

Python no AR2GeMS

Scripts

Estrutura dos points sets

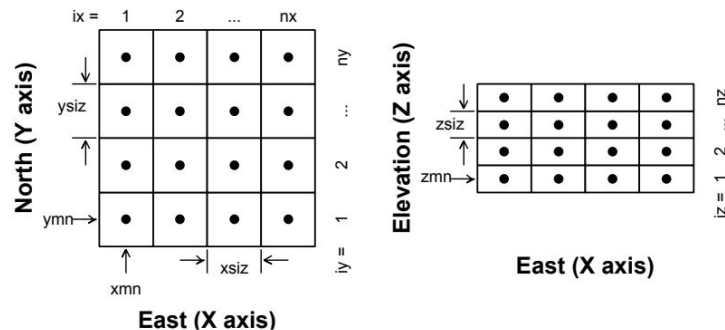
Os points sets são um vetor de coordenadas X , um vetor de coordenadas Y e um vetor de coordenadas Z . em uma determinada ordem. Os teores associados à esse point set são um vetor de valores, ordenados, conforme os vetores de coordenadas.

Estrutura dos grids

Um grid está associado apenas a um vetor de valores ordenados de acordo com o índice de cada nó, dessa forma as coordenadas não precisam ser guardadas.

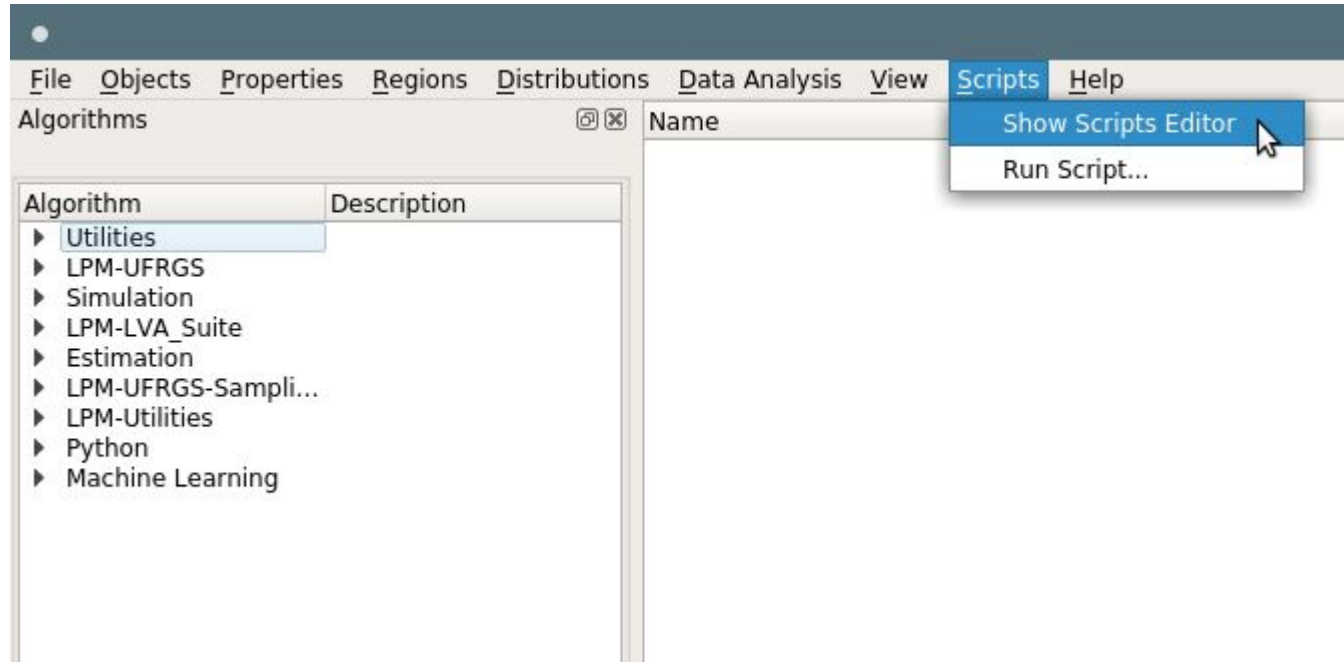
- Cresce, nó a nó, para leste;
- Então linha à linha para o norte;
- E finalmente nível por nível para cima.

X é percorrido mais rápido, depois Y e por fim Z.

