

Assignment

The Abilene network was a high-performance backbone network for the Internet2 community (https://en.wikipedia.org/wiki/Abilene_Network):



The network spanned the United States with 12 “points of presence” (PoP).

Your task for this assignment is to implement an optimal routing strategy for the Abilene Network. By optimal, we mean that for a given traffic matrix, you should find the set of paths that minimizes the maximum congestion ratio. As input, you will use real-world data sets from historical workloads. The workloads are publicly available here:

<https://www.cs.utexas.edu/~yzhang/research/AbileneTM/>

The formats for the data sets are described in the following readme file:

<https://www.cs.utexas.edu/~yzhang/research/AbileneTM/readme.txt>

We will consider just one file, X01, which has one week of trace data. The file has 2016 rows. Each row is taken at a 5-minute interval ($12 \times 24 \times 7 =$ the number of 5-minute intervals in a week). To simplify, you can assume that there is one host connected to each switch in the Abilene Network, so there are 12 hosts total. Each line consists of space-separated numbers representing five demand matrices, each consisting of 144 entries (12×12). The first matrix corresponds to actual measured demands, while the remaining four matrices correspond to demands predicted using different techniques. For your assignment, you only need consider the first matrix of each row (first 144 out of 720 entries).

You will need to write a program that:

- Reads a description of the network topology (your choice of format).
- Reads and parses the traffic demands.
- Formulates an LP program to compute the optimal set of paths.
- Invokes an LP solver to find the paths.
- For every demand matrix, prints the (optimal) congestion ratio.