

Transients: a Transit Visualization

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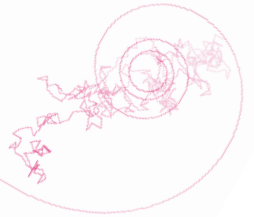
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Abstract: *Transients* is a series of generative animations inspired by the notions of flow, ephemerality and transitory states. The underlying structure of these animations is a database created using GPS data from the Toronto public transit system. The data, available on the web through the Toronto Open Data portal, includes the location, routes and stops of every bus and streetcar in the system, as well as the arrival times of trains within underground subway stations. Custom software created by the artist establishes an aesthetic framework for the data to unfold within, balancing artistic and algorithmic decisions alongside existing patterns within the data.



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1. Context

This work was curated by Sharon Switzer and was developed as a specially commissioned, site-specific installation for Pattison Onestop and Art for Commuters, in the context of Scotiabank Nuit Blanche, an all-night contemporary art festival. *Transients* was exhibited on over 300 information screens operated by Pattison on subway platforms across the Toronto transit system. The work was presented without interruption, replacing the news and advertisements otherwise typically shown on these screens. The animations generated for this work had a total runtime of 12 hours, in order to coincide with the duration of the event.



Fig. 1. The work running on an information screen.

2. Artist Statement

The motivation behind *Transients* is to look at the mundane, everyday nature of transit activity within the city, and present this information from a different perspective than what is typically experienced by commuters. Through animations generated by custom software, motion patterns are slowly revealed using colorful ribbons unfolding according to the paths taken by vehicles. The work provides an opportunity for the audience to become aware of the behavior of the network, as well as to reflect on how they become a part of this larger system by riding transit.

The software alters the scale of the representation over time, going from a bird's eye view to extreme close-ups on individual routes, shifting the focus between the network as a whole (Fig 1) and the seemingly meandering motion of a single vehicle (Fig 2).



Fig. 1. A video excerpt showing motion patterns across the network (<http://vimeo.com/57697210>).

By definition, the term *transient* refers to the commuters; the people in motion, the temporary guests, who are the primary audience for this work. However, the title also implies the notion of ephemerality. Like an improvised performance, the motion patterns of hundreds of vehicles across the city generates an intricate composition. The movement is not rehearsed, yet it follows a specific structure dictated by the routes and timetables. This dance of the trajectories exists in the moment, and as such can only be perceived when captured and represented by a system such as *Transients*.

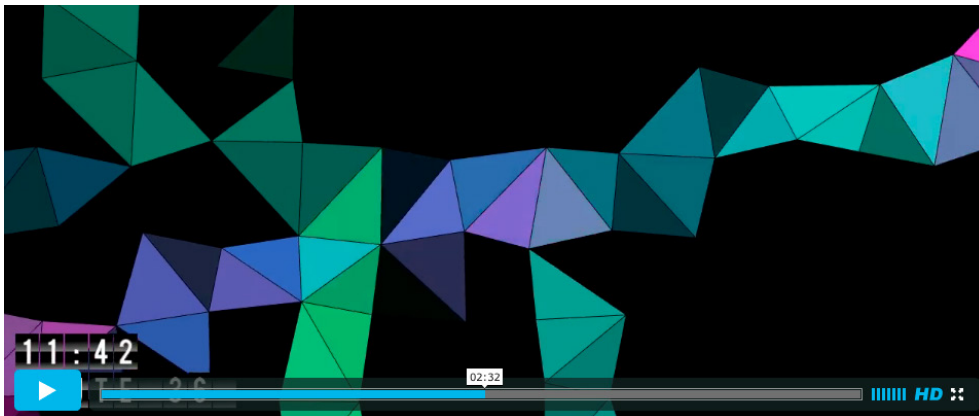


Fig. 2. An example of a close-up, shifting the focus on the motion of individual vehicles (<http://www.vimeo.com/57697214>).

This work is positioned as a form of artistic data visualization. (Viegas/Watternberg, 2007) While it is based on actual data, its aim is not to analyze or represent, but rather to evoke a particular emotion using the underlying data as a driving force. The map metaphor is used as a starting point, but is transformed (particularly at the extreme close-up scale) to the point of not always being recognizable as such.

Another major preoccupation behind this work is an exploration of generative methods within the creative process. *Generative* is sometimes a contested term, but broadly speaking can be defined as following rule-based or mathematical structures, operating in real-time and created with an emphasis on critical concerns for the process of production. (Cox 2002) In the case of *Transients*, the rules are not purely mathematical in nature,

yet the data, which informs the work, is unpredictable and subject to infinite random variations introduced by the real world.

The approach used in creating the work (a real-time software program, as opposed to a static rendering of the data) ensures that the work has some degree of autonomy, introduced by variations within the external data as well as occasional elements of randomness in the rules established to interpret the data. As such, it is a reflection on the notions of artistic control and authorship. (Galanter 2003) The software establishes an aesthetic framework for the data to unfold within; but ultimately the outcome represents the careful balance of thoughtful algorithmic decisions alongside existing patterns within the data itself over which the artist has no control.

3. Process

The initial step for the realization of this work was to collect and process the GPS vehicle data offered by the city's public feed. An automated system was put in place to query and collect the information for individual vehicles over time. The data was then compared against known route topology to filter errors and outliers. The software also performed interpolation between GPS updates in order to generate fluid animations and motions paths.

A real-time visualization engine was then developed to explore, verify, and understand how the data behaved over time. The engine included basic features such as zoom, pan, time controls and vehicle lock-on (the latter eventually became one of the main mechanisms of the final piece).



Fig. 3. The transit map, viewed within the development engine (<http://vimeo.com/57697208>).

After experimenting with the engine, variables were selected to vary within the final work: route number, time of day, speed factor, map scale and route color. The map itself was removed and replaced by a randomly generated triangle mesh. Initially invisible, triangles are revealed and tinted when touched by the path of a vehicle. The result is a series of intertwined ribbon-like shapes, which unfold according to the vehicle's motion. The camera follows selects a route to follow at random, and occasionally jumps from one route to another when two the path of vehicles intersect.

The structure and impression of the transit map remains, albeit in a more abstract form. In order to provide context to the audience, the names of subway stations were left

in their original locations as landmarks, hinting at the actual geography represented by the ribbons. The route number currently being tracked by the engine, as well as the time of day being represented were also included as overlays.

While the engine was capable of generating the visuals in real-time, constraints of the display platform for the exhibition required animations to be pre-rendered and at most 5 minutes long. As such, a script was used to create a playlist of unique short clips, each seeded with randomized starting conditions.

Additional video excerpts from the work are available online on the project's website at <http://www.onestopallnight.com/12>.

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References

Viégas, Fernandes and Wattenberg, Martin. *Artistic Data Visualization: Beyond Visual Analytics*, Online Communities and Social Computing, pp. 182–191. Springer Berlin Heidelberg, 2007.

Cox, Geoff. *Generator: the dialectics of orderly disorder*, Creativity & Cognition, pp. 45–49, 2002.

Galanter, Philip. *What is generative art? Complexity theory as a context for art theory*. 6th Generative Art Conference, 2003.