Modeling Traffic in Detail with Cube Avenue

Opening powerful new possibilities for traffic analyses

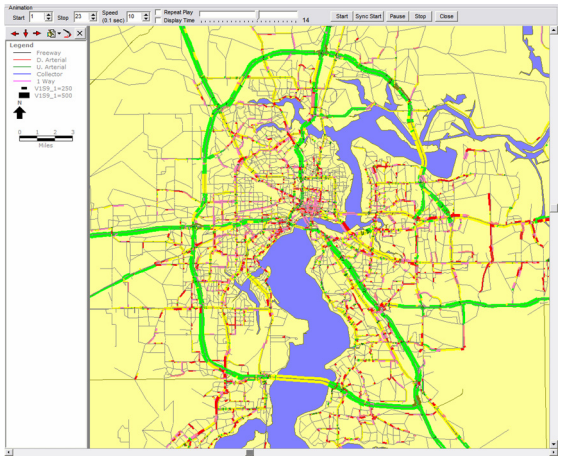
Cube Avenue, an extension to Cube Voyager, offers transportation professionals an innovative tool for analyzing traffic. Cube Avenue is a mesoscopic model—it models traffic at greater levels of detail than macroscopic models, like Cube Voyager's Highway program, and at lesser levels of detail than microscopic models, like Cube Dynasim. With Cube Avenue, analysts can study problems for which traditional models don't provide enough data and for which microscopic models provide too much data.

By explicitly modeling time, Cube Avenue offers the ideal environment for many studies, such as comparing policies for alleviating peak period congestion or examining the effectiveness of emergency evacuation plans. Indeed, pioneering transportation professionals can use Cube Avenue to meld planning with real-time operations, examining likely impacts of operational responses before implementation.

How Cube Avenue differs

Traditional transportation models, such as Cube Voyager's Highway program, use macroscopic techniques to study the flow of traffic from point to point. These models treat the entire volume of traffic traveling between an origin and destination as a single unit. The models compute the lowest-cost path for the traffic volume and compute congestion effects on a gross scale, using volume-capacity ratios and estimating resulting speeds.

In contrast, Cube Avenue uses mesoscopic techniques to study traffic flow over time. You specify the level of detail, for vehicle, time, and network inputs. For example, you can examine traffic as individual vehicles or as platoons of multiple vehicles. You can specify time increments in terms of minutes or hours. And you can specify intersection characteristics, if desired. Using your inputs, Cube Avenue computes the lowest-cost path for each vehicle unit, based on its departure time, and computes interactions among vehicle units as they travel through the



Predict speed and flow on all roads by time

Citilabs, Inc.
312 Clay Street, Suite 180
Oakland, California 94607, USA

World Wide Web
www.citilabs.com

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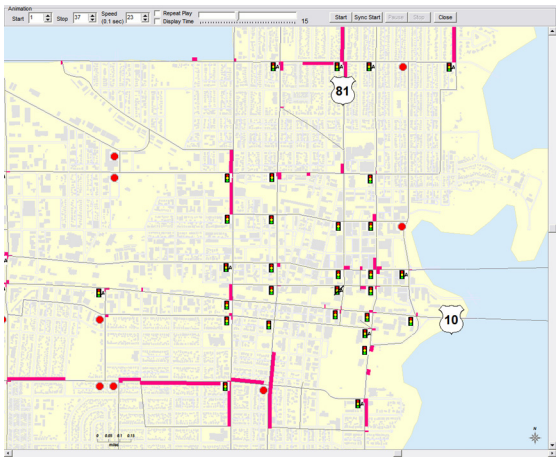
network. Cube Avenue estimates travel speeds based on vehicle density on road segments during each time increment. Because Cube Avenue models time explicitly, you can study time-specific policies, such as variable road pricing or lane closures.

Another Cube module, Cube Dynasim, uses microscopic techniques to present the most detail. A microsimulation model, Cube Dynasim models each vehicle explicitly and captures detailed movements and interactions, such as vehicle acceleration and lane merges. Such detail makes Cube Dynasim the ideal tool for studying infrastructure geometry and traffic control systems or for studying multimodal projects, such as the interactions between pedestrian and vehicle flows. Of course, these detailed results require detailed inputs. Cube Avenue, on the other hand, produces details useful for many studies and requires less-detailed inputs—Cube Avenue requires about the same amount of data as a regional model.

