

Import von Webdaten

Jan-Philipp Kolb

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Import von JavaScript Object Notation (JSON)

- Jedes gültige JSON-Dokument soll ein gültiges JavaScript sein
- JSON wird zur Übertragung und zum Speichern von strukturierten Daten eingesetzt
- Insbesondere bei Webanwendungen und mobilen Apps wird es in Verbindung mit JavaScript, Ajax oder WebSockets zum Transfer von Daten zwischen dem Client und dem Server häufig genutzt.

```
{  
    "Herausgeber": "Xema",  
    "Nummer": "1234-5678-9012-3456",  
    "Deckung": 2e+6,  
    "Waehrung": "EURO",  
    "Inhaber":  
    {  
        "Name": "Mustermann",  
        "Vorname": "Max",  
        "maennlich": true,  
        "Hobbies": [ "Reiten", "Golfen", "Lesen" ],  
        "Alter": 42,  
        "Kinder": [],  
        "Partner": null  
    }  
}
```

Figure 1:

Download von Beispieldaten

- Overpass Turbo kann verwendet werden um Beispieldaten zu bekommen

<https://overpass-turbo.eu/>

Exkurs OpenStreetMap Daten

- Auf Overpass Turbo können Daten für Map Features exportiert werden
- Eine Liste der erhältlichen Map Features gibt es auf http://wiki.openstreetmap.org/wiki/DE:Map_Features

Figure 2:

Figure 3:

Schlüssel	Wert	Element	Kommentar	Darstellung	Foto
Verpflegung, Einkehr					
amenity	bar	<input type="radio"/> <input checked="" type="checkbox"/>	Bar, Nachtlokal . Es werden hauptsächlich alkoholische Getränke serviert. Siehe auch Beschreibung von amenity=bar und amenity=pub zur Unterscheidung von Bar und Pub (Kneipe).		
amenity	bbq	<input type="radio"/>	Grillplatz. Kann mit fuel=* (wood/gas/electric) kombiniert werden.		
amenity	biergarten	<input type="radio"/> <input checked="" type="checkbox"/>	Biergarten		

Figure 4:

Das Paket jsonlite

```
install.packages("jsonlite")

library(jsonlite)
citation("jsonlite")

##
## To cite jsonlite in publications use:
##
##   Jeroen Ooms (2014). The jsonlite Package: A Practical and
##   Consistent Mapping Between JSON Data and R Objects.
##   arXiv:1403.2805 [stat.CO] URL https://arxiv.org/abs/1403.2805.
##
## A BibTeX entry for LaTeX users is
##
## @Article{,
##   title = {The jsonlite Package: A Practical and Consistent Mapping Between JSON Data and R Objects},
##   author = {Jeroen Ooms},
##   journal = {arXiv:1403.2805 [stat.CO]},
##   year = {2014},
##   url = {https://arxiv.org/abs/1403.2805},
## }
```

JSON importieren

- die Daten für die Trinkstationen in Rom habe ich mit Overpass Turbo exportiert

```
library("jsonlite")
DRINKWATER <- fromJSON("data/RomDrinkingWater.geojson")

names(DRINKWATER)[1:3]

## [1] "type"      "generator"  "copyright"
names(DRINKWATER)[4:5]

## [1] "timestamp" "features"
```

Die Daten anschauen

```
head(DRINKWATER$features)

##      type          id properties.@id properties.amenity properties.flow
## 1 Feature node/246574149 node/246574149    drinking_water    push-button
## 2 Feature node/246574150 node/246574150    drinking_water           <NA>
## 3 Feature node/246574151 node/246574151    drinking_water           <NA>
## 4 Feature node/248743324 node/248743324    drinking_water           <NA>
## 5 Feature node/251773348 node/251773348    drinking_water           <NA>
## 6 Feature node/251773551 node/251773551    drinking_water           <NA>
## properties.type properties.name properties.name:fr properties.wheelchair
## 1           nasone            <NA>           <NA>           <NA>
## 2           <NA>            <NA>           <NA>           <NA>
## 3           <NA>            <NA>           <NA>           <NA>
```

```

## 4 <NA> <NA> <NA> <NA>
## 5 nasone <NA> <NA> <NA> <NA>
## 6 <NA> Acqua Marcia Eau potable yes
## properties.created_by properties.indoor geometry.type
## 1 <NA> <NA> Point
## 2 <NA> <NA> Point
## 3 <NA> <NA> Point
## 4 <NA> <NA> Point
## 5 <NA> <NA> Point
## 6 <NA> <NA> Point
## geometry.coordinates
## 1 12.49191, 41.89479
## 2 12.49095, 41.89489
## 3 12.48774, 41.89450
## 4 12.48773, 41.89354
## 5 12.48529, 41.88539
## 6 12.48386, 41.89332

```

Github JSON Daten

- Es lassen sich auch Dinge aus dem Web auslesen:

```

my_repos <- fromJSON("https://api.github.com/users/japhilko/repos")

head(my_repos)

##      id          name          full_name
## 1 29143362 2015-01-15-EMBLHeidelberg Japhilko/2015-01-15-EMBLHeidelberg
## 2 39427013           DataAnalysis       Japhilko/DataAnalysis
## 3 26485588        DataGeneration       Japhilko/DataGeneration
## 4 26164276            DLR_IntroR       Japhilko/DLR_IntroR
## 5 20760765            GeoData       Japhilko/GeoData
## 6 55756271           geosmdata       Japhilko/geosmdata
##   owner.login owner.id
## 1     Japhilko    7593396
## 2     Japhilko    7593396
## 3     Japhilko    7593396
## 4     Japhilko    7593396
## 5     Japhilko    7593396
## 6     Japhilko    7593396
##                               owner.avatar_url owner.gravatar_id
## 1 https://avatars2.githubusercontent.com/u/7593396?v=3
## 2 https://avatars2.githubusercontent.com/u/7593396?v=3
## 3 https://avatars2.githubusercontent.com/u/7593396?v=3
## 4 https://avatars2.githubusercontent.com/u/7593396?v=3
## 5 https://avatars2.githubusercontent.com/u/7593396?v=3
## 6 https://avatars2.githubusercontent.com/u/7593396?v=3
##                               owner.url          owner.html_url
## 1 https://api.github.com/users/Japhilko https://github.com/Japhilko
## 2 https://api.github.com/users/Japhilko https://github.com/Japhilko
## 3 https://api.github.com/users/Japhilko https://github.com/Japhilko
## 4 https://api.github.com/users/Japhilko https://github.com/Japhilko
## 5 https://api.github.com/users/Japhilko https://github.com/Japhilko
## 6 https://api.github.com/users/Japhilko https://github.com/Japhilko

