FRANCESCO CALABRESE

DATA AND SYSTEM ARCHITECTURE

For the New York Talk Exchange project, the MIT senseable city lab developed a software platform to collect AT&T’s IP and voice call data related to international telecommunications connections between New York City and the rest of the world. The focus of the project was to represent this dynamic data graphically so that visitors to the MoMA exhibition could grasp the richness of this type of global telecommunications activity. In considering which visualizations to compose for the exhibition, we had to think carefully about each data type’s characteristics.

Internet Protocol Flows

The data represents the amount of bytes transmitted from and to New York, and is classified either as incoming or outgoing. Incoming data refers to streams of bytes reaching a location in New York from a server located abroad. Outgoing data refers to streams of bytes originating in New York and sent to a server located elsewhere in the world. The IP flows are characterized based on the type of packets exchanged and the type of application involved (such as web browsers, email, peer-to-peer). This allows a differentiation between the kinds of uses of the Internet, such as synchronous communication when there are active participants on all ends and asynchronous communication in the instances when a user connects to a remote server.

The IP flow examined in this project includes all of the Internet traffic going through the AT&T backbone network via one of the network hubs in the tri-state area. The locations at the other end of the stream are derived by geocoding the IP addresses of the packets, which offer a locational accuracy at the city level. The data shows over 35,500 cities from more than 200 countries connecting to New York via AT&T’s backbone network.

Voice Call Data

The voice call data represents the amount of long-distance calls received and made from New York City. A call originates and terminates in New York City if a landline or wireless call connects to a switch or base station controller located in one of the five boroughs of the city. The location of these switches is mapped to geographical coordinates with an average accuracy of 500 meters. The location at the other end of the line is calculated by geocoding the country and city code of landline phones and only the country code for wireless phones. The data from AT&T’s telephone network reveals that there are more than 27,200 different cities from approximately 250 countries connecting to New York City.

DATA TRANSFER AND VISUALIZATIONS

To feed a secure server at the MIT senseable city lab in Cambridge, Massachusetts, AT&T Labs Research customized their aggregated IP and voice traffic data to update every ten minutes. For the MoMA exhibition, the senseable city lab server collected the IP and voice call data from AT&T and ran custom-designed software to analyze it and assign the appropriate geographic references. The resulting visualizations were done using Java programming language and Processing software.

The senseable city lab servers subsequently sent visualized data to two computers at The Museum of Modern Art in New York, which produced dynamic representations of the telecommunications activity by running different algorithms. Snapshots of the visualizations displayed at the Design and the Elastic Mind exhibit are included in the foldout of this book.