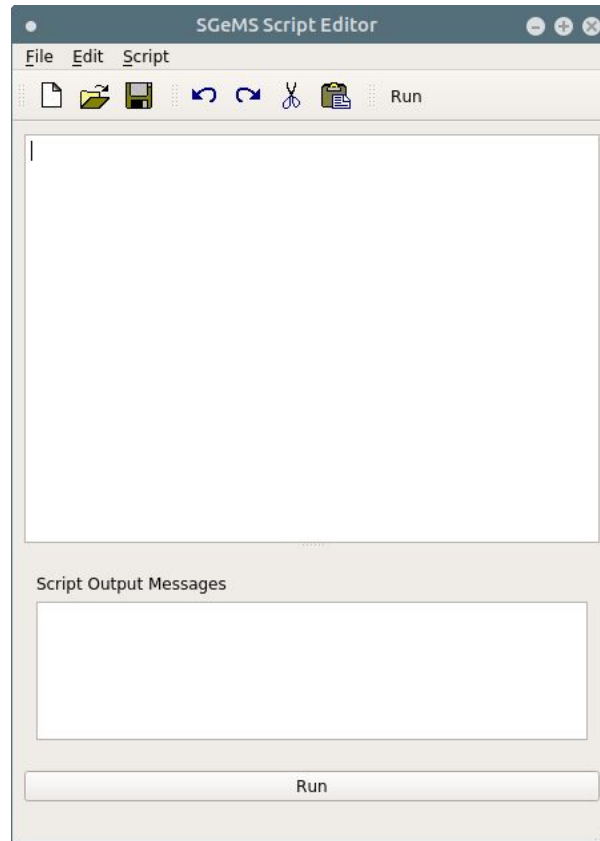


$$loc = (iz - 1) * nx * ny + (iy - 1) * nx + ix$$

Scripts em python

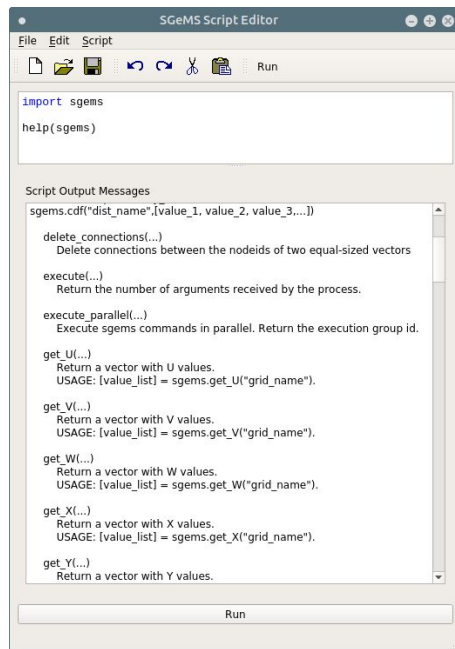


Editor

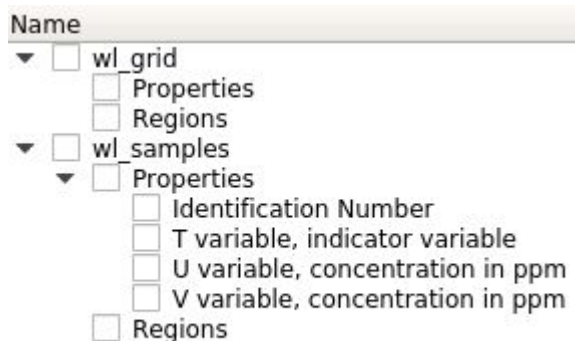


Módulo sgems

A integração sgems + python se dá através do módulo sgems que deve ser importado com o comando `import sgems`. O comando `help(sgems)` lista todas as funções disponíveis.