```

```

##                               owner.followers_url
## 1 https://api.github.com/users/Japhilko/followers
## 2 https://api.github.com/users/Japhilko/followers
## 3 https://api.github.com/users/Japhilko/followers
## 4 https://api.github.com/users/Japhilko/followers
## 5 https://api.github.com/users/Japhilko/followers
## 6 https://api.github.com/users/Japhilko/followers
##                               owner.following_url
## 1 https://api.github.com/users/Japhilko/following{/other_user}
## 2 https://api.github.com/users/Japhilko/following{/other_user}
## 3 https://api.github.com/users/Japhilko/following{/other_user}
## 4 https://api.github.com/users/Japhilko/following{/other_user}
## 5 https://api.github.com/users/Japhilko/following{/other_user}
## 6 https://api.github.com/users/Japhilko/following{/other_user}
##                               owner.gists_url
## 1 https://api.github.com/users/Japhilko/gists{/gist_id}
## 2 https://api.github.com/users/Japhilko/gists{/gist_id}
## 3 https://api.github.com/users/Japhilko/gists{/gist_id}
## 4 https://api.github.com/users/Japhilko/gists{/gist_id}
## 5 https://api.github.com/users/Japhilko/gists{/gist_id}
## 6 https://api.github.com/users/Japhilko/gists{/gist_id}
##                               owner.starred_url
## 1 https://api.github.com/users/Japhilko/starred{/owner}{/repo}
## 2 https://api.github.com/users/Japhilko/starred{/owner}{/repo}
## 3 https://api.github.com/users/Japhilko/starred{/owner}{/repo}
## 4 https://api.github.com/users/Japhilko/starred{/owner}{/repo}
## 5 https://api.github.com/users/Japhilko/starred{/owner}{/repo}
## 6 https://api.github.com/users/Japhilko/starred{/owner}{/repo}
##                               owner.subscriptions_url
## 1 https://api.github.com/users/Japhilko/subscriptions
## 2 https://api.github.com/users/Japhilko/subscriptions
## 3 https://api.github.com/users/Japhilko/subscriptions
## 4 https://api.github.com/users/Japhilko/subscriptions
## 5 https://api.github.com/users/Japhilko/subscriptions
## 6 https://api.github.com/users/Japhilko/subscriptions
##                               owner.organizations_url
## 1 https://api.github.com/users/Japhilko/orgs
## 2 https://api.github.com/users/Japhilko/orgs
## 3 https://api.github.com/users/Japhilko/orgs
## 4 https://api.github.com/users/Japhilko/orgs
## 5 https://api.github.com/users/Japhilko/orgs
## 6 https://api.github.com/users/Japhilko/orgs
##                               owner.repos_url
## 1 https://api.github.com/users/Japhilko/repos
## 2 https://api.github.com/users/Japhilko/repos
## 3 https://api.github.com/users/Japhilko/repos
## 4 https://api.github.com/users/Japhilko/repos
## 5 https://api.github.com/users/Japhilko/repos
## 6 https://api.github.com/users/Japhilko/repos
##                               owner.events_url
## 1 https://api.github.com/users/Japhilko/events{/privacy}
## 2 https://api.github.com/users/Japhilko/events{/privacy}
## 3 https://api.github.com/users/Japhilko/events{/privacy}
## 4 https://api.github.com/users/Japhilko/events{/privacy}

```

```

## 5 https://api.github.com/users/Japhilko/events{/privacy}
## 6 https://api.github.com/users/Japhilko/events{/privacy}
##           owner.received_events_url owner.type
## 1 https://api.github.com/users/Japhilko/received_events      User
## 2 https://api.github.com/users/Japhilko/received_events      User
## 3 https://api.github.com/users/Japhilko/received_events      User
## 4 https://api.github.com/users/Japhilko/received_events      User
## 5 https://api.github.com/users/Japhilko/received_events      User
## 6 https://api.github.com/users/Japhilko/received_events      User
##   owner.site_admin private
## 1          FALSE  FALSE
## 2          FALSE  FALSE
## 3          FALSE  FALSE
## 4          FALSE  FALSE
## 5          FALSE  FALSE
## 6          FALSE  FALSE
##           html_url
## 1 https://github.com/Japhilko/2015-01-15-EMBLHeidelberg
## 2           https://github.com/Japhilko/DataAnalysis
## 3           https://github.com/Japhilko/DataGeneration
## 4           https://github.com/Japhilko/DLR_IntroR
## 5           https://github.com/Japhilko/GeoData
## 6           https://github.com/Japhilko/geosmdata
##           description fork
## 1 R programming and development (EMBL, Jan 2015) TRUE
## 2           My research on data analysis FALSE
## 3           Rcode for generating synthatic data FALSE
## 4           Unterlagen für DLR Workshop FALSE
## 5           Research on statistics and geodata FALSE
## 6           package to import OpenstreetMap data FALSE
##           url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg
## 2           https://api.github.com/repos/Japhilko/DataAnalysis
## 3           https://api.github.com/repos/Japhilko/DataGeneration
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR
## 5           https://api.github.com/repos/Japhilko/GeoData
## 6           https://api.github.com/repos/Japhilko/geosmdata
##           forks_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/forks
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/forks
## 3           https://api.github.com/repos/Japhilko/DataGeneration/forks
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/forks
## 5           https://api.github.com/repos/Japhilko/GeoData/forks
## 6           https://api.github.com/repos/Japhilko/geosmdata/forks
##           keys_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/keys{/key_id}
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/keys{/key_id}
## 3           https://api.github.com/repos/Japhilko/DataGeneration/keys{/key_id}
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/keys{/key_id}
## 5           https://api.github.com/repos/Japhilko/GeoData/keys{/key_id}
## 6           https://api.github.com/repos/Japhilko/geosmdata/keys{/key_id}
##           collaborators_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/collaborators{/collaborator}
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/collaborators{/collaborator}

```

```

## 3      https://api.github.com/repos/Japhilko/DataGeneration/collaborators{/collaborator}
## 4      https://api.github.com/repos/Japhilko/DLR_IntroR/collaborators{/collaborator}
## 5      https://api.github.com/repos/Japhilko/GeoData/collaborators{/collaborator}
## 6      https://api.github.com/repos/Japhilko/geosmdata/collaborators{/collaborator}
##
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/teams
## 2      https://api.github.com/repos/Japhilko/DataAnalysis/teams
## 3      https://api.github.com/repos/Japhilko/DataGeneration/teams
## 4      https://api.github.com/repos/Japhilko/DLR_IntroR/teams
## 5      https://api.github.com/repos/Japhilko/GeoData/teams
## 6      https://api.github.com/repos/Japhilko/geosmdata/teams
##
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/hooks
## 2      https://api.github.com/repos/Japhilko/DataAnalysis/hooks
## 3      https://api.github.com/repos/Japhilko/DataGeneration/hooks
## 4      https://api.github.com/repos/Japhilko/DLR_IntroR/hooks
## 5      https://api.github.com/repos/Japhilko/GeoData/hooks
## 6      https://api.github.com/repos/Japhilko/geosmdata/hooks
##
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/issues/events{/number}
## 2      https://api.github.com/repos/Japhilko/DataAnalysis/issues/events{/number}
## 3      https://api.github.com/repos/Japhilko/DataGeneration/issues/events{/number}
## 4      https://api.github.com/repos/Japhilko/DLR_IntroR/issues/events{/number}
## 5      https://api.github.com/repos/Japhilko/GeoData/issues/events{/number}
## 6      https://api.github.com/repos/Japhilko/geosmdata/issues/events{/number}
##
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/events
## 2      https://api.github.com/repos/Japhilko/DataAnalysis/events
## 3      https://api.github.com/repos/Japhilko/DataGeneration/events
## 4      https://api.github.com/repos/Japhilko/DLR_IntroR/events
## 5      https://api.github.com/repos/Japhilko/GeoData/events
## 6      https://api.github.com/repos/Japhilko/geosmdata/events
##
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/assignees{/user}
## 2      https://api.github.com/repos/Japhilko/DataAnalysis/assignees{/user}
## 3      https://api.github.com/repos/Japhilko/DataGeneration/assignees{/user}
## 4      https://api.github.com/repos/Japhilko/DLR_IntroR/assignees{/user}
## 5      https://api.github.com/repos/Japhilko/GeoData/assignees{/user}
## 6      https://api.github.com/repos/Japhilko/geosmdata/assignees{/user}
##
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/branches{/branch}
## 2      https://api.github.com/repos/Japhilko/DataAnalysis/branches{/branch}
## 3      https://api.github.com/repos/Japhilko/DataGeneration/branches{/branch}
## 4      https://api.github.com/repos/Japhilko/DLR_IntroR/branches{/branch}
## 5      https://api.github.com/repos/Japhilko/GeoData/branches{/branch}
## 6      https://api.github.com/repos/Japhilko/geosmdata/branches{/branch}
##
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/tags
## 2      https://api.github.com/repos/Japhilko/DataAnalysis/tags
## 3      https://api.github.com/repos/Japhilko/DataGeneration/tags
## 4      https://api.github.com/repos/Japhilko/DLR_IntroR/tags
## 5      https://api.github.com/repos/Japhilko/GeoData/tags
## 6      https://api.github.com/repos/Japhilko/geosmdata/tags
##
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/blobs{/blob}