Uses of Cube Avenue

By considering new levels of detail, Cube Avenue allows you to complete new types of analyses. With Cube Avenue, you can:

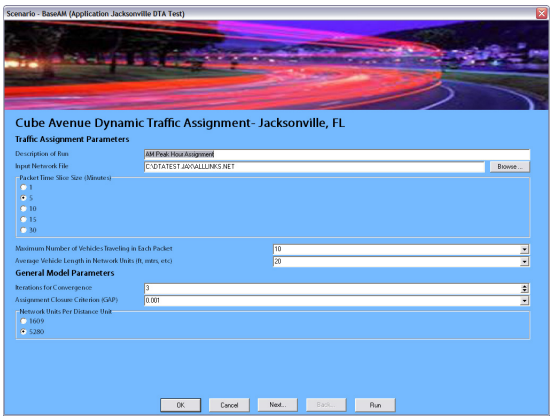
- Quantify impacts of upstream traffic congestion
- Measure queuing at intersections and merge points in a network



Isolate queues by length and time

- Isolate secondary impacts from one intersection through another
- Evaluate the benefits of ITS (intelligent transportation system) projects
- Simulate alternative infrastructure, operational, and policy changes to optimize emergency evacuation plans and strategies
- Test strategies to improve arrival and departure from stadiums and other special-event facilities

Cube Avenue is easy to use and works with traditional four-step transportation planning models or with any model type that uses highway assignment. You implement Cube Avenue with standard Cube Voyager commands and scripts. Therefore, current Cube Voyager users can easily implement a Cube Avenue model, often in less than an hour.



Apply Cube Avenue with Cube's model menu

Data inputs

Most urban areas can use existing data in their regional transportation model to implement Cube Avenue. Cube Avenue inputs include:

- Roadway network in Cube Voyager format
- Peak period trip tables
- Vehicle storage area (vehicles per distance)
- Roadway distance, capacity, and lanes
- Traffic signal locations and characteristics

Dynamic assignment process

Cube Avenue is a dynamic equilibrium assignment model. Cube Avenue loads and tracks the movement of vehicle packets throughout the highway network. Vehicle packets can be any size—from an individual vehicle up to platoons of 20 or more vehicles.

Cube Avenue explicitly simulates traffic flow and traffic control systems. Cube Avenue models traffic signals, roundabouts, stop-controlled intersections, and ramp merges. Vehicle packets move, stop, and queue through upstream roads and intersections.

Through an iterative process, Cube Avenue calculates optimal network conditions. Typically, the model converges in several iterations, an extremely fast process for smaller systems and quite feasible for large urban areas. Indeed, modelers have successfully applied Cube Avenue on areas with 3,000 zones and 25,000 links.

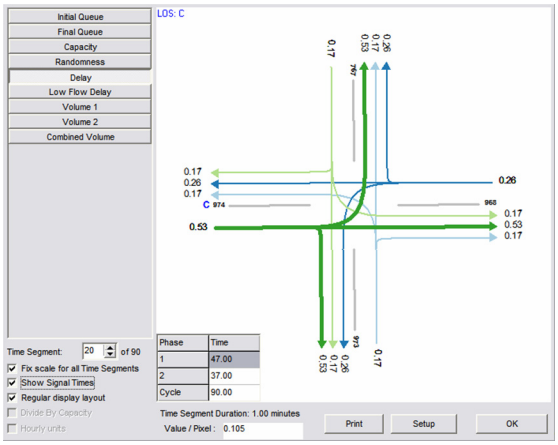
Performance measures

Cube Avenue produces performance measures for time periods that you specify. For example, you can specify 15-minute results, one-hour results, or even one-minute results.

Output performance indicators include:

- Total traffic volume on a road link
- Total traffic in queue
- Link operating speed and travel time
- Link occupancy/utilization
- Intersection LOS and operating conditions

When combined with Cube Base, Cube Avenue can help you analyze and visualize future operating conditions under various demands and road management strategies.



View intersection flow details by time

Examining results

Cube Avenue provides printed reports and data in standard Cube Voyager formats. You can view and animate the data files with Cube Base, and you can summarize the data with the charting and table functions in Cube Reports. Using standard Cube functions, you can easily compare alternatives.

Can I try it out?

Definitely. Citilabs is currently offering 30-day trial licenses of Cube Avenue to existing clients. Contact your sales representative today at sales@citilabs.com to organize a trial.

Cube Avenue is one of the many innovative and market-leading solutions developed by Citilabs—the leader in transportation planning software solutions.