 train/test split</li> </ol>	<ol style="list-style-type: none"> <li>21. Use the yearly networks to identify common nodes</li> <li>22. Use the centrality measures to explore the trends of these nodes over the course of the yearly timescales</li> <li>23. Compare their behaviour to the yearly signal of the network in general noting correlations and anomalies.</li> </ol>