```

```

## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/git/blobs{/sha}
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/git/blobs{/sha}
## 3           https://api.github.com/repos/Japhilko/DataGeneration/git/blobs{/sha}
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/git/blobs{/sha}
## 5           https://api.github.com/repos/Japhilko/GeoData/git/blobs{/sha}
## 6           https://api.github.com/repos/Japhilko/geosmdata/git/blobs{/sha}
##
##                                         git_tags_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/git/tags{/sha}
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/git/tags{/sha}
## 3           https://api.github.com/repos/Japhilko/DataGeneration/git/tags{/sha}
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/git/tags{/sha}
## 5           https://api.github.com/repos/Japhilko/GeoData/git/tags{/sha}
## 6           https://api.github.com/repos/Japhilko/geosmdata/git/tags{/sha}
##
##                                         git_refs_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/git/refs{/sha}
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/git/refs{/sha}
## 3           https://api.github.com/repos/Japhilko/DataGeneration/git/refs{/sha}
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/git/refs{/sha}
## 5           https://api.github.com/repos/Japhilko/GeoData/git/refs{/sha}
## 6           https://api.github.com/repos/Japhilko/geosmdata/git/refs{/sha}
##
##                                         trees_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/git/trees{/sha}
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/git/trees{/sha}
## 3           https://api.github.com/repos/Japhilko/DataGeneration/git/trees{/sha}
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/git/trees{/sha}
## 5           https://api.github.com/repos/Japhilko/GeoData/git/trees{/sha}
## 6           https://api.github.com/repos/Japhilko/geosmdata/git/trees{/sha}
##
##                                         statuses_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/statuses/{sha}
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/statuses/{sha}
## 3           https://api.github.com/repos/Japhilko/DataGeneration/statuses/{sha}
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/statuses/{sha}
## 5           https://api.github.com/repos/Japhilko/GeoData/statuses/{sha}
## 6           https://api.github.com/repos/Japhilko/geosmdata/statuses/{sha}
##
##                                         languages_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/languages
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/languages
## 3           https://api.github.com/repos/Japhilko/DataGeneration/languages
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/languages
## 5           https://api.github.com/repos/Japhilko/GeoData/languages
## 6           https://api.github.com/repos/Japhilko/geosmdata/languages
##
##                                         stargazers_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/stargazers
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/stargazers
## 3           https://api.github.com/repos/Japhilko/DataGeneration/stargazers
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/stargazers
## 5           https://api.github.com/repos/Japhilko/GeoData/stargazers
## 6           https://api.github.com/repos/Japhilko/geosmdata/stargazers
##
##                                         contributors_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/contributors
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/contributors
## 3           https://api.github.com/repos/Japhilko/DataGeneration/contributors
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/contributors
## 5           https://api.github.com/repos/Japhilko/GeoData/contributors

```

```

## 6 https://api.github.com/repos/Japhilko/geosmdata/contributors
##                                         subscribers_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/subscribers
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/subscribers
## 3 https://api.github.com/repos/Japhilko/DataGeneration/subscribers
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/subscribers
## 5 https://api.github.com/repos/Japhilko/GeoData/subscribers
## 6 https://api.github.com/repos/Japhilko/geosmdata/subscribers
##                                         subscription_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/subscription
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/subscription
## 3 https://api.github.com/repos/Japhilko/DataGeneration/subscription
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/subscription
## 5 https://api.github.com/repos/Japhilko/GeoData/subscription
## 6 https://api.github.com/repos/Japhilko/geosmdata/subscription
##                                         commits_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/commits{/sha}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/commits{/sha}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/commits{/sha}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/commits{/sha}
## 5 https://api.github.com/repos/Japhilko/GeoData/commits{/sha}
## 6 https://api.github.com/repos/Japhilko/geosmdata/commits{/sha}
##                                         git_commits_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/git/commits{/sha}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/git/commits{/sha}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/git/commits{/sha}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/git/commits{/sha}
## 5 https://api.github.com/repos/Japhilko/GeoData/git/commits{/sha}
## 6 https://api.github.com/repos/Japhilko/geosmdata/git/commits{/sha}
##                                         comments_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/comments{/number}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/comments{/number}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/comments{/number}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/comments{/number}
## 5 https://api.github.com/repos/Japhilko/GeoData/comments{/number}
## 6 https://api.github.com/repos/Japhilko/geosmdata/comments{/number}
##                                         issue_comment_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/issues/comments{/number}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/issues/comments{/number}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/issues/comments{/number}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/issues/comments{/number}
## 5 https://api.github.com/repos/Japhilko/GeoData/issues/comments{/number}
## 6 https://api.github.com/repos/Japhilko/geosmdata/issues/comments{/number}
##                                         contents_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/contents/{+path}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/contents/{+path}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/contents/{+path}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/contents/{+path}
## 5 https://api.github.com/repos/Japhilko/GeoData/contents/{+path}
## 6 https://api.github.com/repos/Japhilko/geosmdata/contents/{+path}
##                                         compare_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/compare/{base}...{head}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/compare/{base}...{head}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/compare/{base}...{head}

```

```

## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/compare/{base}...{head}
## 5 https://api.github.com/repos/Japhilko/GeoData/compare/{base}...{head}
## 6 https://api.github.com/repos/Japhilko/geosmdata/compare/{base}...{head}
##
## merges_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/merges
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/merges
## 3 https://api.github.com/repos/Japhilko/DataGeneration/merges
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/merges
## 5 https://api.github.com/repos/Japhilko/GeoData/merges
## 6 https://api.github.com/repos/Japhilko/geosmdata/merges
##
## archive_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/{archive_format}{/ref}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/{archive_format}{/ref}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/{archive_format}{/ref}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/{archive_format}{/ref}
## 5 https://api.github.com/repos/Japhilko/GeoData/{archive_format}{/ref}
## 6 https://api.github.com/repos/Japhilko/geosmdata/{archive_format}{/ref}
##
## downloads_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/downloads
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/downloads
## 3 https://api.github.com/repos/Japhilko/DataGeneration/downloads
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/downloads
## 5 https://api.github.com/repos/Japhilko/GeoData/downloads
## 6 https://api.github.com/repos/Japhilko/geosmdata/downloads
##
## issues_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/issues{/number}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/issues{/number}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/issues{/number}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/issues{/number}
## 5 https://api.github.com/repos/Japhilko/GeoData/issues{/number}
## 6 https://api.github.com/repos/Japhilko/geosmdata/issues{/number}
##
## pulls_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/pulls{/number}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/pulls{/number}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/pulls{/number}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/pulls{/number}
## 5 https://api.github.com/repos/Japhilko/GeoData/pulls{/number}
## 6 https://api.github.com/repos/Japhilko/geosmdata/pulls{/number}
##
## milestones_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/milestones{/number}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/milestones{/number}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/milestones{/number}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/milestones{/number}
## 5 https://api.github.com/repos/Japhilko/GeoData/milestones{/number}
## 6 https://api.github.com/repos/Japhilko/geosmdata/milestones{/number}
##
## notifications
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/notifications{?since,all,participants}
## 2 https://api.github.com/repos/Japhilko/DataAnalysis/notifications{?since,all,participants}
## 3 https://api.github.com/repos/Japhilko/DataGeneration/notifications{?since,all,participants}
## 4 https://api.github.com/repos/Japhilko/DLR_IntroR/notifications{?since,all,participants}
## 5 https://api.github.com/repos/Japhilko/GeoData/notifications{?since,all,participants}
## 6 https://api.github.com/repos/Japhilko/geosmdata/notifications{?since,all,participants}
##
## labels_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/labels{/name}

