```
ClearAll["Global`*"]
```

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netCorr: notion of correlation between functional networks.

Note: the code still has to be optimized (right now is a bit slow, but works just fine).

Some GLOBAL definitions

Files you should have in this folder:

- The file COBE_bilinear _sst _ 1980_ 2015.mat contains the linearly detrended anomalies for the COBEv2 datasets. It is formatted in this way:
size(COBE_bilinear _sst _ 1980_ 2015.mat) = [time, dimY, dimX]

- domains found for the COBEv2 (HadISST) datasets
- networks found for the COBEv2 (HadISST) datasets
- a list of strengths assigned to each domain in COBEv2 (HadISST)

```
In[170]:= (*path to land*)
pathLand =
  StringJoin[NotebookDirectory[], "COBE/COBE_bilinear_sst_1980_2015.mat"];
(*Importing the land: I always use the COBEv2 land*)
timeSeries = Import[pathLand, "Data"][[1, 1]];
(*Define the land as Indeterminate...I know already that the land
  is masked with the value -1000000
*)
land1 = timeSeries /. {x_ /; x < -100 → Indeterminate, x_ /; x > -100 → 0};
```

```
In[174]:= (*Defining PATHS and dimension of the map*)
         (*We need the path for domains, networks, strengths*)
         (*********************************
          DATASET 1 ***********************************)
         (*path to domains*)
         pathDomainCOBE =
           FileNames[{"domain*"}, StringJoin[NotebookDirectory[], "COBE/domains/"]];
         (*path to network*)
         pathNetworkCOBE = StringJoin[NotebookDirectory[], "COBE/network.txt"];
         (*Path to Strenghts*)
         pathStrengthsCOBE = StringJoin[NotebookDirectory[], "COBE/strengths.txt"];
         (*********************************
          DATASET 2 ***********************************)
         (*path to domains*)
         pathDomainHadISST =
           FileNames[{"domain*"}, StringJoin[NotebookDirectory[], "HadISST/domains/"]];
         (*path to network*)
         pathNetworkHadISST = StringJoin[NotebookDirectory[], "HadISST/network.txt"];
         (*Path to Strenghts*)
         pathStrengthsHadISST = StringJoin[NotebookDirectory[], "HadISST/strengths.txt"];

         (*Dimensions of the maps*)
         dimX = 288;
         dimY = 180;

In[183]:= (*Step 2*)
         (*we want to check how the domains
          are defined: we want them not to be reversed*)
         (*I look at some domains for both datasets*)
         (*********************************
          DATASET 1 ***********************************)
         preDomainsJustALookCOBE =
           Partition[
            ToExpression[
             Import[pathDomainCOBE[[3]], "Words"]
            ], {288}];
         (*OK domains from DATA1 are upsided down, let's flip it when we download them*)
         (******************************** DATASET
          2 ********************************)preDomainsJustALookHadISST =
           Partition[
            ToExpression[
             Import[pathDomainHadISST[[5]], "Words"]
            ], {288}];
```

```
In[185]:= (*Here I import all domains*)
     (**********************************
      DATASET 1 ***********************************)
     preDomainsCOBE =
       Table[
        Reverse[(*FLIPPING THEM!!!*)
         Partition[
          ToExpression[
           Import[pathDomainCOBE[[i]], "Words"]
           ], {288}]],
         {i, 1, Length[pathDomainCOBE]}];
     (**********************************
      DATASET 2 ***********************************)
     preDomainsHadISST =
       Table[
        Reverse[(*FLIPPING THEM!!!*)
         Partition[
          ToExpression[
           Import[pathDomainHadISST[[i]], "Words"]
           ], {288}]],
         {i, 1, Length[pathDomainHadISST]}];

In[187]:= (*If you reverse the domains, make sure you also reverse the land*)
     land = Reverse[land1];
```

Computing "The Matrix"

Importing Function

Some Useful Functions

Computing Matrix Function

netCorr(COBEv2,HadISST)

```
In[192]:= matrixCOBEv2 =
       theMatrix[pathNetworkCOBE, pathStrengthsCOBE, pathDomainCOBE, preDomainsCOBE];

In[193]:= matrixHadISST = theMatrix[pathNetworkHadISST,
        pathStrengthsHadISST, pathDomainHadISST, preDomainsHadISST];

In[194]:= Correlation[Flatten[matrixCOBEv2], Flatten[matrixHadISST]]

Out[194]= 0.545393
```