

# UltraPINK

#### Newest developments in visualizing and interacting with Self-Organizing Kohonen Maps

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### What happened so far?

#### The situation

- Observed and simulated data comes in giant scales
- The era of machine learning provides many elegant methods for automatic data processing
- Still, training a reliable model is a demanding journey
- Our solution: Take the best of both worlds!



#### PINK? UltraPINK? Kohonen Maps?



PINK: **P**arallelized rotation and flipping **IN**variant **K**ohonen maps

- Developed by Bernd Doser et al.
- Creates prototypical representations of common shapes in the data set
- Brute-force mapping for every data point to a prototype
- Speed-up via parallelized CUDA implementation

### PINK? UltraPINK? Kohonen Maps?



- Python-based web application to examine self-organizing Kohonen Maps generated with PINK
- Train, load, store, and investigate maps on arbitrary data
- Organize your data sets in projects
- Annotate map and data points
- Export map and annotations



# What's new in UltraPINK **GUI Update**

## Hexagonal Maps<sup>s</sup>

### Aladin Interface



UltraPINK is a Python-based web application to visualize self-organizing maps (SOMs) created with the PINK framework. PINK is a tool to generate parallelized invariant Kohonen maps structuring data according to their morphological features. Thus, a semi-automatic analysis of the data is possible.

View PINK sources View UltraPINK sources

# What's new in UltraPINK GUI Update Mered Appendix Appendix

## Hexagonal Mapss

### Aladin Interface

SuperAwesomeProject

### Major Update on User Interface

- New appearance based on Google's Material Design
- Responsive
- Multi-device interaction
- Icons and thumbnails



#### UltraPINK then: The cotton-candied nightmare

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#### UltraPINK now



SuperAwesomeProject

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Project description

A test project with various different data demonstrating the basic Features of (Ultra)PINK.

+ Add dataset

< Back to all projects

#### Welcome to the project SuperAwesomeProject!

Datasets included with this project:

+ Add dataset

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ashionMNIST	GalaxyZoo
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#### UltraPINK now



#### UltraPINK now

	Home About New project All projects
SuperAwesomeProject	Dataset: Galaxy2co A dataset that actually has to do something with astronomy.
₽ Edit	TRAIN SOM IMPORT BINARY FILE IMPORT PYTHON OBJECT
<ul> <li>Export</li> </ul>	Train a SOM
Project description A test project with various different data demonstrating the basic Peatures of (uttrapPiek.	Clive link the folder containing the data below. The folder can contain data in the foldowing formats images Protectmence, you need to specify the dimensions of the map and for how many epochs you want to train the model. Contents Conten
	Fenia Kollasch, UltraPINK returns AG Meeting 2021



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**GUI Update** 

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### Hexagonal Mapss

#### Aladin Interface

SuperAwesomeProject

#### Hexagonal maps

- UltraPINK now supports displaying hexagonal Kohonen Maps
- Users can decide between Cartesian and Hexagonal layouts
- All operations can be performed likewise



#### Hexagonal Maps



#### Hexagonal Maps





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#### Add a data table

- Users may upload a CSV file with additional data
  - Object identifiers
  - Positions
  - Survey information and results
  - ...
- If information about positions is given, each data point can be inspected with ALADIN

Dataset name:			
Dataset narr	1e		
Description:			
Description.			
TRAINING	DATA		

#### Inspect a data point with ALADIN



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#### Compare data points

- Data points with given position are modeled with core concepts of spatial information
  - Abstract data types encapsulating spatial relations
  - Question-based computing
- Interface to get data points close to a respective point
- Compare the results of spatially close and morphological close

#### Compare data points



# Summary and Outlook

#### Summary and outlook

#### What happened?

- More user-friendly appearance and usage
- Full-feature capturing of PINK's possibilities
- ALADIN embedding

#### What comes next?

- Enhance the library of operations
- More interfaces to common astronomy software
- More flexibility
- Support of alternative data types





#### www.h-its.org



Thanks for your attention! View our source code on GitHub:



https://github.com/SirrahErydya/UltraPINK

https://github.com/HITS-AIN/PINK