```

```

## 2           https://api.github.com/repos/Japhilko/DataAnalysis/labels{/name}
## 3           https://api.github.com/repos/Japhilko/DataGeneration/labels{/name}
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/labels{/name}
## 5           https://api.github.com/repos/Japhilko/GeoData/labels{/name}
## 6           https://api.github.com/repos/Japhilko/geosmdata/labels{/name}
##
##           releases_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/releases{/id}
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/releases{/id}
## 3           https://api.github.com/repos/Japhilko/DataGeneration/releases{/id}
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/releases{/id}
## 5           https://api.github.com/repos/Japhilko/GeoData/releases{/id}
## 6           https://api.github.com/repos/Japhilko/geosmdata/releases{/id}
##
##           deployments_url
## 1 https://api.github.com/repos/Japhilko/2015-01-15-EMBLHeidelberg/deployments
## 2           https://api.github.com/repos/Japhilko/DataAnalysis/deployments
## 3           https://api.github.com/repos/Japhilko/DataGeneration/deployments
## 4           https://api.github.com/repos/Japhilko/DLR_IntroR/deployments
## 5           https://api.github.com/repos/Japhilko/GeoData/deployments
## 6           https://api.github.com/repos/Japhilko/geosmdata/deployments
##
##           created_at      updated_at      pushed_at
## 1 2015-01-12T15:59:33Z 2015-01-12T15:59:34Z 2015-01-10T22:26:12Z
## 2 2015-07-21T06:00:37Z 2016-02-04T13:01:54Z 2017-04-24T14:20:11Z
## 3 2014-11-11T13:14:01Z 2015-04-21T14:51:01Z 2015-07-27T13:59:39Z
## 4 2014-11-04T10:34:17Z 2016-07-26T08:22:47Z 2016-08-11T13:23:54Z
## 5 2014-06-12T08:51:41Z 2017-03-23T06:00:42Z 2017-03-23T15:31:16Z
## 6 2016-04-08T06:35:45Z 2016-06-06T10:36:01Z 2016-06-08T11:06:58Z
##
##           git_url
## 1 git://github.com/Japhilko/2015-01-15-EMBLHeidelberg.git
## 2           git://github.com/Japhilko/DataAnalysis.git
## 3           git://github.com/Japhilko/DataGeneration.git
## 4           git://github.com/Japhilko/DLR_IntroR.git
## 5           git://github.com/Japhilko/GeoData.git
## 6           git://github.com/Japhilko/geosmdata.git
##
##           ssh_url
## 1 git@github.com:Japhilko/2015-01-15-EMBLHeidelberg.git
## 2           git@github.com:Japhilko/DataAnalysis.git
## 3           git@github.com:Japhilko/DataGeneration.git
## 4           git@github.com:Japhilko/DLR_IntroR.git
## 5           git@github.com:Japhilko/GeoData.git
## 6           git@github.com:Japhilko/geosmdata.git
##
##           clone_url
## 1 https://github.com/Japhilko/2015-01-15-EMBLHeidelberg.git
## 2           https://github.com/Japhilko/DataAnalysis.git
## 3           https://github.com/Japhilko/DataGeneration.git
## 4           https://github.com/Japhilko/DLR_IntroR.git
## 5           https://github.com/Japhilko/GeoData.git
## 6           https://github.com/Japhilko/geosmdata.git
##
##           svn_url homepage    size
## 1 https://github.com/Japhilko/2015-01-15-EMBLHeidelberg <NA> 5667
## 2           https://github.com/Japhilko/DataAnalysis <NA> 55636
## 3           https://github.com/Japhilko/DataGeneration <NA> 336
## 4           https://github.com/Japhilko/DLR_IntroR <NA> 32546
## 5           https://github.com/Japhilko/GeoData <NA> 1589706
## 6           https://github.com/Japhilko/geosmdata <NA> 19931

```

```

##   stargazers_count watchers_count      language has_issues has_projects
## 1              0            0          TeX     FALSE      TRUE
## 2              0            0         HTML      TRUE      TRUE
## 3              0            0           R      TRUE      TRUE
## 4              2            2           R      TRUE      TRUE
## 5              6            6         HTML      TRUE      TRUE
## 6              0            0 ActionScript    TRUE      TRUE
##   has_downloads has_wiki has_pages forks_count mirror_url
## 1      TRUE     TRUE    FALSE          0        NA
## 2      TRUE     TRUE    FALSE          1        NA
## 3      TRUE     TRUE    TRUE          0        NA
## 4      TRUE     TRUE   FALSE          0        NA
## 5      TRUE     TRUE    TRUE          1        NA
## 6      TRUE     TRUE   FALSE          0        NA
##   open_issues_count forks open_issues watchers default_branch
## 1              0     0            0          0    master
## 2              0     1            0          0    master
## 3              0     0            0          0    master
## 4              0     0            0          2    master
## 5              1     1            1          6    master
## 6              0     0            0          0    master

```

Weiteres Beispiel für JSON Daten

- Die Ergast Developer API ist ein experimenteller Web Service, der eine historische Aufzeichnung von Motorsportdaten liefert.



Figure 5:

Ergast Daten lesen

```

library(knitr)
library(jsonlite)
res <- fromJSON('http://ergast.com/api/f1/2004/1/results.json')
drivers <- res$MRData$RaceTable$Races$Results[[1]]$Driver
kable(head(drivers))

```

driverId	code	url	givenName	familyName	dateOfB
michael_schumacher	MSC	http://en.wikipedia.org/wiki/Michael_Schumacher	Michael	Schumacher	1969-
barrichello	BAR	http://en.wikipedia.org/wiki/Rubens_Barrichello	Rubens	Barrichello	1972-
alonso	ALO	http://en.wikipedia.org/wiki/Fernando_Alonso	Fernando	Alonso	1981-
ralf_schumacher	SCH	http://en.wikipedia.org/wiki/Ralf_Schumacher	Ralf	Schumacher	1975-
montoya	MON	http://en.wikipedia.org/wiki/Juan_Pablo_Montoya	Juan	Pablo Montoya	1975-
button	BUT	http://en.wikipedia.org/wiki/Jenson_Button	Jenson	Button	1980-

Daten der New York Times

- Die New York Times hat mehrere APIs als Teil des NYT-Entwickler-Netzwerks.
- Es ist eine Schnittstelle zu Daten aus verschiedenen Abteilungen, wie Nachrichtenartikel, Buchbesprechungen, Immobilien, etc.
- Registrierung ist erforderlich (aber kostenlos) und ein Schlüssel kann hier erhalten werden.

New York Times Beispiel

```
article_key <- "&api-key=c2fede7bd9aea57c898f538e5ec0a1ee:6:68700045"
url <- "http://api.nytimes.com/svc/search/v2/articlesearch.json?q=obamacare+socialism"
req <- fromJSON(paste0(url, article_key))
articles <- req$response$docs
# kable(head(articles))
```

XML Dateien einlesen

```
<?xml version="1.0" encoding="UTF-8"?>
- <osm generator="Overpass API" version="0.6">
  <note>The data included in this document is from www.openstreetmap.org. The data is made available under ODbL.</note>
  <meta areas="2017-05-07T07:22:03Z" osm_base="2017-05-07T08:19:03Z"/>
  - <node lon="8.5028074" lat="49.5190994" id="30560755">
    <tag v="Potlatch 0.5d" k="created_by"/>
    <tag v="playground" k="leisure"/>
  </node>
  - <node lon="8.5393963" lat="49.4963345" id="76468450">
    <tag v="Potlatch 0.4a" k="created_by"/>
    <tag v="playground" k="leisure"/>
    <tag v="Rutsche, Schaukel, großer Sandkasten, Tischtennis" k="note"/>
  </node>
  - <node lon="8.5529589" lat="49.4967807" id="76468534">
    <tag v="playground" k="leisure"/>
  </node>
  - <node lon="8.5487501" lat="49.4923030" id="76468535">
    <tag v="playground" k="leisure"/>
  </node>
  - <node lon="8.5481399" lat="49.5024260" id="76468536">
    <tag v="playground" k="leisure"/>
    <tag v="Schaukel, Rutsche, Sandkasten, Spielhäuser, Tischtennis" k="note"/>
  </node>
  - <node lon="8.5420356" lat="49.4975937" id="76468558">
    <tag v="playground" k="leisure"/>
  </node>
```

Figure 6:

Import von XML Dateien

```
install.packages("XML")
library(XML)
citation("XML")

##
## To cite package 'XML' in publications use:
##
## Duncan Temple Lang and the CRAN Team (2016). XML: Tools for
## Parsing and Generating XML Within R and S-Plus. R package
## version 3.98-1.5. https://CRAN.R-project.org/package=XML
```

```

##' @Manual{
##'   title = {XML: Tools for Parsing and Generating XML Within R and S-Plus},
##'   author = {Duncan Temple Lang and the CRAN Team},
##'   year = {2016},
##'   note = {R package version 3.98-1.5},
##'   url = {https://CRAN.R-project.org/package=XML},
##' }
##'
##' ATTENTION: This citation information has been auto-generated from
##' the package DESCRIPTION file and may need manual editing, see
##' 'help("citation")'.

```

Das R-Paket XML - Gaston Sanchez

```
library("XML")
```



Figure 7: Gaston Sanchez - Dataflow

Seine Arbeit sieht man hier.

