`rinat`

Quickstart guide

About

R wrapper for iNaturalist APIs for accessing the observations. The Detailed documentation of API is available on iNaturlaist website and is part of our larger species occurence searching packages SPOCC

Install

Install the development version using `install_github` within Hadley's devtools package.

```
install.packages("devtools")
require(devtools)

install_github("rinat", "ropensci")
library(rinat)
```

Get observations

Searching

Fuzzy search

You can search for observations by either common or latin name. It will search the entire iNaturalist entry, so the search below will return all entries that mention Monarch butterflies, not just entries for Monarchs.

```
butterflies <- get_inat_obs(query = "Monarch Butterfly")
```

Another use for a fuzzy search is searching for a common name or habitat, e.g. searching for all observations that might happen in a vernal pool. We can then see all the species names found.

```
library(rinat)

vp_obs <- get_inat_obs(query = "vernal pool")
head(vp_obs$Species.guess)
```

```
## [1]                         Rails, Gallinules, and Coots
## [3] Western Spadefoot        Western Spadefoot
## [5] Eupsilia                 upland chorus frog
## 156 Levels:  Alisma lanceolatum Alisma plantago-aquatica ... Yellow Starthistle (Centaurea solstitial
```

Taxon query To return only records for a specific species or taxonomic group, use the taxon option.

```
## Return just observations in the family Plecoptera
stone_flies <- get_inat_obs(taxon = "Plecoptera")

## Return just Monarch Butterfly records
just_butterflies <- get_inat_obs(taxon = "Danaus plexippus")
```

Bounding box search

You can also search within a bounding box by giving a simple set of coordinates.

```
## Search by area

bounds <- c(38.44047, -125, 40.86652, -121.837)
deer <- get_inat_obs(query = "Mule Deer", bounds = bounds)
```

Other functions

Get information and observations by project

You can get all the observations for a project if you know it's ID or name as an intaturalist slug

```
## Just get info about a project
vt_crows <- get_inat_obs_project("crows-in-vermont", type = "info", raw = FALSE)
```

```
## 25  Records
## 0
```

```
## Now get all the observations for that project
vt_crows_obs <- get_inat_obs_project(vt_crows$id, type = "observations")
```

```
## 25  Records
## 0-100
```

Get observation details

Detailed information about a specific observation can be retrieved by observation ID. The easiest way to get the ID is from a more general search.

```
m_obs <- get_inat_obs(query = "Monarch Butterfly")
head(get_inat_obs_id(m_obs$Id[1]))
```

```
## $captive
## [1] FALSE
##
## $comments_count
## [1] 0
##
## $community_taxon_id
## NULL
##
## $created_at
## [1] "2014-03-20T13:40:34-03:00"
##
## $delta
## [1] TRUE
##
## $description
## [1] "Two individuals flying around in the grassy margin of a large eucalyptus grove, adjacent to a s
```

Get all observations by user

If you just want all the observations by a user you can download all their observations by user ID. A word of warning though, this can be quite large (easily into the 1000's)

```
m_obs <- get_inat_obs(query = "Monarch Butterfly")
head(get_inat_obs_user(as.character(m_obs$User.login[1]), maxresults = 20))[,
    1:5]
```

```
##                   Scientific.name                   Datetime
## 1               Danaus plexippus 2014-03-18 15:59:56 +0000
## 2                 Taricha torosa 2014-02-26 22:30:00 +0000
## 3        Toxicoscordion fremontii 2014-03-09 14:21:50 +0000
## 4 Coluber lateralis euryxanthus 2014-03-09 14:32:59 +0000
##
## 1
## 2
## 3
## 4 The snake was approximately 50 cm long. It was seen sitting motionless in a bare patch on a east-so
##                                Place.guess Latitude
## 1 Point Pinole Regional Shoreline, CA, US    38.00
## 2             Tilden Regional Park, CA, US    37.91
## 3            Briones Regional Park, CA, US    37.91
## 4            Briones Regional Park, CA, US    37.92
```

