Supporting Real-Time Visual Analytics in Neuroscience*

Enrique Arriaga-Varela**
UAG
Mexico

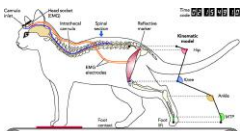
Javier A. Espinosa-Oviedo
BSC-LAFMIA
Spain

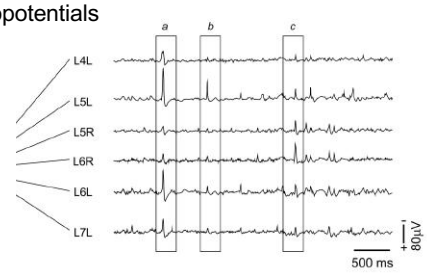
Genoveva Vargas-Solar
CNRS-LIG-LAFMIA
France

Rogelio Dávila Pérez
UAG
Mexico

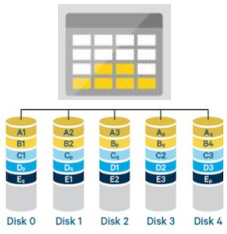
Visual Analysis of Neurons Activity

Data Acquisition
Continuous monitoring of biopotentials





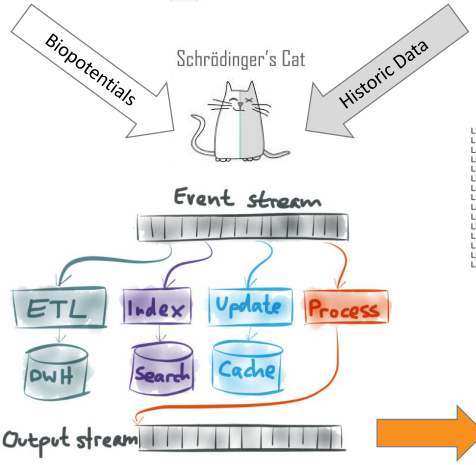
Data Storage
Archival of data as files



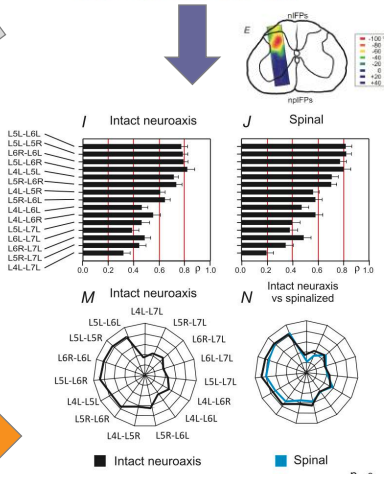
Problems
- Analysis conducted postmortem and cannot be used for guiding the experiment
  - 1 subject = 1 experiment (*and only one*)

Objective
- Built real-time system for visually analyzing data streams

Challenges
- **Stream processing**
  - High-speed & rate variations (velocity)
  - Combine streams with historical data
  - Define RAM, CACHE and DISK strategies (volume)
- **Visualization**
  - Display large & dense datasets
  - Interactive plots over streams



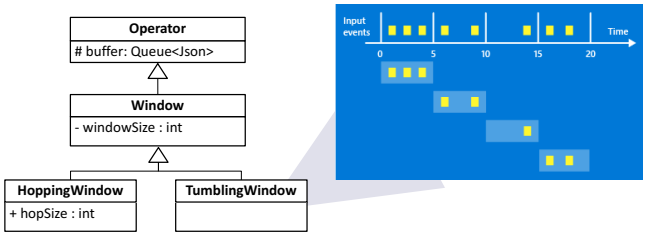
Real-Time Visual Analysis
stream + databases + dataviz



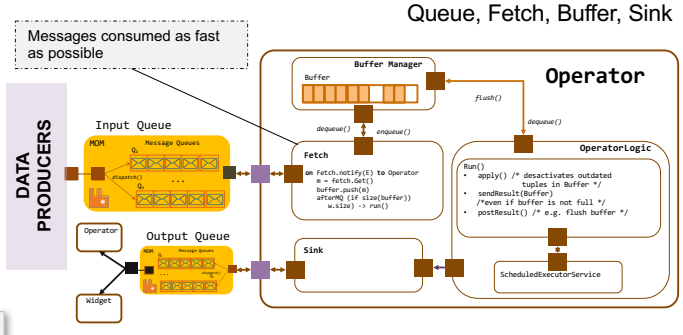
Visual Exploration
Pattern and causal relationship discovering

Towards a Visual Stream Processing System

Stream Operator *(core concept)*
Software component in charge of processing data

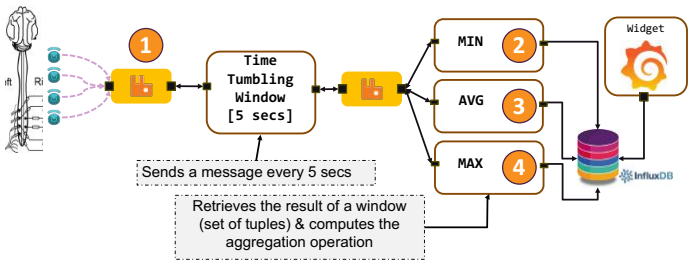


Operator Architecture
Queue, Fetch, Buffer, Sink



Example: 1

1. *Give me the evolution of intensity of pain in L4ci*
2. *Give me the evolution of the minimum, average, maximum and intensity of pain in L4ci every three 3 seconds* 2 3 4



* Special thanks to Diogenes Chavez from the CINVESTAV Department of Physiology, Biophysics and Neuroscience for providing the datasets used in this work.
** Master student funded by the Mexican CONACyT. Currently in internship at BSC with CONACyT support.