Das Arbeiten mit XML Daten

Funktionen im XML Paket

Function	Description
xmlName()	name of the node

Function	Description
xmlSize()	number of subnodes
xmlAttrs()	named character vector of all attributes
xmlGetAttr()	value of a single attribute
xmlValue()	contents of a leaf node
xmlParent()	name of parent node
xmlAncestors()	name of ancestor nodes
getSibling()	siblings to the right or to the left
xmlNamespace()	the namespace (if there's one)

Das neuere xml2 Paket

```
install.packages("xml2")

library(xml2)
citation("xml2")

##
## To cite package 'xml2' in publications use:
##
##   Hadley Wickham, James Hester and Jeroen Ooms (2017). xml2: Parse
##   XML. R package version 1.1.0.
##   https://CRAN.R-project.org/package=xml2
##
## A BibTeX entry for LaTeX users is
##
## @Manual{,
##   title = {xml2: Parse XML},
##   author = {Hadley Wickham and James Hester and Jeroen Ooms},
##   year = {2017},
##   note = {R package version 1.1.0},
##   url = {https://CRAN.R-project.org/package=xml2},
## }
```

Beispiel Daten - die OpenStreetMap API

- OpenStreetMap hat eine Editier-API welche zum Lesen und Speichern von Rohen Geodaten von bzw. auf die OpenStreetMap Datenbank benutzt werden kann.

Die OpenStreetMap ID herausfinden

Einzelne Objekte finden

<www.openstreetmap.org/export>

OSM Ausschnitte herunterladen

<www.openstreetmap.org/export>

Getting Data from the Web with R

Part 4: Parsing XML/HTML Content

Gaston Sanchez

April-May 2014

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Figure 8: Gaston Sanchez - Webdaten bekommen

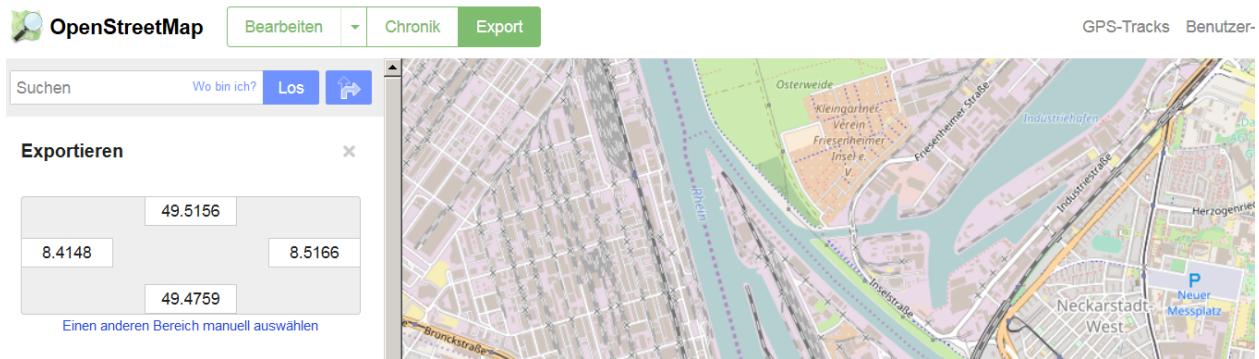


Figure 9:

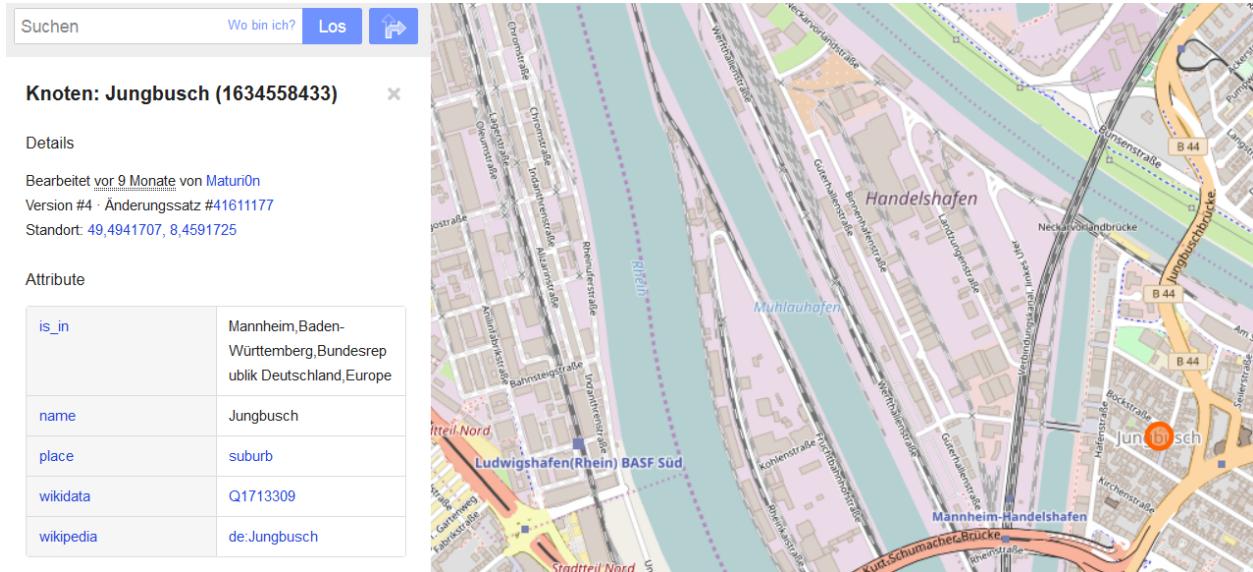


Figure 10:

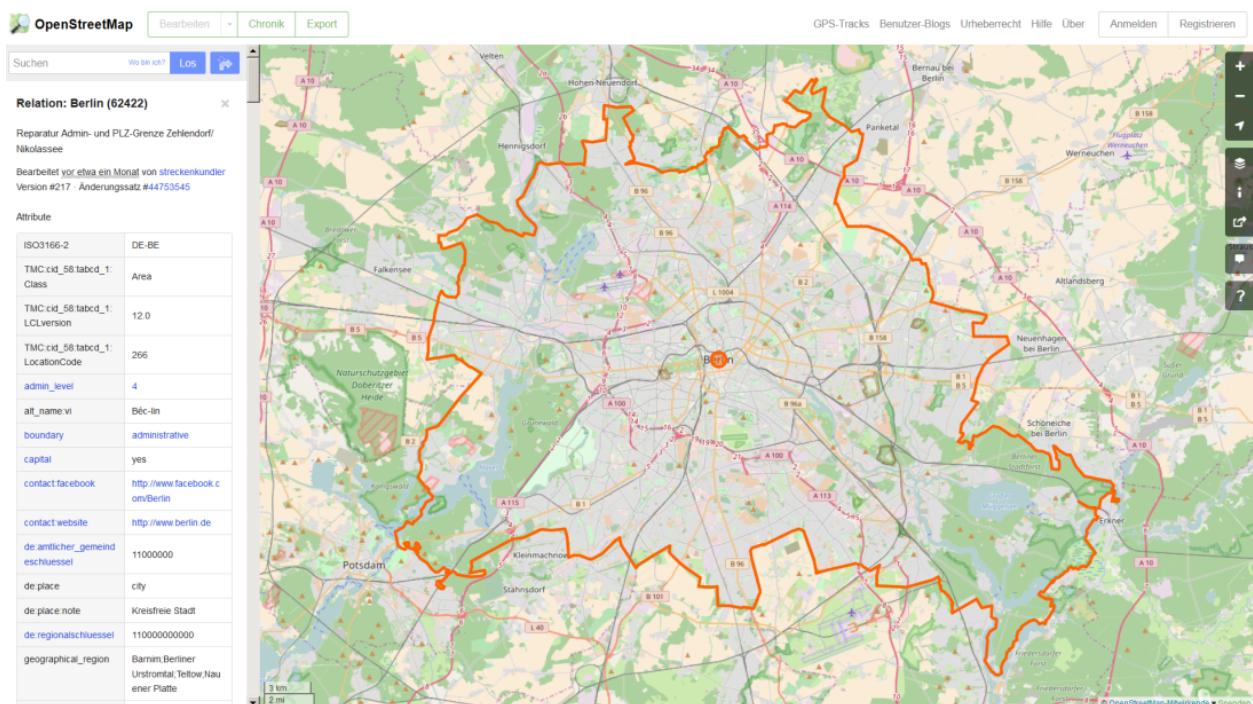


Figure 11: osm export

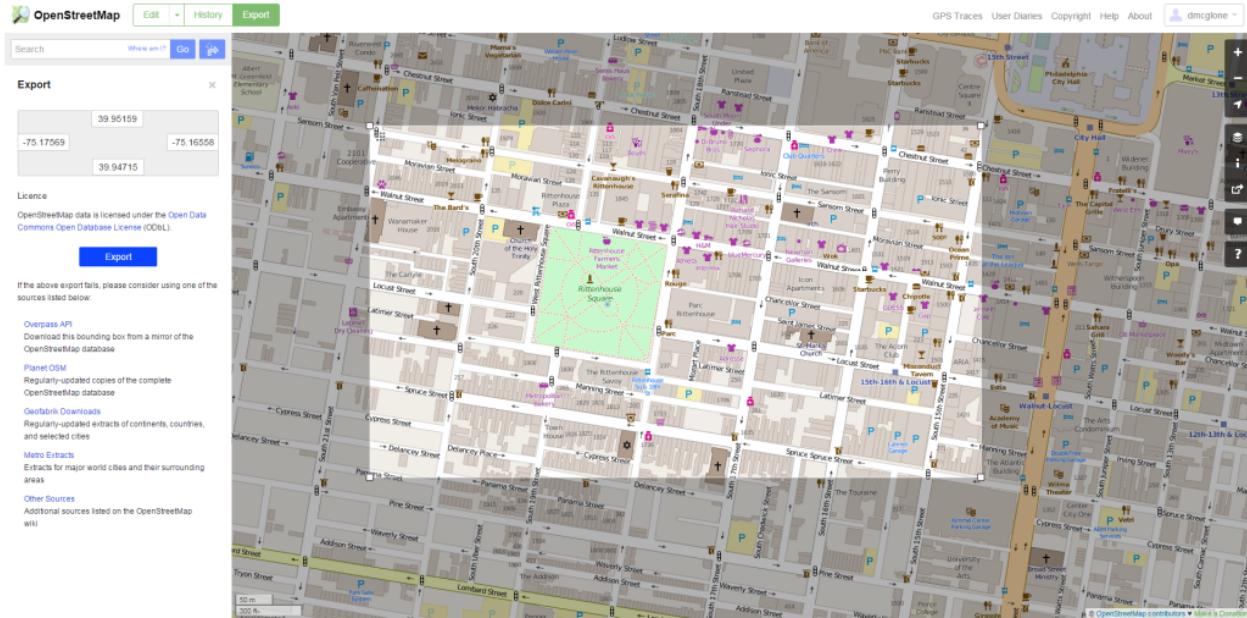


Figure 12: osm export

Erstes Beispiel

```
url <- "http://api.openstreetmap.org/api/0.6/
relation/62422"

library(xml2)
BE <- xmlParse(url)
```

```
<osm version="0.6" generator="CGImap 0.4.0 (19884 thorn-03.openstreetmap.org)" copyright="OpenStreetMap and contributors" attribution="http://www.openstreetmap.org/copyright"
license="http://opendatacommons.org/licenses/odbl/1-0/">
- <relation id="62422" visible="true" version="209" changeset="36072269" timestamp="2015-12-20T19:49:52Z" user="tbicr" uid="278800">
  <member type="node" ref="240109189" role="admin_centre"/>
  <member type="way" ref="50291800" role="outer"/>
  <member type="way" ref="7791336" role="outer"/>
  <member type="way" ref="315222039" role="outer"/>
  <member type="way" ref="77487568" role="outer"/>
  <member type="way" ref="315222038" role="outer"/>
  <member type="way" ref="98035898" role="outer"/>
  <member type="way" ref="77501737" role="outer"/>
```

Figure 13: Administrative Grenzen Berlin

Das XML analysieren

- Tobi Bosede - Working with XML Data in R

```
xmltop = xmlRoot(BE)
class(xmltop)

## [1] "XMLInternalElementNode" "XMLInternalNode"
## [3] "XMLAbstractNode"

xmlSize(xmltop)

## [1] 1
```

```
xmlSize(xmltop[[1]])
```

```
## [1] 328
```

Nutzung von Xpath

Xpath, the XML Path Language, is a query language for selecting nodes from an XML document.

```
xpathApply(BE, "//tag[@k = 'source:population']")
```

```
## [[1]]
```

```
## <tag k="source:population" v="http://www.statistik-berlin-brandenburg.de/Publikationen/Stat_Berichte"##  
## attr("class")  
## [1] "XMLNodeSet"
```

Beispiel: administrative Grenzen Berlin

Administrative Grenzen für Deutschland

```
url <- "http://api.openstreetmap.org/api/0.6/relation/62422"
```

```
BE <- xmlParse(url)
```

```
<osm version="0.6" generator="CGImap 0.4.0 (19884 thorn-03.openstreetmap.org)" copyright="OpenStreetMap and contributors" attribution="http://www.openstreetmap.org/copyright"  
license="http://opendatacommons.org/licenses/odbl/1-0/">  
-<relation id="62422" visible="true" version="209" changeset="36072269" timestamp="2015-12-20T19:49:52Z" user="tbicr" uid="278800">  
-<member type="node" ref="240109189" role="admin_centre"/>  
<member type="way" ref="50291800" role="outer"/>  
<member type="way" ref="77913336" role="outer"/>  
<member type="way" ref="315222039" role="outer"/>  
<member type="way" ref="77487568" role="outer"/>  
<member type="way" ref="315222038" role="outer"/>  
<member type="way" ref="98035898" role="outer"/>  
<member type="way" ref="77501737" role="outer"/>
```

Figure 14: Administrative Grenzen Berlin

Quelle für die Bevölkerungsgröße

```
xpathApply(BE, "//tag[@k = 'source:population']")
```

```
## [[1]]
```

```
## <tag k="source:population" v="http://www.statistik-berlin-brandenburg.de/Publikationen/Stat_Berichte"##  
## attr("class")  
## [1] "XMLNodeSet"
```

-Statistik Berlin Brandenburg

Etwas überraschend:

```
xpathApply(BE, "//tag[@k = 'name:ta']")
```

```
## [[1]]
## <tag k="name:ta" v="<U+OBAA><U+OBC6><U+OBBO><U+OBCT><U+OB2><U+OBBF><U+OBA9><U+OBCD>" />
##
## attr(,"class")
## [1] "XMLNodeSet"
```

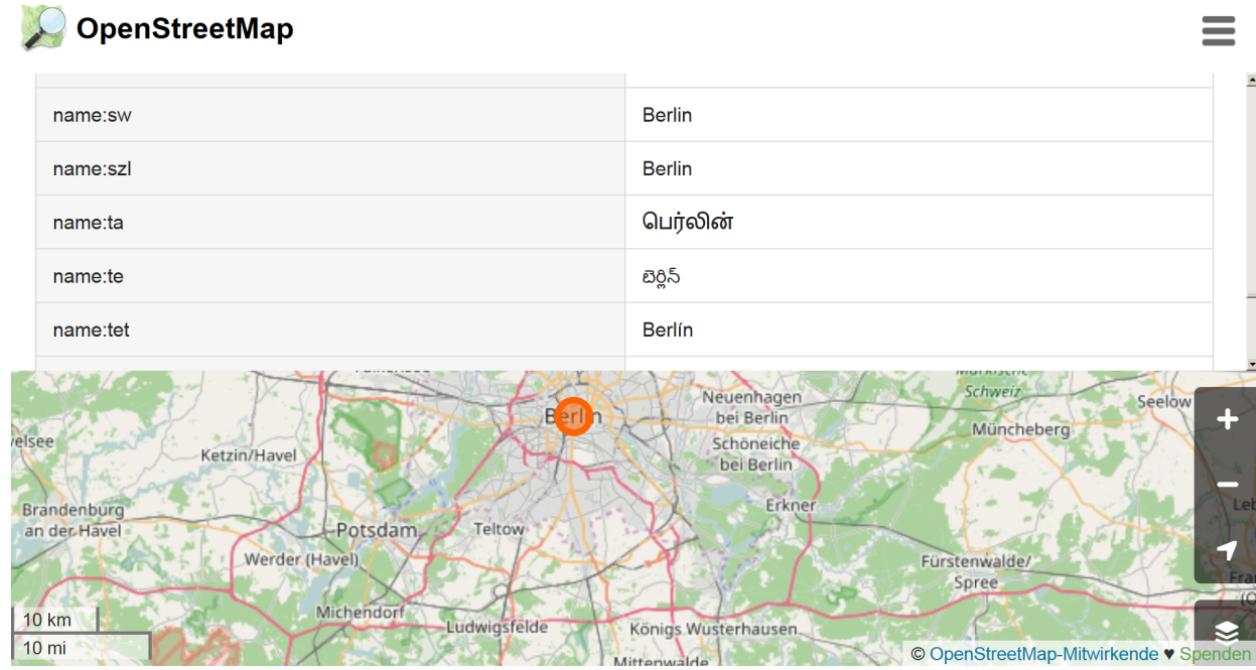


Figure 15:

Geographische Region

```
region <- xpathApply(BE,
  "//tag[@k = 'geographical_region']")
# regular expressions
region[[1]]

## <tag k="geographical_region" v="Barnim;Berliner Urstromtal;Teltow;Nauener Platte"/>
<tag k="geographical_region"
  v="Barnim;Berliner Urstromtal;
  Teltow;Nauener Platte"/>
```

Landkreis

Weiteres Beispiel

```
url2<-http://api.openstreetmap.org/api/0.6/node/25113879
obj2<-xmlParse(url2)
obj_amenity<-xpathApply(obj2, "//tag[@k = 'amenity']")[[1]]
obj_amenity
```



Figure 16: Barnim

```
## <tag k="amenity" v="university"/>
```

Wikipedia Artikel

```
xpathApply(obj2,"//tag[@k = 'wikipedia']")[[1]]  
  
## <tag k="wikipedia" v="de:Universität Mannheim"/>  
xpathApply(obj2,"//tag[@k = 'wheelchair']")[[1]]  
  
## <tag k="wheelchair" v="limited"/>  
xpathApply(obj2,"//tag[@k = 'name']")[[1]]  
  
## <tag k="name" v="Universität Mannheim"/>
```

Das C und das A

```
url3<-"http://api.openstreetmap.org/api/0.6/node/303550876"  
obj3 <- xmlParse(url3)  
xpathApply(obj3,"//tag[@k = 'opening_hours']")[[1]]  
  
## <tag k="opening_hours" v="Mo-Sa 09:00-20:00; Su,PH off"/>
```

Nur Fliegen ist schöner

```
url5<-"http://api.openstreetmap.org/api/0.6/way/162149882"  
obj5<-xmlParse(url5)  
xpathApply(obj5,"//tag[@k = 'name']")[[1]]  
  
## <tag k="name" v="City-Airport Mannheim"/>  
xpathApply(obj5,"//tag[@k = 'website']")[[1]]  
  
## <tag k="website" v="http://www.flugplatz-mannheim.de"/>  
xpathApply(obj5,"//tag[@k = 'iata']")[[1]]  
  
## <tag k="iata" v="MHG"/>
```

Einen Punkt parsen

```
url2 <- "http://api.openstreetmap.org/api/0.6/node/2923760808"  
RennesBa <- xmlParse(url2)  
RennesBa  
  
## <?xml version="1.0" encoding="UTF-8"?>  
## <osm version="0.6" generator="CGImap 0.6.0 (17121 thorn-02.openstreetmap.org)" copyright="OpenStreet  
##   <node id="2923760808" visible="true" version="7" changeset="47392918" timestamp="2017-04-02T20:42:  
##     <tag k="addr:city" v="Rennes"/>  
##     <tag k="addr:country" v="FR"/>  
##     <tag k="addr:housenumber" v="25"/>  
##     <tag k="addr:postcode" v="35000"/>
```

```

##      <tag k="addr:street" v="Avenue Jean Janvier"/>
##      <tag k="amenity" v="restaurant"/>
##      <tag k="capacity" v="90"/>
##      <tag k="name" v="Il Basilico"/>
##      <tag k="source:addr:housenumber" v="Rennes MÃ©tropole"/>
##      <tag k="source:addr:housenumber:ref" v="66075"/>
##      <tag k="source:addr:housenumber:version" v="2013-04-02"/>
##      <tag k="website" v="http://ilbasilico.fr"/>
##      <tag k="wheelchair" v="limited"/>
##      <tag k="wheelchair:description" v="Aucune sonnette pour indiquer sa prÃ©sence mais une rampe d'accÃ©s est installÃ©e au niveau de l'Ã©tablissement."/>
##    </node>
## </osm>
##

```

Einen Weg parsen

```

url3 <- "http://api.openstreetmap.org/api/0.6/way/72799743"
MadCalle <- xmlParse(url3)
MadCalle

```

```

## <?xml version="1.0" encoding="UTF-8"?>
## <osm version="0.6" generator="CGImap 0.6.0 (31527 thorn-01.openstreetmap.org)" copyright="OpenStreetMap contributors">
##   <way id="72799743" visible="true" version="5" changeset="11915713" timestamp="2012-06-16T14:49:40Z">
##     <nd ref="869268876"/>
##     <nd ref="1790008568"/>
##     <nd ref="864117544"/>
##     <nd ref="1790008571"/>
##     <nd ref="1790008601"/>
##     <nd ref="864117511"/>
##     <nd ref="1790008612"/>
##     <nd ref="1790008618"/>
##     <nd ref="864117819"/>
##     <tag k="highway" v="residential"/>
##     <tag k="name" v="Calle Alfonso Ercilla"/>
##     <tag k="oneway" v="yes"/>
##     <tag k="surface" v="asphalt"/>
##   </way>
## </osm>
##

```

The Overpass API

The Overpass API is a read-only API that serves up custom selected parts of the OSM map data.
http://wiki.openstreetmap.org/wiki/Overpass_API

Wichtige Information

http://wiki.openstreetmap.org/wiki/Map_Features



Figure 17: Logo Overpass API

Key	Value	Element	Comment	Rendering	Photo
leisure	beach_resort	<input type="checkbox"/> <input checked="" type="checkbox"/>	To mark the boundary of a managed beach.		
leisure	bird_hide	<input type="checkbox"/> <input checked="" type="checkbox"/>	A place to observe birds.		
leisure	common	<input type="checkbox"/> <input checked="" type="checkbox"/>	An area where the public can walk anywhere (UK)		
leisure	dance	<input type="checkbox"/> <input checked="" type="checkbox"/>	A place to go dancing.		
leisure	dog_park	<input type="checkbox"/> <input checked="" type="checkbox"/>	Designated area, with or without a fenced boundary, where dog-owners are permitted to exercise their pets unrestrained		
leisure	firepit	<input type="checkbox"/> <input checked="" type="checkbox"/>	A permanent location or structure to host campfires, bonfires, etc		
leisure	fishing	<input type="checkbox"/> <input checked="" type="checkbox"/>			