Stats by taxa

Basic statistics are available for taxa counts by date, date range, place ID (numeric ID), or user ID (string)

```
## By date
counts <- get_inat_taxon_stats(date = "2010-06-14")
counts
```

```
## $total
## [1] 49
##
## $species_counts
##   count taxon.id            taxon.name taxon.rank taxon.rank_level
## 1     1   58564       Boloria bellona    species               10
## 2     1   81746  Necrophila americana    species               10
## 3     1   17009          Sayornis saya    species               10
## 4     1   24422 Ptychohyla spinipollex    species               10
## 5     1   11935     Tachycineta bicolor    species               10
##   taxon.default_name.created_at taxon.default_name.creator_id
## 1     2010-04-01T14:12:20-05:00                            NA
## 2     2011-10-22T06:37:44-05:00                          1392
## 3     2008-03-12T22:33:21-05:00                            NA
## 4     2008-03-17T19:43:27-05:00                            NA
## 5     2008-03-12T22:10:45-05:00                            NA
##   taxon.default_name.id taxon.default_name.is_valid
## 1                 92809                         TRUE
## 2                211685                         TRUE
## 3                 20375                         TRUE
## 4                 29116                         TRUE
```

```
## 5                14831                              TRUE
##   taxon.default_name.lexicon taxon.default_name.name
## 1              English        meadow fritillary
## 2              English American Carrion Beetle
## 3              English             Say's Phoebe
## 4      Scientific Names  Ptychohyla spinipollex
## 5              English              Tree Swallow
##   taxon.default_name.name_provider taxon.default_name.source_id
## 1              UBioNameProvider                            2
## 2                        <NA>                            NA
## 3              ColNameProvider                            1
## 4              ColNameProvider                            1
## 5              ColNameProvider                            1
##   taxon.default_name.source_identifier
## 1                          839117
## 2                            <NA>
## 3                          850333
## 4                         3845913
## 5                          850447
##                                                                   taxon.default_name.source_url
## 1                            http://www.ubio.org/browser/details.php?namebankID=839117
## 2                                                                                    <NA>
## 3 http://www.catalogueoflife.org/annual-checklist/show_species_details.php?record_id=1365378
## 4 http://www.catalogueoflife.org/annual-checklist/show_species_details.php?record_id=1569188
## 5 http://www.catalogueoflife.org/annual-checklist/show_species_details.php?record_id=1618023
##   taxon.default_name.taxon_id taxon.default_name.updated_at
## 1                     58564     2010-04-01T14:12:20-05:00
## 2                     81746     2011-10-22T06:37:44-05:00
## 3                     17009     2008-03-12T22:33:21-05:00
## 4                     24422     2008-03-17T19:43:27-05:00
## 5                     11935     2008-03-12T22:10:45-05:00
##   taxon.default_name.updater_id
## 1                       NA
## 2                     1392
## 3                       NA
## 4                       NA
## 5                       NA
##                                                  taxon.image_url
## 1 http://farm4.staticflickr.com/3137/4563715160_60ea310ff4_s.jpg
## 2 http://farm5.staticflickr.com/4013/4658689710_1a534b47ef_s.jpg
## 3 http://farm4.staticflickr.com/3382/3333991507_7fa8dfa600_s.jpg
## 4 http://farm5.staticflickr.com/4093/4769499547_523a426857_s.jpg
## 5   http://farm1.staticflickr.com/177/435466650_1ea6cb197e_s.jpg
##   taxon.iconic_taxon_name taxon.conservation_status_name
## 1             Insecta                          <NA>
## 2             Insecta                          <NA>
## 3                Aves                 least_concern
## 4            Amphibia                    endangered
## 5                Aves                 least_concern
##
## $rank_counts
## $rank_counts$subspecies
## [1] 1
##
```

```
## $rank_counts$genus
## [1] 3
##
## $rank_counts$species
## [1] 44
##
## $rank_counts$variety
## [1] 1
```

```
## By place_ID
vt_crows <- get_inat_obs_project("crows-in-vermont", type = "info", raw = FALSE)
```

```
## 25  Records
## 0
```

```
place_counts <- get_inat_taxon_stats(place = vt_crows$place_id)
place_counts
```

```
