Probability with Engineering Applications
ECE 313 – Section C – Lecture 16

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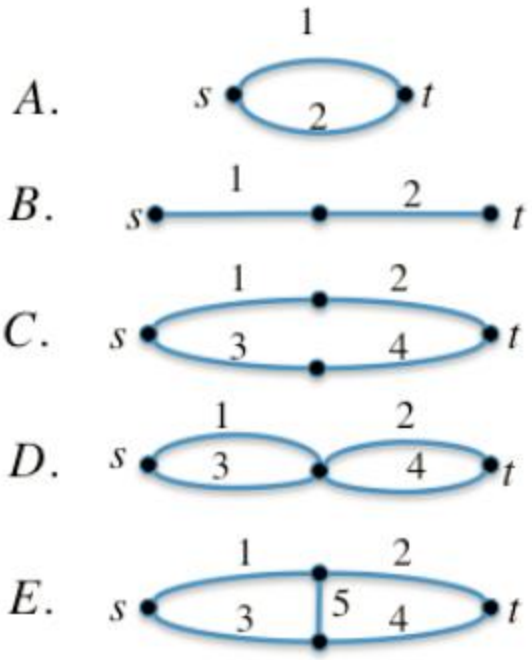
Network Reliability

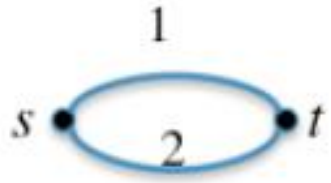
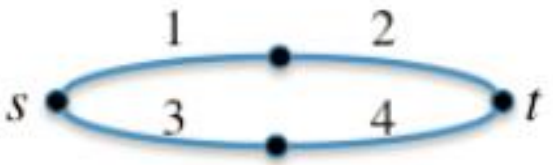
- An s–t network consists of a source node s, a terminal node t, possibly some additional nodes, and edges that connect pairs of nodes



Various combinations of series/parallel connections

Network Reliability

- Let F_i be the event that edge i fails, with probability p_i, independently for each edge
- Network outage is said to occur if at least one link fails along every s–t path, which is the event F
- Want to find $P(F)$ either exactly or approximately

		$P(F)$
A.		$p_1 p_2$
B.		$p_1 + p_2 - p_1 p_2$
C.		$(p_1 + p_2 - p_1 p_2)(p_3 + p_4 - p_3 p_4)$
D.		$p_1 p_3 + p_2 p_4 - p_1 p_2 p_3 p_4$

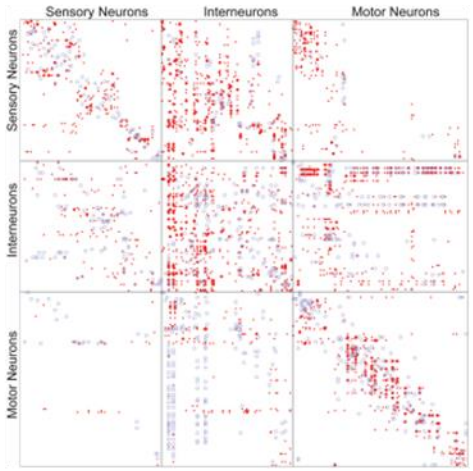
Boole's Inequality (Union Bound)

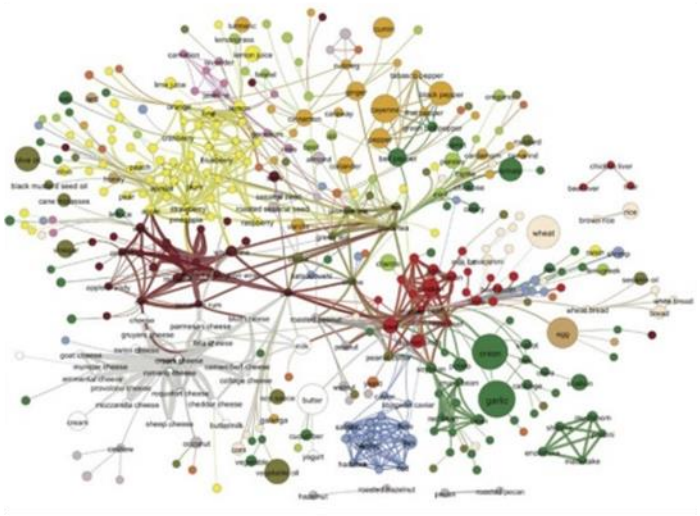
- For a countable set of events $A_1, A_2, \ldots$, we have:

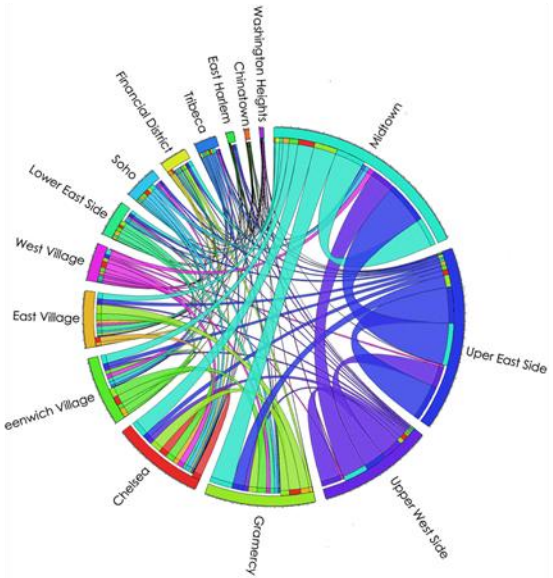
$$P\left(\bigcup_i A_i\right) \leq \sum_i P(A_i)$$

New Course

ECE 498LV — Network Science: Dynamics and Flow
Spring 2018







- Can we predict the behavior of the nematode *C. elegans* by looking at the connectivity pattern of its neurons?
- Can we characterize the pulse of life in New York City by looking at flows of taxi cabs?
- Can we design flavorful culinary recipes by understanding knowledge on shared flavor compounds in ingredients?

By taking an engineering perspective on network science, we can address these problems; more traditional problems in communications, computing, and power; and more!