Package 'eyedata'

December 9, 2020

Title Open Source Ophthalmic Data Sets Curated for R

Version 0.1.0

Description Open source data allows for reproducible research and helps advance our knowledge. The purpose of this package is to collate open source ophthalmic data sets curated for direct use. This is real life data of people with intravitreal injections with anti-vascular endothelial growth factor (anti-VEGF), due to age-related macular degeneration or diabetic macular edema. Associated publications of the data sets: Fu et al. (2020) <doi:10.1001/jamaophthalmol.2020.5044>, Moraes et al (2020) <doi:10.1016/j.ophtha.2020.09.025>, Fasler et al. (2019) <doi:10.1136/bmjopen-2018-027441>, Arpa et al. (2020) <doi:10.1136/bjophthalmol-2020-317161>, Kern et al. 2020, <doi:10.1038/s41433-020-1048-0>.

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URL https://github.com/tjebo/eyedata

BugReports https://github.com/tjebo/eyedata/issues

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Depends R (>= 4.0)

Imports dplyr (>= 1.0.2)

NeedsCompilation no

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R topics documented:

`amd` *Twelve years neovascular AMD survival data*

Description

To explore potential utility of survival analysis techniques for retrospective clinical practice visual outcomes in a retrospective cohort study with 12-year observation period.

Usage

```
data("amd")
```

Format

A data frame (tibble) with 6696 rows and 23 variables:

patID anonymised patient number

sex gender of patient (m = male, f = female)

age age at initiation of anti-VEGF therapy (50-59 years, 60-69 years, 70-79 years, 80 years and above)

avdays_induc arithmetical average of interval between injections in induction phase in days

ethnicity ethnicity of patient: asian (South East Asian), caucasian Afro Caribbean, Mixed, unknown_other)

loaded induction phase was appropriately completed within 90 days (TRUE) or not (FALSE)

time days following initiation of anti-VEGF therapy

injgiven whether injection was given at appointment time or not (TRUE = injections given , FALSE = injection not given)

va visual acuity at time point in early treatment diabetic retinopathy study letter score

regimen anti-VEGF drug given is ranibizumab only or aflibercept only

pre2013 anti-VEGF therapy initiated before October 2013 (TRUE) or after (FALSE) i.e. before or after the introduction of aflibercept, respectively

Study setting and design

Of 10,744 eyes with neovascular AMD receiving anti-VEGF therapy between October 2008 and February 2020, 7802 eyes met study criteria (treatment-naïve, first-treated eyes starting anti-VEGF therapy). Institution: Moorfields Eye Clinic, London, UK Approval was granted by the Institutional Review Board of the hospital (ROAD17/031). The study complied with the Declaration of Helsinki

Data source

All clinical information at Moorfields Eye Hospital is recorded within an electronic medical record (EMR) application (OpenEyes Foundation, London, UK). A SQL database (SQL Server Reporting Service, Microsoft Corporation, Richmond, USA) containing all the information from the EMR is in place and regular updates are performed overnight to keep the data warehouse up-to-date. VA is reported in ETDRS letter score (and categories for ETDRS < 1). The highest value (independent of measurement method) available at each visit was chosen.

Data

Types of data: de-identified human subjects data Information governance authorised Moorfields Eye Clinic 19/07/2018. age not provided as a continuous variable as in original analysis to facilitate de-identification

Source

https://doi.org/10.5061/dryad.nvx0k6dqg

See Also

Associated publication: „Insights from survival analyses during 12 years of anti-vascular endothelial growth factor therapy for neovascular age-related macular degeneration“ https://doi.org/10.1001/jamaophthalmol.2020.5044

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amd2 *Real life data of patients with neovascular AMD*

Description

A dataset containing anonymized real life human subjects data on eyes with treatment naive neovascular age-related macular degeneration (AMD), which underwent intravitreal anti-VEGF therapy with ranibizumab and/or aflibercept.