## $total
## [1] 3772
##
## $species_counts
##   count taxon.id         taxon.name taxon.rank taxon.rank_level
## 1   349   52391      Pinus strobus    species               10
## 2   320   49005      Quercus rubra    species               10
## 3   274   49202 Fagus grandifolia    species               10
## 4   233   48734  Tsuga canadensis    species               10
## 5   230    5212 Buteo jamaicensis    species               10
##   taxon.default_name.created_at taxon.default_name.creator_id
## 1     2009-07-14T16:17:36-03:00                            NA
## 2     2009-01-10T00:20:56-02:00                            NA
## 3     2009-01-21T05:04:08-02:00                            NA
## 4     2008-11-17T13:31:09-02:00                            NA
## 5     2008-03-12T23:47:36-03:00                            NA
##   taxon.default_name.id taxon.default_name.is_valid
## 1                 83116                        TRUE
## 2                 78334                        TRUE
## 3                 78629                        TRUE
## 4                 77895                        TRUE
## 5                  6745                        TRUE
##   taxon.default_name.lexicon taxon.default_name.name
## 1                    English       Eastern White Pine
## 2                    English         northern red oak
## 3                    English           American Beech
## 4                    English          Eastern Hemlock
## 5                    English          Red-tailed Hawk
##   taxon.default_name.name_provider taxon.default_name.source_id
## 1                  ColNameProvider                            1
## 2                 UBioNameProvider                            2
## 3                 UBioNameProvider                            2
## 4                 UBioNameProvider                            2
## 5                  ColNameProvider                            1
```

```
##    taxon.default_name.source_identifier
## 1                        1903147
## 2                         796025
## 3                         972534
## 4                         838136
## 5                         848620
##                                                         taxon.default_name.sou:
## 1 http://www.catalogueoflife.org/annual-checklist/2009/show_common_name_details.php?name=Eastern+whi
## 2                                    http://www.ubio.org/browser/details.php?namebankID=
## 3                                    http://www.ubio.org/browser/details.php?namebankID=
## 4                                    http://www.ubio.org/browser/details.php?namebankID=
## 5            http://www.catalogueoflife.org/annual-checklist/show_species_details.php?record_id=
##    taxon.default_name.taxon_id taxon.default_name.updated_at
## 1                        52391      2012-08-27T07:25:39-03:00
## 2                        49005      2013-09-29T08:23:43-03:00
## 3                        49202      2012-08-27T07:05:00-03:00
## 4                        48734      2012-08-28T07:00:54-03:00
## 5                         5212      2008-03-12T23:47:36-03:00
##    taxon.default_name.updater_id
## 1                          7996
## 2                          7996
## 3                          7996
## 4                          7996
## 5                            NA
##                                                 taxon.image_url
## 1 http://farm4.staticflickr.com/3261/2923651680_b6f373defd_s.jpg
## 2 http://farm4.staticflickr.com/3473/3235731853_5f08927f08_s.jpg
## 3 http://farm4.staticflickr.com/3169/2925868680_201c5c6b06_s.jpg
## 4 http://farm4.staticflickr.com/3076/2861403736_aef342656f_s.jpg
## 5 http://farm4.staticflickr.com/3233/2939911664_a9e7513df5_s.jpg
##    taxon.iconic_taxon_name taxon.conservation_status_name
## 1                  Plantae                             NA
## 2                  Plantae                             NA
## 3                  Plantae                             NA
## 4                  Plantae                             NA
## 5                     Aves                             NA
##
## $rank_counts
## $rank_counts$phylum
## [1] 10
##
## $rank_counts$superfamily
## [1] 12
##
## $rank_counts$class
## [1] 17
##
## $rank_counts$infraorder
## [1] 1
##
## $rank_counts$subfamily
## [1] 16
##
## $rank_counts$stateofmatter
```

```
## [1] 1
##
## $rank_counts$family
## [1] 150
##
## $rank_counts$epifamily
## [1] 1
##
## $rank_counts$genus
## [1] 513
##
## $rank_counts$order
## [1] 46
##
## $rank_counts$suborder
## [1] 10
##
## $rank_counts$subspecies
## [1] 62
##
## $rank_counts$subclass
## [1] 2
##
## $rank_counts$variety
## [1] 25
##
## $rank_counts$hybrid
## [1] 14
##
## $rank_counts$kingdom
## [1] 5
##
## $rank_counts$form
## [1] 4
##
## $rank_counts$fo
## [1] 1
##
## $rank_counts$species
## [1] 2873
##
## $rank_counts$tribe
## [1] 9
```

