Hyperbolic routing in NDN

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Outline

- Popularity versus similarity
- Hyperbolic experiments with the testbed
- Conclusions
Validation

- Take a series of historical snapshots of a real network
- Infer angular/similarity coordinates for each node
- Test if the probability of new connections follows the model theoretical prediction
Why relevant

• Hyperbolicity emerges in very different networks with very different “addressing”
  – Addressing does not really matter
  – Hyperbolicity = popularity \times similarity
  – NDN namespace will likely be hyperbolic

• We can use the model for greedy routing in the testbed (Van’s suggestion #2)
Take-home message

• Prepending names with the AS numbers or organization IDs (OIDs) of the corresponding content producers, and then applying hyperbolic greedy routing in the AS/OID graph (Map-Encap), will work efficiently

• Any workable ideas about routing directly on names are still welcome 😊
To do or not to do?

• Is the WWW hyperbolic and navigable?
  – The Web is closest to a “future NDN content space”

• Showing that it is hyperbolic will further support our claims that the NDN name space will likely be hyperbolic

• This is necessary but not sufficient condition!
  – What are the relationships between this namespace and “routerspace” (router topology)???
  – How can routers compute their coordinates in the namespace using only local information???
  – Should we do simulations or some “content flow” modeling to relate the two spaces???

• M. Boguñá, F. Papadopoulos, and D. Krioukov, *Sustaining the Internet with Hyperbolic Mapping*, *Nature Communications*, v.1, 62, 2010

• D. Krioukov, F. Papadopoulos, A. Vahdat, and M. Boguñá, *Hyperbolic Geometry of Complex Networks*, *Physical Review E*, v.82, 036106, 2010,
  *Physical Review E*, v.80, 035101(R), 2009