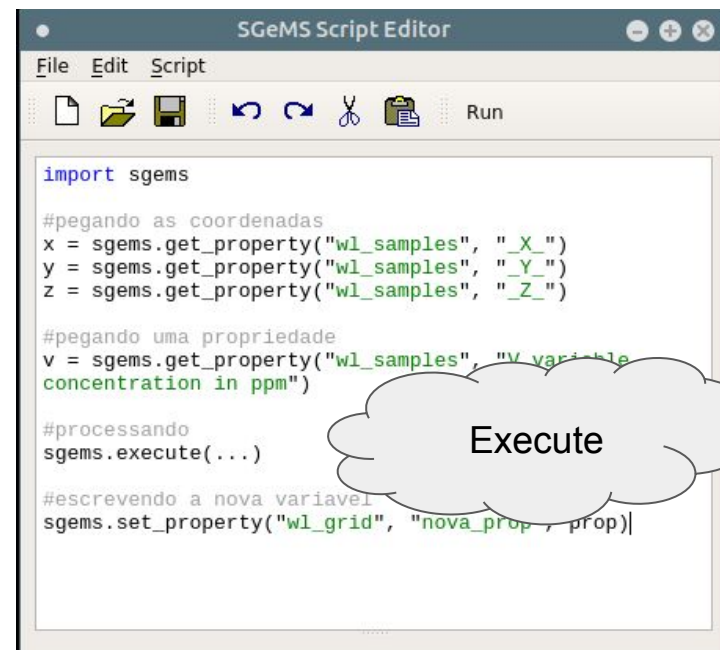


Workflow



Get functions

Set functions



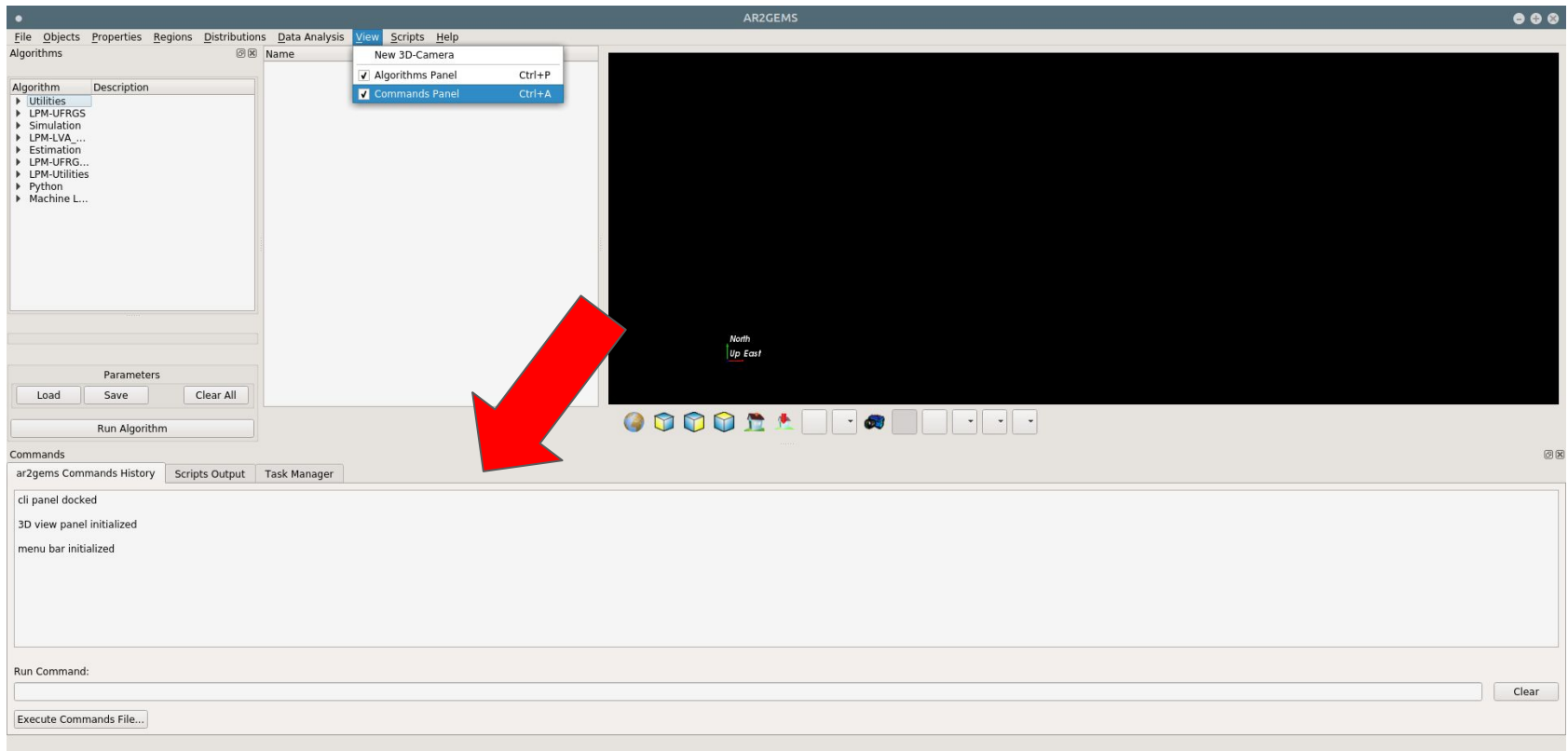
Get functions

Function	Description	Example
<code>get_X(...)</code>	Return a vector with X values.	<code>[value_list] = sgems.get_X("grid_name")</code>
<code>get_Y(...)</code>	Return a vector with Y values.	<code>[value_list] = sgems.get_Y("grid_name")</code>
<code>get_Z(...)</code>	Return a vector with Z values.	<code>[value_list] = sgems.get_Z("grid_name")</code>
<code>get_property(...)</code>	Return a vector with property values if informed.	<code>[value_vector] = sgems.get_property("grid_name", "property_name")</code> - Use <code>_X_</code> or <code>_Y_</code> or <code>_Z_</code> for x,y,z.
<code>get_property_list(...)</code>	Return the list of property name in a grid.	<code>[prop_list] = sgems.get_property_list("grid_name")</code>
<code>get_region(...)</code>	Export a region from a grid.	<code>[v1,v2,v3...] = sgems.get_region("grid_name", "region_name")</code>
<code>get_closest_nodeid(...)</code>	Return the closest nodeid from a x,y,z location.	<code>[nodeid] = sgems.get_closest_nodeid("grid_name", x,y,z)</code>
<code>get_grid_info(...)</code>	Get informations about the grid.	<code>{'z_rotation': z_rotation, 'origin': [ox, oy, oz], 'dimension': [xsize, ysize, zsize], 'num_cells': [nx, ny, nz]} = sgems.get_grid_info("grid_name")</code>
<code>get_ijk(...)</code>	Return the i,j,k indexes of a regular grid based on the nodeid.	<code>[i,j,k] = sgems.get_ijk("grid_name", nodeid)</code>
<code>get_location(...)</code>	Return the x,y,z location of a grid based on the nodeid.	<code>[x,y,z] = sgems.get_location("grid_name", nodeid)</code>
<code>get_masked_grid_full_X(...)</code>	Return a vector with X values of the cartesian grid behind a masked grid.	<code>[value_list] = sgems.get_masked_grid_full_X("masked_grid_name")</code>
<code>get_masked_grid_full_Y(...)</code>	Return a vector with Y values of the cartesian grid behind a masked grid.	<code>[value_list] = sgems.get_masked_grid_full_Y("masked_grid_name")</code>
<code>get_masked_grid_full_Z(...)</code>	Return a vector with the Z values of the cartesian grid behind a masked grid.	<code>[value_list] = sgems.get_masked_grid_full_Z("masked_grid_name")</code>
<code>get_masked_grid_mask(...)</code>	Return a vector of the mask of a masked grid.	<code>[value_list] = sgems.get_masked_grid_mask("masked_grid_name")</code>
<code>get_neighbors(...)</code>	Get the neighbors id for a list of nodeid.	<code>[nodeids] = sgems.get_neighbors("grid_name", "prop_name", range1, range2, range3, azimuth, dip, rake, max_neighbors, "grid_source_name", "prop_source_name", list_of_nodeids)</code>
<code>get_nodeid(...)</code>	Return the nodeid from a x,y,z location.	<code>[nodeid] = sgems.get_nodeid("grid_name", x,y,z)</code>
<code>get_nodeid_from_ijk(...)</code>	Return the nodeid from a i,j,k indexes for a regular grid.	<code>[nodeid] = sgems.get_nodeid_from_ijk("grid_name", i,j,k)</code>

Exercício

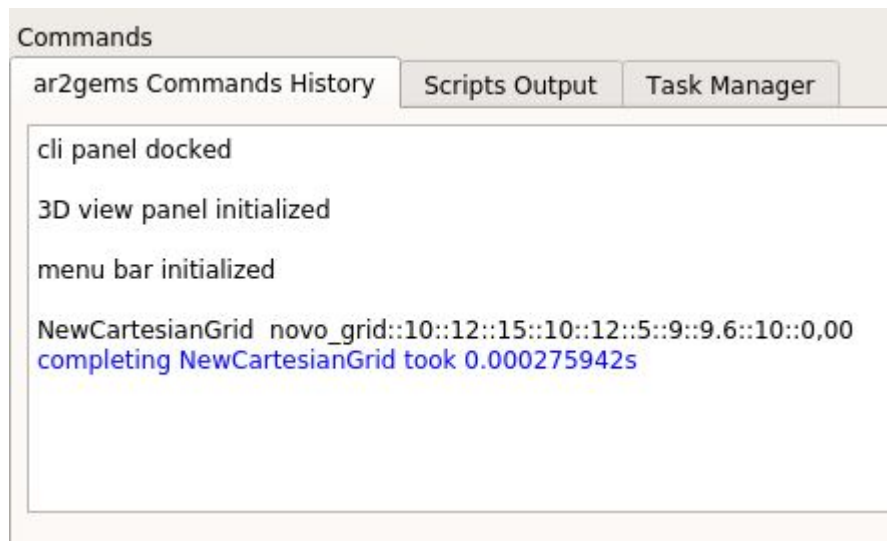
1. Carregue o banco de dados walker lake;
2. Atribua a uma variável os valores da coordenada X usando a função `get_X(...)` e imprima os 10 primeiros valores;
3. Faça o mesmo para Y e Z;
4. Atribua a uma variável os teores de V usando a função `get_property(...)` e imprima os 10 primeiros valores;
5. Crie uma região qualquer no ar2gems;
6. Atribua a uma variável os valores da região usando o comando `get_region(...)` e imprima todos os valores.