Usage

```
data("amd2")
```

Format

A data frame (tibble) with 40764 rows and 7 variables:

patID Anonymized patient identifier

sex Sex of patient (m = male, f = female)

age0 Age (years) at day of first appointment

eye Left or right eye of patient (r = right, l = left)

time Time in days after date of first appointment (0 = first appointment)

va Visual acuity in Early Treatment Diabetic Retinopathy Study letters

inj_no Current number of injection at appointment date

Details

The data was collected in Moorfields Eye Hospital, London, UK. (Information governance sign off Moorfields Eye Hospital 19/07/2018)

Data was accessed on the 25th May 2020

Missing values

There are two missing visual acuity entries in this data set. They result from data entry errors (ETDRS values above 100) in the original medical health records. Unfortunately, the correct VA value could not be retrieved and it was decided to assign missing values to those measurements.

Source

https://doi.org/10.5061/dryad.97r9289

See Also

Scientific article to which this data set was supplement: https://doi.org/10.1136/bmjopen-2018-027441

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amd3 *Ten year neovascular AMD survival data*

Description

Ten Year Survival Trends of Neovascular Age Related Macular Degeneration at First Presentation

Usage

```
data("amd3")
```

Format

A data frame (tibble) with 6696 rows and 23 variables:

patID Anonymized patient identifier.

sex Sex of patient (m = male, f = female)

time time in days after date of first injection (0 = first injection or baseline)

eye Left or right eye of patient (r = right, l = left)

ethnicity Ethnicity of patient following the categories from the UK ETHNIC CATEGORY CODE 2001. (asian = Asian or Asian British, white = White, black = Black or Black British, other_unknown = Other ethnic group or unknown)

fellow fellow eye requires anti-VEGF within observation period

ttofellow time between baseline and fellow eye involvement in months

drug_switch anti-VEGF drug agent is switched during observation period

ttodrugswitch time between baseline and date of drug switch in months

ltfu patient is lost to follow-up during observation period

ltfu_stable of those lost to follow-up, are they stable prior to this timepoint

ltfu_outcome reason for lost to follow-up (discharged, dna (did not attend last appointment), dead, transferred)

ttoltfu time between baseline and loss to follow-up in months

stable10y patient is stable at ten year timepoint

irf presence of intraretinal fluid at last visit

srf presence of subretinal fluid at last visit

disciform presence of disciform scar at last visit (0 = no, 1a = type 1a, 1b = type 1b)

ga presence of geographic atrophy at last visit

ga_foveal presence of foveal geographic atrophy at last visit

ttoga time to geographic atrophy development in months

injgiven injection given (TRUE) or not given (FALSE)

va visual acuity in Early Treatment Diabetic Retinopathy Study letters

crt foveal thickness in microns

Central retinal thickness (CRT)

There are double CRT measurements for 1011 time points. This is because the data set curator provided both automatic measurement and manual measurement. Unfortunately, based on the information in the raw data, it is not possible to know which entry belongs to which. One possible way to adjust for this may be to create an average for both measurements. For one way to do this, see "Examples"

Missing values

There are 1388 missing visual acuity entries and 858 missing central retinal thickness entries.

Study setting and design

Retrospective cohort study of treatment-naïve, first-affected eyes with nAMD started on ranibizumab before January 1, 2009. Approval was granted by the Institutional Review Board of the hospital (ROAD17/031). The study complied with the Declaration of Helsinki

Data source

All clinical information at Moorfields Eye Hospital is recorded within an electronic medical record (EMR) application (OpenEyes Foundation, London, UK). Information governance authorised Moorfields Eye Clinic 19/07/2018. Age not provided as a continuous variable as in original analysis to facilitate de-identification

Source

https://doi.org/10.5061/dryad.9cnp5hqfm

See Also

Scientific article to which this data set was supplement: https://doi.org/10.1136/bjophthalmol-2020-317161

