Insite
A Generalized Pipeline for In-transit Visualization and Analysis

Simon Oehrl¹, Jan Müller¹, Ali C. Demiralp¹, Marcel Krüger¹, Sebastian Spreizer²,³, Benjamin Weyers³, Torsten W. Kuhlen¹

Visual Computing Institute, RWTH Aachen University, Germany
Albert-Ludwigs-Universität Freiburg, Germany
Human-Computer Interaction, University of Trier, Germany

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What’s Insite?

Meta-information
Spike / voltage data

HTTP Endpoint

JSON

Client
What’s Insite?

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API

- Closely developed for visualization needs with focus on ease of use
API

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Features

- Query simulation time

```json
GET /simulation_time_info
{
  "start": 1000.0,
  "end": 2000.0,
  "time_step": 0.1,
  "current": 1140.1
}
```
API

- Closely developed for visualization needs with focus on ease of use

Features

- Query simulation time
- Query neuron IDs

GET /gids

[ 0, 1, …, 10000 ]
API

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Features
- Query simulation time
- Query neuron IDs
- Query populations

GET /populations

[ 0, 1, 2, 3 ]

GET /population/0/gids

[ 0, 1, ..., 2499, 2500]
API

- Closely developed for visualization needs with focus on ease of use

Features

- Query simulation time
- Query neuron IDs
- Query populations
- Query positions

```
GET /neuron_properties?gids=1,2
```

```json
[
  {
    "position": [0.12, 0.57, 0.13]
  },
  {
    "position": [0.22, 0.57, 0.13]
  }
]
```
API

- Closely developed for visualization needs with focus on ease of use

Features

- Query simulation time
- Query neuron IDs
- Query populations
- Query positions

- Query spikes

```
GET /spikes?from=1050&to=1070&gids=1,2,3
{
    "times": [ 1050.4, 1055.8, 1061.8 ],
    "gids": [ 1, 3, 1 ]
}

GET /population/0/spikes
...
```
Large Scale Simulations

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GET /spikes?from=100&to=200

{  
times = [ 100.3, 101.8, 102.9, ... ],
  gids = [ 1001, 42, 109, ... ]
}
Simulation Integration

```
nest.Install("insitemodule")

spike_detector = nest.Create("spike_detector")
nest.SetStatus(
    spike_detector,
    [{"record_to": "insite"}])
```
Module Installation

Option 1: Build it yourself
- Somewhat cumbersome

Option 2: Use docker-compose
- Clone https://github.com/VRGroupRWTH/insite
- Run “docker-compose run …”
- The simulation data is accessible via http://localhost:8080
- Workflow can be optimized using NEST Server (PR 1415)
Unable to connect

Firefox can’t establish a connection to the server at localhost:8080.

- The site could be temporarily unavailable or too busy. Try again in a few moments.
- If you are unable to load any pages, check your computer’s network connection.
In-transit Analysis

In-transit Analysis

NEST Module

In-transit Server

Plugin 1

Plugin 2

Access Node

Client

Metadata Storage

MPI

MPI

MPI

HTTP / JSON

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Analysis API (WIP)

Features

- Query plugin list

```
GET /analysis

[
  {
    "id": "mfr",
    "short_desc": "Calculates the mean firing rate for all neurons."
  },
  ...
]
```
Analysis API (WIP)

Features
- Query plugin list
- Query plugin details

GET /analysis/mfr

{  
  "name": "Mean Firing Rate",
  "short_desc": "Calculates the …",
  "long_desc": "…"
  "parameters": [
    {
      "name": "window_size",
      "type": "float"
    },
    ...  
  ]}
Analysis API (WIP)

Features
- Query plugin list
- Query plugin details
- (De-)Activate plugins

GET /analysis/mfr/activate

```
{
  "is_active": false
}
```

PUT /analysis/mfr/active?is_active=true
Analysis API (WIP)

Features
- Query plugin list
- Query plugin details
- (De-)Activate plugins
- Set/get parameters

GET /analysis/mfr/params

```
{
    "window_size": 2
}
```

PUT /analysis/mfr/params?window_size=3
Analysis API (WIP)

Features
- Query plugin list
- Query plugin details
- (De-)Activate plugins
- Set/get parameters
- Query data

GET /analysis/mfr/data

```
{
    "0" : [12.3, 10.1, 10.3],
    "1" : [4.0, 1.0, 0.1],
    ...
}
```
What’s Next?

- Documentation
- Improved data formats
  - E.g., Google FlatBuffers
- Steering
  - POST /pause
  - POST /resume
  - ...

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Thank you for your attention!

oehrl@vr.rwth-aachen.de