Command Panel



Criando um grid

NewCartesianGrid nome::nx::ny::nz::sx::sy::sz::ox::oy::oz::rotz



O método format

```
nome = "Andre"
```

```
idade = 25
```

```
string = "Ola! Meu nome eh {}, eu tenho {} anos".format(nome, idade)
```

```
print(string)
```

```
Ola! Meu nome eh Andre, eu tenho 25 anos
```

Execute functions

```
sgems.execute("NewCartesianGrid novo_grid::10::15::25::10::12::5::9::9.5::5::0")
```

Um jeito mais prático:

```
nx, ny, nz, sx, sy, sz, ox, oy, oz, rotz = 10, 15, 25, 10, 12, 5, 9, 9.5, 5, 0
```

```
comando = "NewCartesianGrid novo_grid::{ }::{ }::{ }::{ }::{ }::{ }::{ }::{ }::{ }::{ }".format(nx, ny, nz,  
sx, sy, sz, ox, oy, oz, rotz)
```

```
sgems.execute(comando)
```

Exercício

1. Crie um grid 1x1 (Objects > New cartesian grid);
2. Imprima as informações do grid usando a função `get_grid_info(...)`;
3. Rode um NN para a variável V e observe o resultado no command panel (Estimation > nearest-neighbor);
4. Reproduza o mesmo resultado mas dessa vez a partir de um script, use a função `sgems.execute(...)` e o método `format`;
5. Faça o mesmo, mas dessa vez usando o controle de fluxo `for`, para as variáveis U e V.

Set functions

Function	Description	Example
<code>set_UVW(...)</code>	Set UVW coordinates on grid from fully-informed list.	<code>sgems.set_UVW_from_properties("grid_name", "prop1", "prop2", "prop3")</code>
<code>set_UVW_from_properties(...)</code>	Set UVW coordinates on grid from fully-informed grid properties.	<code>sgems.set_UVW_from_properties("grid_name", "prop1", "prop2", "prop3")</code>
<code>set_categorical_property_alpha(...)</code>	Set a categorical property from a list of alphanumeric entries (string).	<code>[void] = sgems.set_categorical_property_int("grid_name", property_name, strings)</code>
<code>set_categorical_property_int(...)</code>	Set a categorical property from a list of integer.	<code>[void] = sgems.set_categorical_property_int("grid_name", property_name, property_values)</code>
<code>set_cell_property(...)</code>	Change or create a property of a grid at specific nodeid	<code>sgems.set_cell_property("grid_name", "property_name", [node1,node2,node3...], [val1,val2,val3...])</code>
<code>set_connections(...)</code>	Set connections between the nodeids of two equal-sized vectors.	<code>[void] = sgems.set_connections(list_of_N_nodeid_left, list_of_N_nodeid_right)</code>
<code>set_property(...)</code>	Change or create a property of a grid.	<code>sgems.set_property("grid_name", "property_name", vector of values populated in nodeid order)</code>
<code>set_region(...)</code>	Import a region to a grid.	<code>sgems.set_region("grid_name", "region_name", [v1,v2,v3...])</code>

Exercício

1. Atribua a uma variável os teores de U usando a função `get_property(...)`;
2. Use a biblioteca numpy para calcular o logaritmo de todos os itens da lista variável U, atribua o novo vetor a uma variável; **Dica:** cuidado com os zeros! `np.where(...)`;
3. Escreva a nova variável no point set usando a função `sgems.set_property(...)`;
4. Visualize a nova variável;
5. Imprima todos os valores da variável U;
6. Crie uma nova variável que vale 1 se U for NaN e zero caso contrário; **Dica:** Use `np.isnan(...)` para checar se um valor NaN.

Outras funções

Function	Description	Example
new		
<code>new_masked_grid(...)</code>	Create a new masked grid, given a set of cartesian grid parameters and a mask.	<code>sgems.new_masked_grid("grid_name",[nx, ny, nz], [ox, oy, oz], [sx, sy, sz], [rot_ox, rot_oy, rot_oz, angle], mask)</code>
<code>new_point_set(...)</code>	Create a new point set or append to existing point set, given a set of x,y,z coordinates.	<code>sgems.new_point_set("point_set_name",x,y,z)</code>
distributions		
<code>cdf(...)</code>	Get the cdf values (probability below) from a list of quantiles.	<code>[probability_below values list (doubles between 0 and 1)] = sgems.cdf("dist_name",[value_1, value_2, value_3,...])</code>
<code>pdf(...)</code>	Get the pdf values (probability) from a list of quantiles.	<code>[probability values list (doubles between 0 and 1)] = sgems.pdf("dist_name",[value_1, value_2, value_3,...])</code>
<code>quantile(...)</code>	Get the inverse cdf values (quantiles) from a list of probabilities.	<code>[quantile values list] = sgems.quantile("dist_name",[.1, .2, .5,...])</code>
execution		
<code>execute(...)</code>	Return the number of arguments received by the process.	
<code>execute_parallel(...)</code>	Execute sgems commands in parallel. Return the execution group id.	
<code>wait(...)</code>	Wait sgems commands running in parallel.	
misc		
<code>delete_connections(...)</code>	Delete connections between the nodeids of two equal-sized vectors	
<code>reset_connections(...)</code>	Delete all connections on the grid, and restore default connections using face contacts.	
<code>nan(...)</code>	Return the ar2gems value for NAN.	<code>[nanval] = sgems.nan()</code>