Figure 18: osm map features

Beispiel: Nutzung der Overpass API

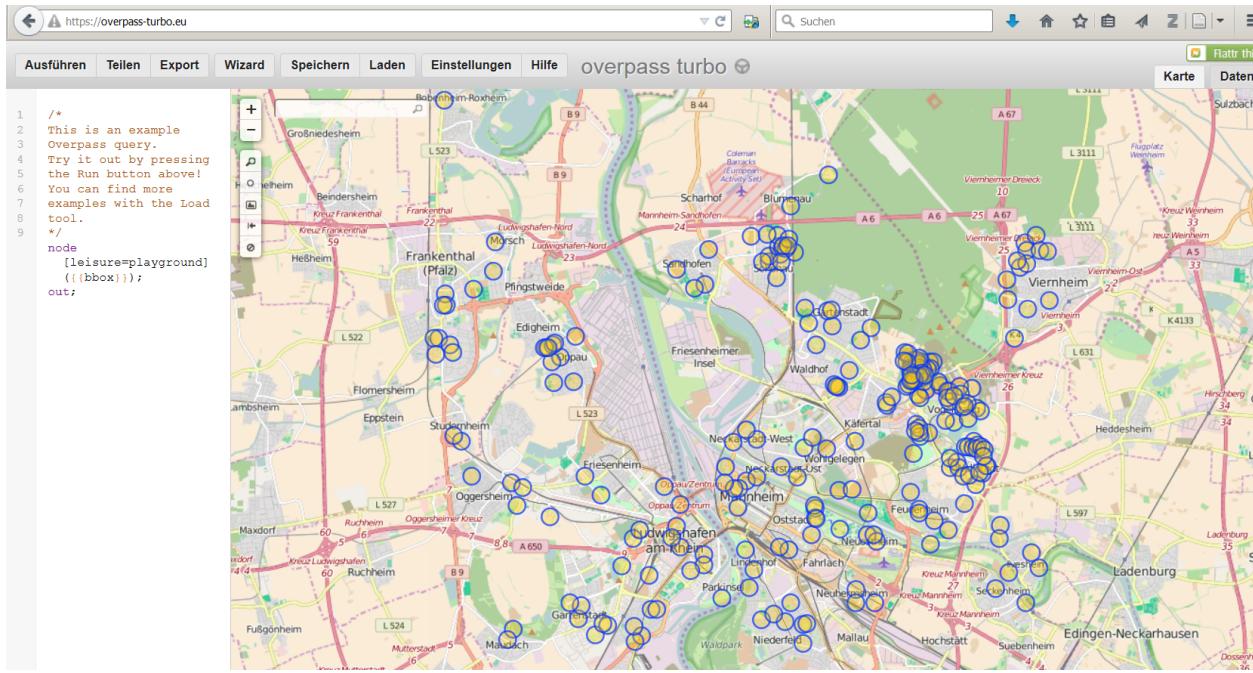


Figure 19: Spielplätze Mannheim

Export der Rohdaten

Import von der Overpass API zu R

```
library(XML)
place <- "Mannheim"
type_obj <- "node"
object <- "leisure=playground"

InfoList <- xmlParse(paste(Link1,place,"\"],",
type_obj,"(area)[",object,"];out;","sep=""))
```

XML Output

Das Arbeiten mit XML Daten (xpath)

Die Liste der ID's mit dem Wert *playground*:

```
node_id <- xpathApply(InfoList,
"/@v='playground']/parent::node/@id")
## node_id[[1]]
```

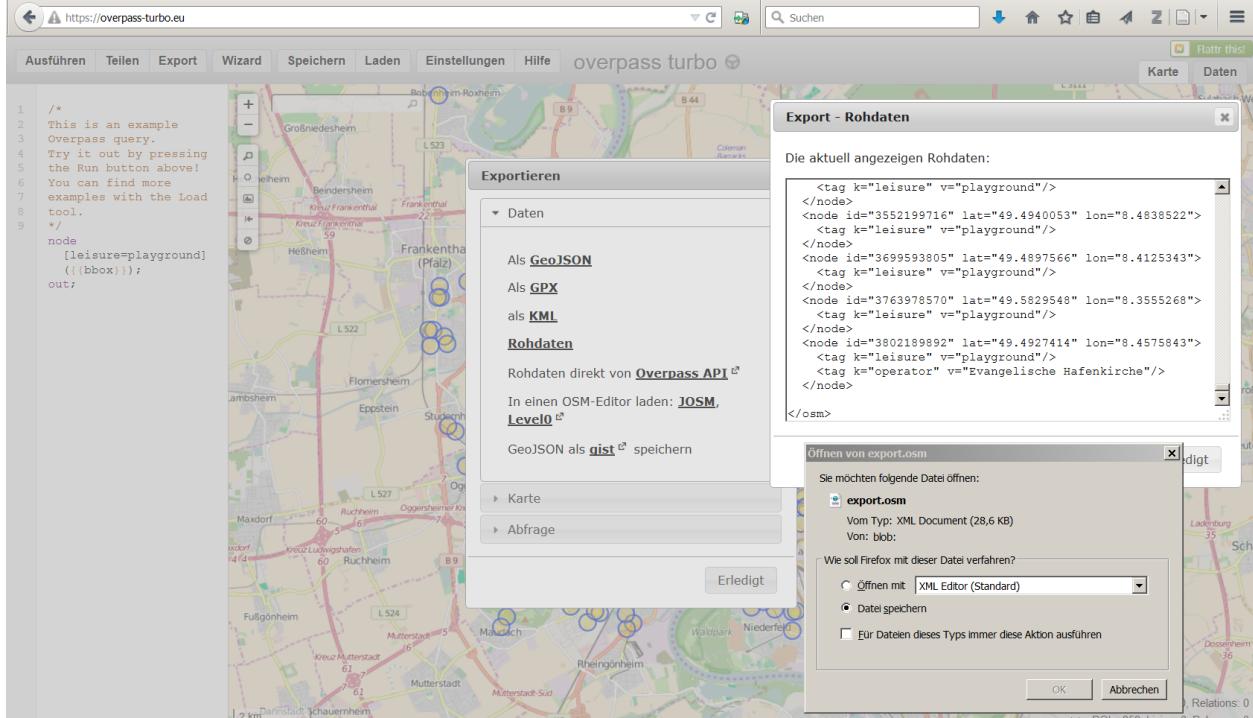


Figure 20: Export Rohdaten

```

<?xml version="1.0" encoding="UTF-8"?>
- <osm generator="Overpass API" version="0.6">
  <note>The data included in this document is from www.openstreetmap.org. The data is made available under ODbL.</note>
  <meta areas="2017-02-06T06:35:03Z" osm_base="2017-02-06T06:48:02Z"/>
  - <node lon="8.5028074" lat="49.5190994" id="30560755">
    <tag v="Potlatch 0.5d" k="created_by"/>
    <tag v="playground" k="leisure"/>
  </node>
  - <node lon="8.5393963" lat="49.4963345" id="76468450">
    <tag v="Potlatch 0.4a" k="created_by"/>
    <tag v="playground" k="leisure"/>
    <tag v="Rutsche, Schaukel, großer Sandkasten, Tischtennis" k="note"/>
  </node>
  - <node lon="8.5529589" lat="49.4967807" id="76468534">
    <tag v="playground" k="leisure"/>
  </node>
  - <node lon="8.5487501" lat="49.4923030" id="76468535">
    <tag v="playground" k="leisure"/>
  </node>

```

Figure 21: Spielplätze in Mannheim

```

> node_id[[1]]
      id
"30560755"
attr(,"class")
[1] "XMLAttributeValue"
> |

```

Figure 22: Erste node id

latitude und longitude bekommen

```
lat_x <- xpathApply(InfoList,
  "//tag[@v= 'playground']/parent::node/@ lat")
# lat_x[[1]];lat_x[[2]]

lat_x <- xpathApply(InfoList,
  "//tag[@v= 'playground']/parent::node/@ lon")
```

```
          lat
"49.5190994"
attr(,"class")
[1] "XMLAttributeValue"
          lat
"49.4963345"
attr(,"class")
[1] "XMLAttributeValue"
```

Figure 23: Latitude Koordinate

Paket auf Github

```
library(devtools)
install_github("Japhilko/gosmd")

library(gosmd)
pg_MA <- get_osm_nodes(object="leisure=playground",
                        "Mannheim")
info <- extract_osm_nodes(OSM.Data=pg_MA,
                           value="playground")
```

Ausschnitt der Ergebnisse

	leisure	lat	lon	note
30560755	playground	49.51910	8.502807	NA
76468450	playground	49.49633	8.539396	Rutsche, Schaukel, großer Sandkasten, Tischtennis
76468534	playground	49.49678	8.552959	NA
76468535	playground	49.49230	8.548750	NA
76468536	playground	49.50243	8.548140	Schaukel, Rutsche, Sandkasten, Spielhaus, Tischtennis
76468558	playground	49.49759	8.542036	NA

Link

- Tutorial zur Nutzung der Overpass API
- Vignette xml2

Mehr Beispiele, wie man mit XML Daten umgeht:

- Deborah Nolan - Extracting data from XML
- Duncan Temple Lang - A Short Introduction to the XML package for R

Noch mehr Informationen

- Web Daten manipulieren
- Tutorial zu xquery
- R und das Web (für Anfänger), Teil II: XML und R
- String Manipulation
- Nutzung, Vor- und Nachteile OSM
- Forschungsprojekte im Zusammenhang mit OpenStreetMap
- XML parsen - Stackoverflow
- Processing of GeoJson data in R