Frontier Depth and Virtual Species Experimentation

Here is a step-by-step guide for performing experiments on the SDM methods using three methods of virtual species.

All functions mentioned are documented and explain the optional and required inputs, the description, the outputs and the default values.

Colombia Map

Preparing environment

1. Clear command window, workspace variables, and close all figures. Turn off warnings.

```
clear; clc; close all;
warning('off', 'all');
```

2. Set the path to the folder containing the layer data

```
layerfolder = '../VirtualSpeciesGeneration/data/Capas_Colombia_30S/';
```

3. Read in the layer data from the specified folder using ReadLayers:

- To execute ReadLayers, there is one required input and three optional inputs.

Layers = ReadLayers(layer_folder, parallel, nanvalue)

```
Dimensions = ReadLayers(layerfolder);
```

```
----Reading layers----
Elapsed time is 10.695169 seconds.
```

4. Defining experimentation hyperparameters

- Virtual_Species_Methods: list of Virtual Species.
- Samples: list of numbers of samples for the vs sampling method.
- Number_Of_Maps: how many maps to perform the experimentation.

```
Virtual_Species_Methods = ["harmonic", "beta", "coeff"];
Samples = [50,100,300];
Number_Of_Maps = 100;
```

5. Experiments

```
tic
Results = Experimentation(Dimensions,Virtual_Species_Methods, Samples, Number_Of_Maps,
toc
```

```
Elapsed time is 35834.498828 seconds.
```

6. Interpreting results

Each SDM method is tested with the three virtual species methods and three sample sizes for the VS sampling: 50, 100, and 300.

Each accuracy scores row shows the accuracy in each sample size for each vs method.

```
Results.Closest_Point
```

ans = 3×3 table

	50	100	300
1 harmonic	0.7584	0.7264	0.7140
2 beta	0.7587	0.7423	0.7115
3 coeff	0.7544	0.7259	0.6956

```
Results.Percentile_Point
```

ans = 3×3 table

	50	100	300
1 harmonic	0.8068	0.8151	0.7691
2 beta	0.8134	0.8310	0.7850
3 coeff	0.8185	0.8361	0.7730

South America Map

Preparing environment

1. Clear command window, workspace variables, and close all figures. Turn off warnings.

```
clear; clc; close all;
warning('off', 'all');
```

2. Set the path to the folder containing the layer data

```
layerfolder = '../VirtualSpeciesGeneration/data/Capas_SouthAmerica_2.5M/';
```

3. Read in the layer data from the specified folder using ReadLayers:

- To execute ReadLayers, there is one required input and three optional inputs.

Layers = ReadLayers(layer_folder, parallel, nanvalue)

```
Dimensions = ReadLayers(layerfolder);
```

```
----Reading layers----
Elapsed time is 6.771385 seconds.
```

4. Defining lists of options for experimentation

```
Virtual_Species_Methods = ["harmonic", "beta", "coeff"];
Samples = [50, 100, 300];
```

```
Number_Of_Maps = 100;
```

5. Experiments

```
tic
Results = Experimentation(Dimensions,Virtual_Species_Methods, Samples, Number_Of_Maps,
toc
```

```
Elapsed time is 22555.315827 seconds.
```

6. Interpreting results

Each SDM method is tested with the three virtual species methods and three sample sizes for the VS sampling: 50, 100, and 300.

Each accuracy scores row shows the accuracy in each sample size for each vs method.

```
Results.Closest_Point
```

```
ans = 3×3 table
```

	50	100	300
1 harmonic	0.8385	0.8330	0.7872
2 beta	0.7815	0.7361	0.6973
3 coeff	0.7673	0.7340	0.6870

```
Results.Percentile_Point
```

```
ans = 3×3 table
```

	50	100	300
1 harmonic	0.8276	0.8353	0.8026
2 beta	0.7936	0.7655	0.7174
3 coeff	0.7939	0.7765	0.7148

Cropped Colombia Map

Preparing environment

1. Clear command window, workspace variables, and close all figures. Turn off warnings.

```
clear; clc; close all;
warning('off', 'all');
```

2. Set the path to the folder containing the layer data

```
layerfolder = '../VirtualSpeciesGeneration/data/layers/';
```

3. Read in the layer data from the specified folder using ReadLayers:

- To execute ReadLayers, there is one required input and three optional inputs.

Layers = ReadLayers(layer_folder, parallel, nanvalue)

```
Dimensions = ReadLayers(layerfolder);
```

```
----Reading layers----
Elapsed time is 2.380767 seconds.
```

4. Defining lists of options for experimentation

```
Virtual_Species_Methods = ["harmonic", "beta", "coeff"];
Samples = [50, 100, 300];
Number_Of_Maps = 100;
```

5. Experiments

```
tic
Results = Experimentation(Dimensions,Virtual_Species_Methods, Samples, Number_Of_Maps,
toc
```

```
Elapsed time is 8723.248983 seconds.
```

6. Interpreting results

Each SDM method is tested with the three virtual species methods and three sample sizes for the VS sampling: 50, 100, and 300.

Each accuracy scores row shows the accuracy in each sample size for each vs method.

```
Results.Closest_Point
```

ans = 3×3 table

	50	100	300
1 harmonic	0.8310	0.8316	0.7858
2 beta	0.7964	0.7599	0.7239
3 coeff	0.7963	0.7695	0.7290

```
Results.Percentile_Point
```

ans = 3×3 table

	50	100	300
1 harmonic	0.8344	0.8682	0.8338
2 beta	0.8362	0.8447	0.7852
3 coeff	0.8455	0.8404	0.7848