Python no AR2GeMS

Plugins

Os plugins

Um plugin python para o ar2gems é formado de dois arquivos:

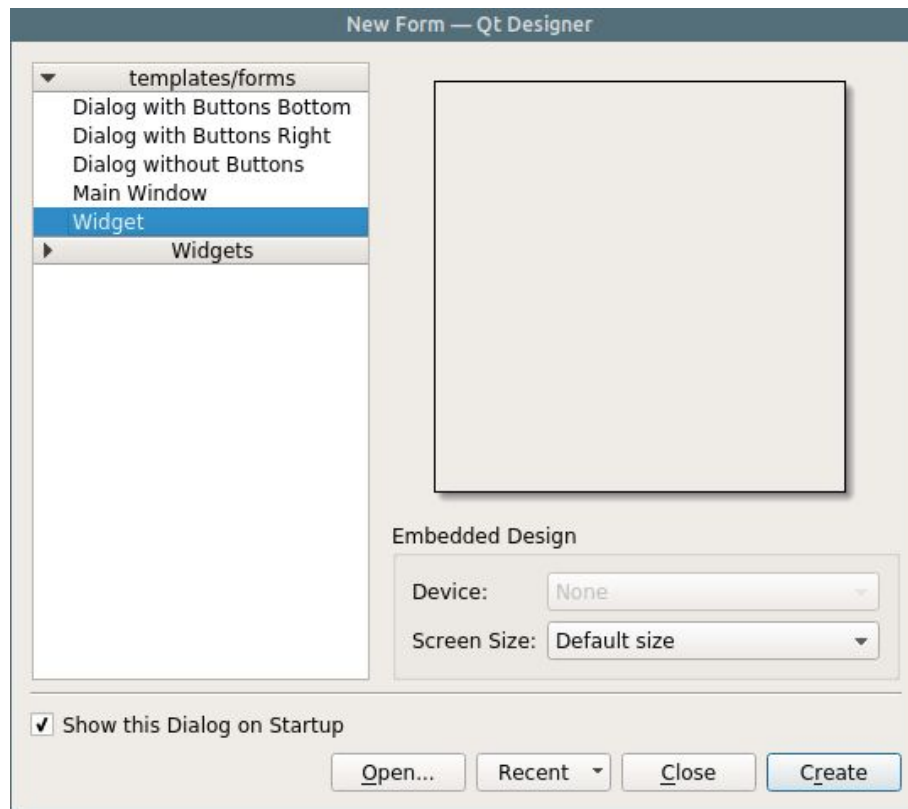
1. Arquivo `.py`: Código python;
2. Arquivo `.ui`: Código xml que determina a interface do plugin;

Instalação

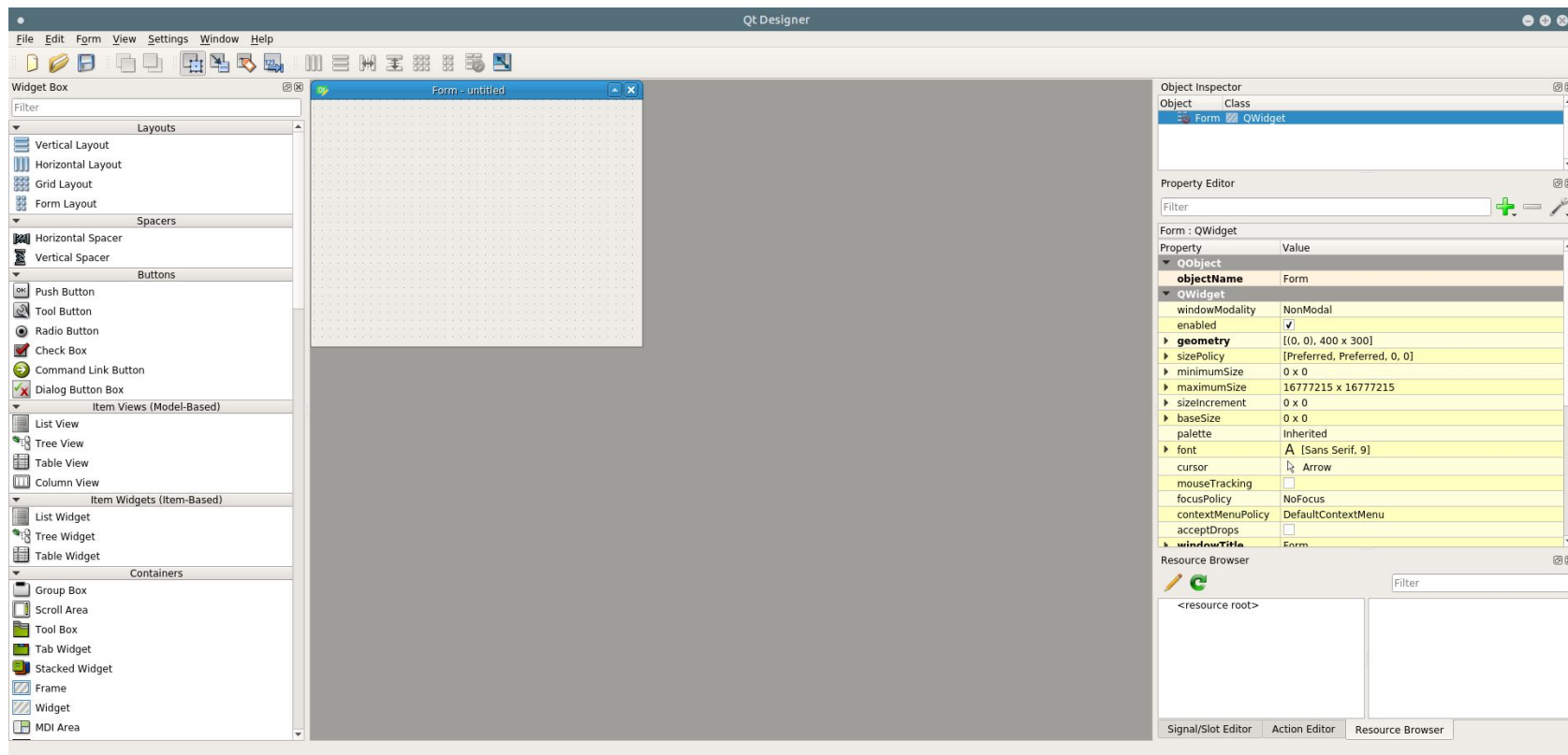
Os arquivos devem ser colocados em suas respectivas pastas:

1. Arquivo `.py`:
 - a. No Linux: `opt/ar2gems/bin/plugins/Geostat/python/`
 - b. No Windows: `C:\SGeMS-ar2tech-x64\plugins\Geostat\python`
2. Arquivo `.ui`: Código xml que determina a interface do plugin;
 - a. No Linux: `opt/ar2gems/bin/plugins/Geostat/`
 - b. No Windows: `C:\SGeMS-ar2tech-x64\plugins\Geostat`

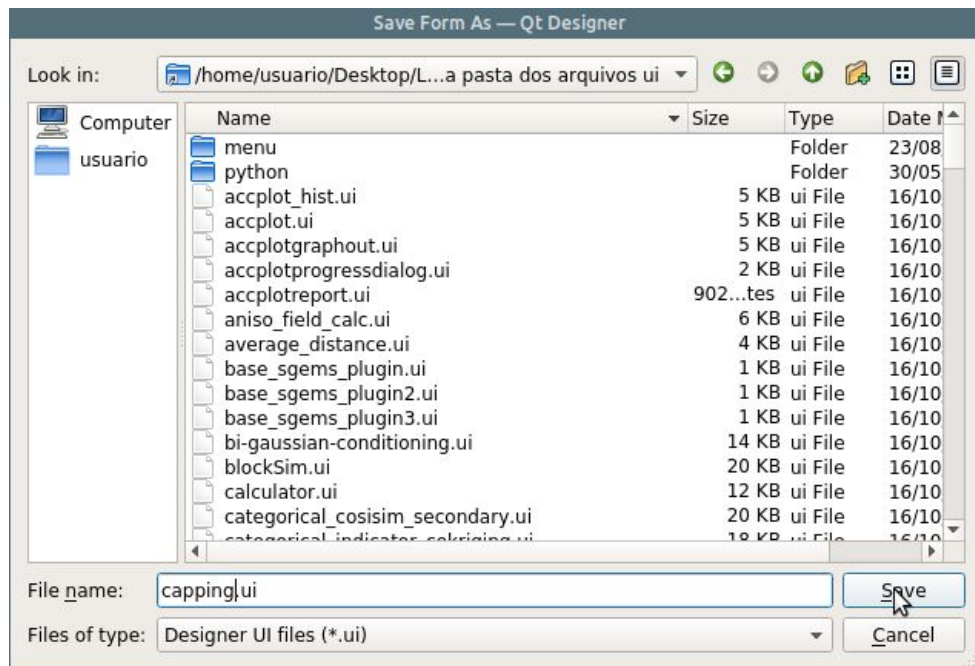
Criando a interface gráfica



Área de trabalho do Qt



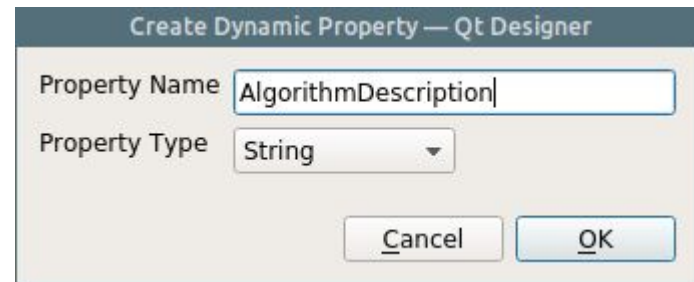
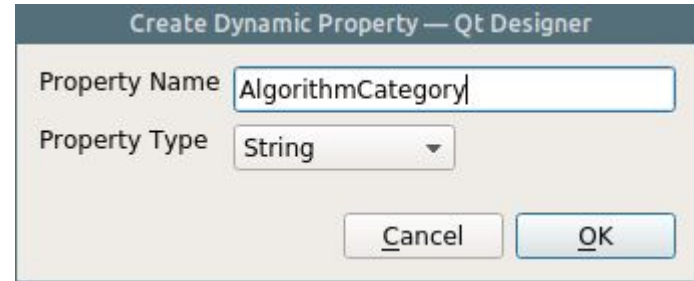
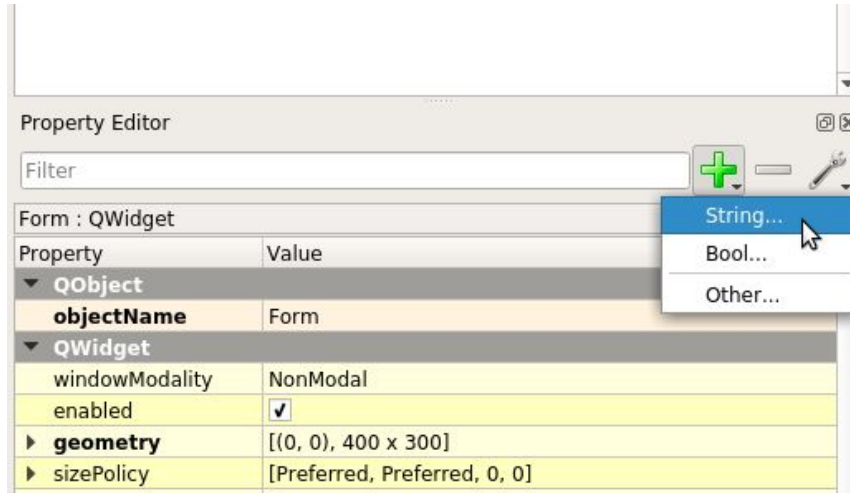
Salvando seu arquivo .ui