Stats by user

Similar statistics can be gotten for users. The same input parameters can be used, but results are the top five users by species count and observation count.

```
## By date
counts <- get_inat_user_stats(date = "2010-06-14")
counts
```

```
## $total
```

```
## [1] 25
##
## $most_observations
##   count user.id user.login  user.name
## 1    10    9706 greglasley Greg Lasley
## 2     4     357  annetanne
## 3     4   10285    finatic  BJ Stacey
## 4     3     873   tapbirds  Scott Cox
## 5     3   18056   plantman       <NA>
##                                                   user.user_icon_url
## 1  http://www.inaturalist.org/attachments/users/icons/9706-thumb.jpg?1389224786
## 2   http://www.inaturalist.org/attachments/users/icons/357-thumb.jpg?1362061338
## 3 http://www.inaturalist.org/attachments/users/icons/10285-thumb.jpg?1350000458
## 4            http://www.inaturalist.org/attachments/users/icons/873-thumb.jpg
## 5                                                                 <NA>
##
## $most_species
##   count user.id user.login  user.name
## 1    10    9706 greglasley Greg Lasley
## 2     4   10285    finatic  BJ Stacey
## 3     3    3403     davidr    David R
## 4     3     382    tsoleau
## 5     3     873   tapbirds  Scott Cox
##                                                   user.user_icon_url
## 1  http://www.inaturalist.org/attachments/users/icons/9706-thumb.jpg?1389224786
## 2 http://www.inaturalist.org/attachments/users/icons/10285-thumb.jpg?1350000458
## 3  http://www.inaturalist.org/attachments/users/icons/3403-thumb.jpg?1394954695
## 4            http://www.inaturalist.org/attachments/users/icons/382-thumb.jpg
## 5            http://www.inaturalist.org/attachments/users/icons/873-thumb.jpg
```

```r
## By place_ID
vt_crows <- get_inat_obs_project("crows-in-vermont", type = "info", raw = FALSE)
```

```
## 25  Records
## 0
```

```r
place_counts <- get_inat_user_stats(place = vt_crows$place_id)
place_counts
```

```
## $total
## [1] 285
##
## $most_observations
##   count user.id   user.login     user.name
## 1  5571    2179      charlie  Charlie Hohn
## 2  2747   12610 susanelliott Susan Elliott
## 3  2228     317     catharus Kent McFarland
## 4  2050   11792    kylejones    Kyle Jones
## 5  1614   12036    cotaweaver      Zac Cota
##                                                   user.user_icon_url
## 1  http://www.inaturalist.org/attachments/users/icons/2179-thumb.jpg?1367974806
## 2 http://www.inaturalist.org/attachments/users/icons/12610-thumb.jpg?1390441055
```

```
## 3   http://www.inaturalist.org/attachments/users/icons/317-thumb.jpg?1373935791
## 4 http://www.inaturalist.org/attachments/users/icons/11792-thumb.jpg?1394793142
## 5 http://www.inaturalist.org/attachments/users/icons/12036-thumb.jpg?1387504441
##
## $most_species
##   count user.id   user.login      user.name
## 1  1215   12610 susanelliott  Susan Elliott
## 2  1025   11792    kylejones     Kyle Jones
## 3   835   12045     larry522 Larry Clarfeld
## 4   807     317     catharus Kent McFarland
## 5   719    2179      charlie   Charlie Hohn
##                                            user.user_icon_url
## 1 http://www.inaturalist.org/attachments/users/icons/12610-thumb.jpg?1390441055
## 2 http://www.inaturalist.org/attachments/users/icons/11792-thumb.jpg?1394793142
## 3 http://www.inaturalist.org/attachments/users/icons/12045-thumb.jpg?1357252118
## 4   http://www.inaturalist.org/attachments/users/icons/317-thumb.jpg?1373935791
## 5  http://www.inaturalist.org/attachments/users/icons/2179-thumb.jpg?1367974806
```

Mapping.

Basic maps can be created as well to quickly visualize search results. Maps can either be plotted automatically `plot = TRUE` or simply return a ggplot2 object with `plot = FALSE`. This works well with single species data, but more complicated plots are best made from scratch.

```
library(rinat)
library(ggplot2)

## Map salamanders in the genuse Ambystoma
m_obs <- get_inat_obs(taxon = "Ambystoma maculatum")

salamander_map <- inat_map(m_obs, plot = FALSE)
### Now we can modify the returned map
salamander_map + borders("state") + theme_bw()
```

```
## Warning: Removed 4 rows containing missing values (geom_point).
```