

Browsing Movebank within R

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Abstract

This vignette gives examples of how to browse the Movebank database within R and how to import data for the **move** package. It explains how to login, search for studies, get sensor, animal and study IDs, download location data, non-location data and data from the Movebank Data Repository.

Keywords: movebank, move, R.

Introduction

The provided functions allow you to search for studies stored in Movebank, browse them and download¹ them. A possible workflow could look like this:

First you always have to create an object containing your credentials of your Movebank account (www.movebank.org) in order to use the functions listed in this manual (except for Section 6.):

1. Login to Movebank

Then you can search for studies or get information about studies, animals, tags, etc.:

2. Search for a study name and ID

3. Get information about the used tags and animals

Once you know the study name and the kind of data you want to download you can:

4. Download the location data of a study as a `move/moveStack` object

5. Download the non-location data of a study as a `data.frame`

To download published data of the repository you do not need to have an account on Movebank:

6. Download data from the Movebank Data Repository as a `move/moveStack` object

1. Login to Movebank

There are two ways to login. Either you login every time you use the functions that are presented in this vignette. Or you use the `movebankLogin()` function to login to Movebank

¹If you have the rights to do so.

and create an object that stores your login information. You can pass this object on to every function you use to skip the login process. Use your username and password which you use to login to the web based Movebank. Note that the password is stored in this object meaning that if you store the session or objects these are stored in plain text. If you want to hide the password while typing it might be worth to have a look at the package: "getPass".

If you do not have a Movebank account, you can register at www.movebank.org or download csv files of publicly available studies directly from Movebank and read them into the Move package as described in the help file of the `move` function.

```
> loginStored <- movebankLogin(username="user", password="password")
```

2. Search for a study name and ID

2.1. Search for a study name with keywords

You can use the `searchMovebankStudies()` function to search within the study names for a specific study. For example, if you want to find all studies that worked with goose try the following:

```
> searchMovebankStudies(x="oose", login=loginStored)
```

You may rather use the search term without the first letter, e.g. 'oose' instead of 'Goose' or 'goose', to find studies with both ways of writing.

2.2. Get the Movebank ID of a study

All of the here presented studies can work with the study ID or the study name to find information within the database. If you rather want to work with the short study ID instead of the longer study name use `getMovebankID()`. This number can also be found on the 'Study Details' page of the study on Movebank.

```
> getMovebankID("BCI Ocelot",login=loginStored)
> # 123413
```

3. Get information about the used tags and animals

3.1. Get general information of a study

You found a study you are interested in, let's say 'BCI Ocelot'. To get more information about this study, e.g. the authors of the study, licence type, citation and more, use:

```
> getMovebankStudy(study="BCI Ocelot",login=loginStored)
```

3.2. Get information about sensors

If you want to know, which sensor types were used for each tag in this study you can use:

```
> getMovebankSensors(study="BCI Ocelot",login=loginStored)
```

To see all available sensor types on Movebank use the same function, leaving the "study" argument empty.

```
> getMovebankSensors(login=loginStored)
```

To get a list of the attributes that are available for the sensors of a particular study use:

```
> getMovebankSensorsAttributes(study="BCI Ocelot",login=loginStored)
```

3.3. Get information about the animals of a study

A list of the animals names, their tag ids, sensors used and more information associated to each individual is returned with this command:

```
> getMovebankAnimals(study="BCI Ocelot",login=loginStored)
```

3.4. Get all reference data of a study

Get a table with all information associated to the animals, tags and deployments. This table is equivalent to the table obtained on the Movebank webpage through the option "Download Reference Data" of the study.

```
> getMovebankReferenceTable(study="BCI Ocelot",login=loginStored)
```

4. Download the location data of a study as a 'move/moveStack' object

*NOTE: **Agreement to license terms:** to be able to download with R the data of a study on Movebank, you might first have to accept the license terms for the study. For this go to www.movebank.org, search for your study of interest, click on the download tab, and accept the license terms. **This only has to be done once per data set.***

If you know which coordinates of which animal you want to download you can either download the timestamp and coordinates, or directly create a move object.

4.1. Download location data of a study

An entire study can be downloaded:

```
> bci_ocelot <- getMovebankData(study="BCI Ocelot", login=loginStored)
```


5.3. Download non-location data with the 'getMovebankData' function

There is also the option to download non-location data with the `getMovebankData()` function. When the argument `includeExtraSensors=TRUE` than the data of all non-location sensors available for that study will be downloaded and stored in the 'unusedRecords' slot. With this option it is not possible to select specific sensors.

```
> mymove <- getMovebankData(study=74496970, login=loginStored,
+                           animalName="DER AR439",includeExtraSensors=TRUE)

> ## to get a data.frame containing the data for the non-location
> ## sensors use the "unUsedRecords" function
> nonlocation <- as.data.frame(unUsedRecords(mymove))
```

6. Download data from the Movebank Data Repository as a 'move/moveStack' object

This function downloads data from the 'Movebank Data Repository'. It returns a `move` object (if only one individual is included) or a `moveStack` (if several individuals are included). If data of non-location sensors are included in the data set, these will be stored in the 'unUsedRecords' slot of the `move` object.

```
> getDataRepositoryData("doi:10.5441/001/1.2k536j54")
```

Visit the dataset's repository page at <http://dx.doi.org/<doi>> for citations and a readme that might contain additional details needed to understand the data. If analyzing these published datasets, always consult the related papers and cite the paper and dataset. If preparing analysis for publication, also contact the data owner if possible for their contribution.

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