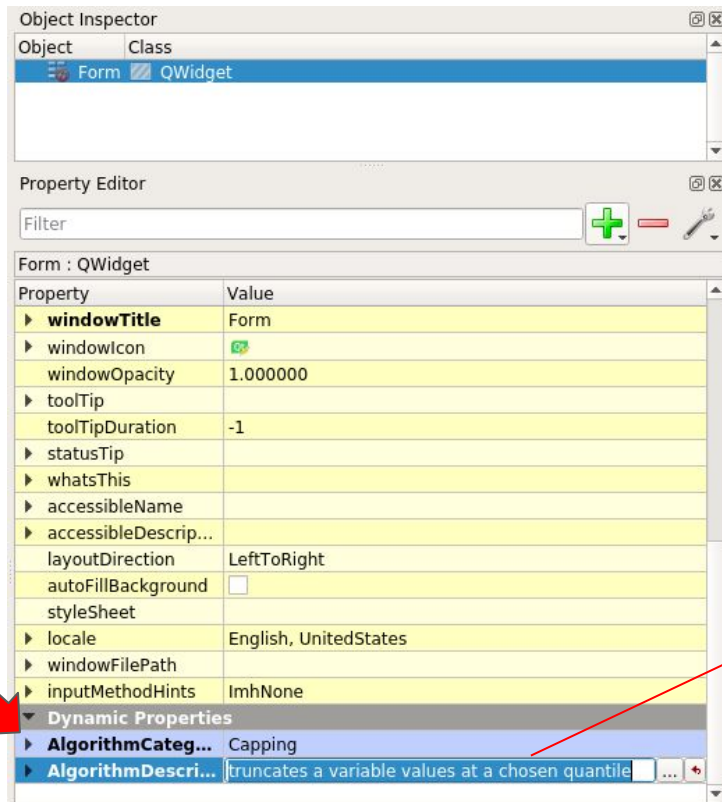
O arquivo deve ser salvo na pasta dos arquivos .ui.

O arquivo .py deve ter o mesmo nome.

Variáveis AlgorithmCategory e AlgorithmDescription



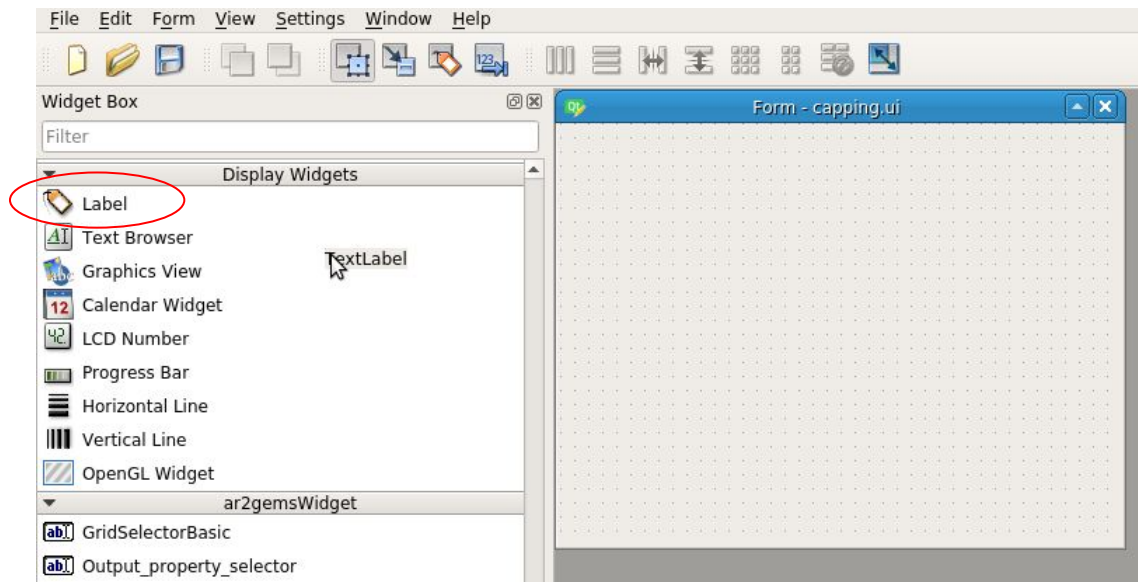
Editando as variáveis criadas



Algorithm	Description
▶ Utilities	
▶ LPM-UFRGS	
▶ Simulation	
▶ LPM-LVA_...	
▶ Estimation	
▶ LPM-UFRG...	
▶ LPM-Utilities	
▶ Python	
▼ Capping	
capping	truncates a variable values at a chosen quantile
▶ Machine L...	

Inserindo widgets

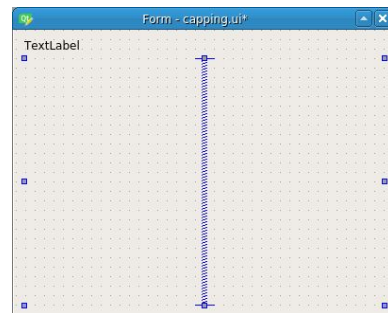
O primeiro widget a ser inserido é um label, que vai dar uma instrução ao usuário. Arraste o widget escolhido para o plugin.



Layouts



Os layouts organizam os widgets no plugin.