Examples

```
library(dplyr)
amd3 %>%
  group_by(patID, time) %>%
  mutate(crt_av = mean(crt, na.rm = TRUE)) %>%
  select(-crt) %>%
  distinct()
```

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amdoct *Real life OCT segmentation data of patients with AMD*

Description

This CSV dataset (AMD_baseline_MEH_v1.csv) is associated with the paper Moraes et al Quantitative analysis of optical coherence tomography for neovascular age-related macular degeneration using deep learning. Ophthalmology. (2020). The dataset comprises anonymised metadata and OCT segmentation data of patients undergoing treatment for wet AMD at Moorfields Eye Hospital, London, United Kingdom. The dataset includes 2966 rows (2966 individual patients)

Usage

```
data("amdoct")
```

Format

A data frame (tibble) with 2966 rows and 24 variables:

patID Anonymized patient identifier

sex Sex of patient (m = male, f = female)

ageStrat Stratified age (years) as factor. One missing value

ethnicity Ethnicity of patient following the categories from the UK ETHNIC CATEGORY CODE 2001. (asian = Asian or Asian British, white = White, black = Black or Black British, other_unknown = Other ethnic group or unknown)

eye Left or right eye of patient (r = right, l = left)

first_eye Is the eye the first injected eye

va Visual acuity in Early Treatment Diabetic Retinopathy Study (ETDRS) letters and categories hand motion (hm) or counting fingers (cf) for values <1. One value = 0 was not specified in the original data set.

inj Injection given (TRUE) or not

time Time in days from baseline, i.e. injection number 1

Neurosensory_volume_voxels Number of voxels segmented as the feature neurosensory retina (NSR)

RPE_volume_voxels Number of voxels segmented as the feature retinal pigment epithelium (RPE)

SRF_volume_voxels Number of voxels segmented as the feature subretinal fluid (SRF)

IRF_volume_voxels Number of voxels segmented as the feature intraretinal fluid (IRF)

SHRM_volume_voxels Number of voxels segmented as the feature subretinal hyperreflective material (SHRM)

Drusen_volume_voxels Number of voxels segmented as the feature drusen

sPED_volume_voxels Number of voxels segmented as the feature serous pigment epithelium detachment (sPED)

fvPED_volume_voxels Number of voxels segmented as the feature fibrovascular pigment epithelium detachment (fvPED)

HRF_volume_voxels Number of voxels segmented as the feature hyperreflective foci (HRF)

Neurosensory_thickness_um Thickness (measured in microns) of the segmented feature neurosensory retina (NSR)

IRF_thickness_um Thickness (measured in microns) of the segmented feature intraretinal fluid (IRF)

SRF_thickness_um Thickness (measured in microns) of the segmented feature subretinal fluid (SRF)

SHRM_thickness_um Thickness (measured in microns) of the segmented feature subretinal hyperreflective material (SHRM)

HRF_thickness_um Thickness (measured in microns) of the segmented feature hyperreflective foci (HRF)

CST_um Central subfield retinal thickness measured as the sum of NSR, IRF, SRF, SHRM, HRF thickness (measured in microns)

Missing values

There are 233 missing visual acuity entries in this data set. They result from data entry errors (ETDRS values above 100) and missing data in the original medical health records.

Study setting and design

Study setting and design: This study is a retrospective cohort study of patients that commenced anti-VEGF therapy for neovascular AMD between June 2012 and June 2017 at Moorfields Eye Hospital NHS Foundation Trust, London, UK. Approval was granted by the Institutional Review Board of the hospital (ROAD17/031). The study complied with the Declaration of Helsinki

Data source

All clinical information at Moorfields Eye Hospital is recorded within an electronic medical record (EMR) application (OpenEyes Foundation, London, UK). A SQL database (SQL Server Reporting Service, Microsoft Corporation, Richmond, USA) containing all the information from the EMR is in place and regular updates are performed overnight to keep the data warehouse up-to-date. VA is reported in ETDRS letter score (and categories for ETDRS < 1). The highest value (independent of measurement method) available at each visit was chosen.

