Can Infopipes Facilitate Reuse in a Traffic Application?

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Can Infopipes Facilitate Reuse in a Traffic Application?

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Calculating truck volume on roadways is important in planning, design, and policy decisions. While modern highway instruments can very accurately measure truck volume, many US highways are equipped with antiquated equipment that is designed to detect only total volume.

Infopipes are presented as reusable building blocks for streaming applications. To evaluate this claim, we have built a significant traffic application in Smalltalk using Infopipes. This poster presents a traffic problem and solution, a short introduction to Infopipes, and the types of reuse Infopipes facilitate in our implementation.

We implemented an algorithm described by Kwon and colleagues*. This algorithm allows truck volume to be accurately estimated on a segment of highway using single induction loops. Our implementation of this algorithm is representative of a current, real-world traffic analysis application.

The algorithm rests on two basic assumptions about highway traffic:

1. The innermost lane contains no trucks.
2. Velocity in adjacent lanes is closely correlated.

We used some Infopipes to visualize the data from single induction loops. Each pulse represents a vehicle passing over a loop.

General-purpose Infopipes should be reusable in any application. Below is a class hierarchy of some well known Infopipes.

Infopipes can be subclassed to specialize behavior. In this application, eight Infopipes reused behavior from their superclass. For instance, a VehicleCounter has the same control, data flow, and connection semantics as a Buffer, so a VehicleCounter is a natural subclass of Buffer.

Infopipes can be reused by instantiating the same Infopipe class in different contexts. For instance, one VehicleClassifier was used for each lane in the HighwayVehicleClassifier.

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