TextLabel

Parameters

Load Save Clear All

Run Algorithm

TextLabel

Parameters

Load Save Clear All

Run Algorithm

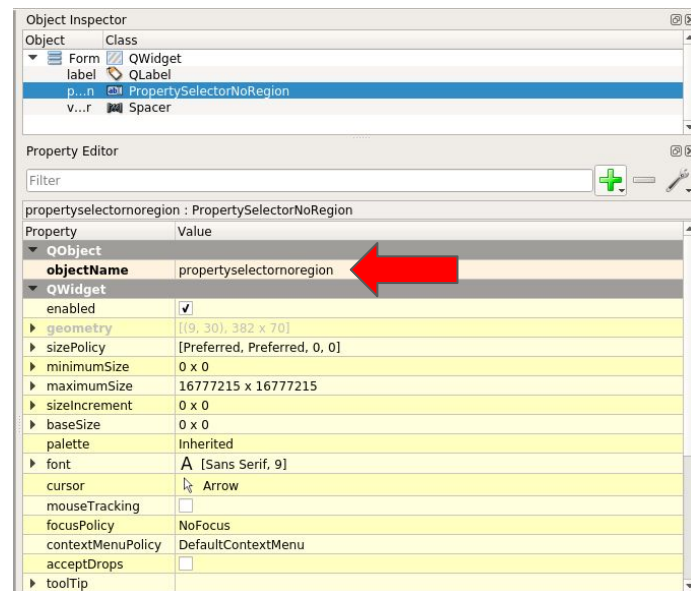
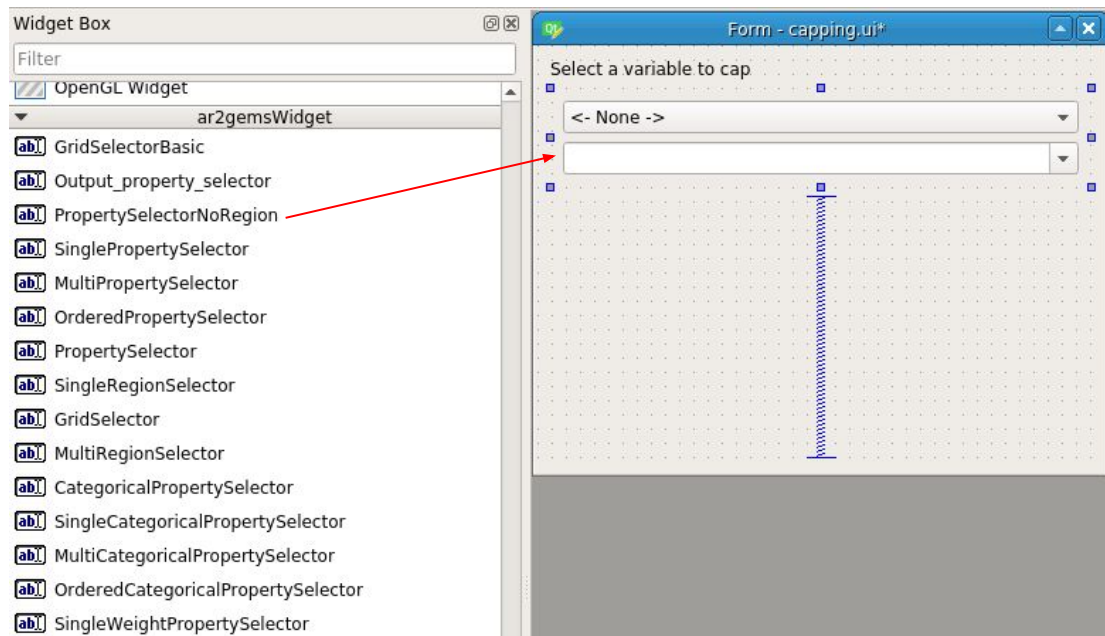
TextLabel

Parameters

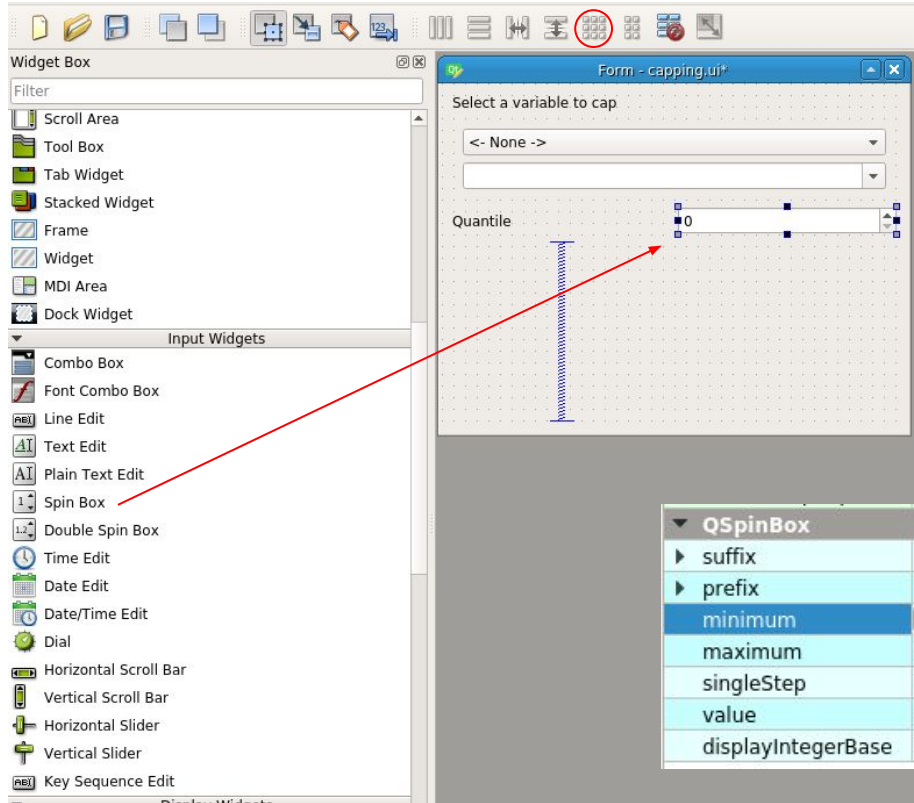
Load Save Clear All

Run Algorithm

Adicionando mais widgets



Adicionando mais widgets



QSpinBox	
suffix	
prefix	
minimum	0
maximum	99
singleStep	1
value	0
displayIntegerBase	10