OCT

Each voxel equates to 2.60 x 11.72 x 47.24 microns in the A-scan, B-scan, and C-scan directions, respectively. All OCT data is captured using 3DOCT-2000 devices (Topcon Corp., Tokyo, Japan). All images comprise 512 x 885 x 128 voxels covering a volume of 6x6x2.3mm. In this dataset, only one image is available per eye. The image with the lowest segmented artifacts was chosen if multiple scans were available at the same visit.

Time variable

For first-treated eyes, time will generally equal 0. Where a scan at day 0 was not available, a scan up to 14 days prior to the first injection (i.e. up to -14 days), is used for analysis.

Segmentation

Segmentation data was output using a deep learning segmentation model described further in De Fauw et al. and Yim and Chopra et al.

Source

https://doi.org/10.5061/dryad.2rbnzs7m4

See Also

Scientific article to which this data set was supplement: https://doi.org/10.1016/j.ophtha.2020.09.025

dme *Real life data of patients with diabetic macular edema*

Description

A dataset containing anonymized real life human subjects data on eyes with diabetic macular edema (DME), which underwent intravitreal anti-VEGF therapy with ranibizumab and/or aflibercept. Data was accessed on the 3rd July 2020.

Usage

```
data("dme")
```

Format

A data frame (tibble) with 40281 rows and 8 variables:

patID Anonymized patient identifier

sex Sex of patient (m = male, f = female)

ageStrat Age (years) at day of first appointment, stratified. Factor! Labels are constructed using "(a,b]" interval notation, e.g., "(60,70]" means x > 60 & x<= 70

ethnicity Ethnicity of patient following the categories from the UK ETHNIC CATEGORY CODE 2001. (asian = Asian or Asian British, white = White, black = Black or Black British, mixed = Mixed, other = Other ethnic group, unknown = Unknown)

eye Left or right eye of patient (r = right, l = left)

va Visual acuity in Early Treatment Diabetic Retinopathy Study (ETDRS) letters

time Time in days following baseline i.e. injection number 1

inj Injection given or not (TRUE = injection given, FALSE = no injection given)

Missing values

There are 18 missing visual acuity entries in this data set. They result from data entry errors (ETDRS values above 100) in the original medical health records. Unfortunately, the correct VA value could not be retrieved and it was decided to assign missing values to those measurements.

Study setting and design

Study setting and design: This study is a retrospective cohort study of diabetic patients treated for DMO by anti-VEGF at a tertiary referral center - Moorfields Eye Hospital NHS Foundation Trust, London, UK. Approval was granted by the Institutional Review Board of the hospital (ROAD17/031) - Audit registration was completed (MEH-233). The study complied with the Declaration of Helsinki and STROBE guidelines for the reporting of cohort studies.

Data source

All clinical information at Moorfields Eye Hospital is recorded within an electronic medical record (EMR) application (OpenEyes Foundation, London, UK). A SQL database (SQL Server Reporting Service, Microsoft Corporation, Richmond, USA) containing all the information from the EMR is in place and regular updates are performed overnight to keep the data warehouse up-to-date. VA is reported in ETDRS letter score. The highest value (independent of measurement method) available at each visit was chosen.

Participants

A data-warehouse query for patients that received one IVI for DMO (between March 2013 and October 2018) resulted in 3226 unique eyes from 2368 patients. Exclusion criteria were those that: (i) suffered from macular oedema secondary to other conditions than diabetes; (ii) under 18 years old; (iii) received fewer than 3 IVI; (iv) received bevacizumab, dexamethasone intravitreal implant, or fluocinolone acetonide intravitreal implant; leaving 2614 eyes of 1964 patients taken forward for analysis.

Source

https://doi.org/10.5061/dryad.pzgmsbcfw

See Also

Scientific article to which this data set was supplement: https://doi.org/10.1038/s41433-020-1048-0

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