Package 'CaPO4Sim'

August 18, 2024

Type Package

Title A Virtual Patient Simulator in the Context of Calcium and
Phosphate Homeostasis

Version 0.2.1

Maintainer David Granjon <dgranjon@ymail.com>

Description Explore calcium (Ca) and phosphate (Pi) homeostasis with two novel 'Shiny' apps,
building upon on a previously published mathematical model written in C,
to ensure efficient computations. The underlying model is accessible
here <https://pubmed.ncbi.nlm.nih.gov/28747359/)>.
The first application explores the fundamentals of Ca-Pi homeostasis,
while the second provides interactive case studies for in-depth exploration of the topic,
thereby seeking to foster student engagement and an integrative understanding of Ca-
Pi regulation.

Imports shiny, shinyjs, shinyWidgets, shinyjqui, plotly, rintrojs,
shinycssloaders, visNetwork, purrr, DT, magrittr, utils

Suggests htmltools, shinydashboard, shinydashboardPlus

License GPL-3

Encoding UTF-8

RoxygenNote 7.3.2

NeedsCompilation no

Author David Granjon [aut, cre, cph],
Diane de Zélicourt [cph],
Vartan Kurtcuoglu [cph],
Olivier Bonny [cph],
François Verrey [cph],
University of Lausanne [fnd],
University of Zurich [fnd],
Kidney NCCR.CH [fnd],
The Interface Group [cph] (Hosting Group),
RinteRface [cph] (R/HTML Templates)

Repository CRAN

Date/Publication 2024-08-18 13:50:02 UTC

Contents

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arrow_lighting *Highlight arrows for steady state events*

Description

Use inside in the networkCaPO4. Nothing is returned except that the network is updated via visNetworkProxy.

Usage

```
arrow_lighting(edges, simulation, counter, session)
```

Arguments

edges	A dataframe of edges provided by generate_edges.
simulation	Which disease is currently selected. See extract_running_sim.
counter	To determine which notification to display. We expect a counter returned by the networkCaPO4 module.
session	Session object.

CaPO4Sim *CaPO4Sim*

Description

Explore calcium (Ca) and phosphate (Pi) homeostasis with two novel 'Shiny' apps, building upon on a previously published mathematical model written in C, to ensure efficient computations. The underlying model is accessible here <https://www.ncbi.nlm.nih.gov/pubmed/28747359>. The first application explores the fundamentals of Ca-Pi homeostasis, while the second provides interactive case studies for in-depth exploration of the topic, thereby seeking to foster student engagement and an integrative understanding of Ca-Pi regulation. These applications are hosted at <https://rinterface.com/AppsPhysiol.html>.

Author(s)

Maintainer: David Granjon <dgranjon@ymail.com> [copyright holder]

Other contributors:

- Diane de Zélicourt [copyright holder]
- Vartan Kurtcuoglu [copyright holder]
- Olivier Bonny [copyright holder]
- François Verrey [copyright holder]
- University of Lausanne [funder]
- University of Zurich [funder]

- Kidney NCCR.CH [funder]

- The Interface Group (Hosting Group) [copyright holder]

- RinteRface (R/HTML Templates) [copyright holder]

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diseaseCheckBox   *Create a checkbox for diseaseSelectUi*

Description

Create a prettyCheckbox.

Usage

```
diseaseCheckBox(inputId, label)
```

Arguments

inputId	Checkbox Input id.
label	Checkbox label.

---

diseaseSelect   *Create a disease selector server logic*

Description

Only returns inputs associated with php1, hypopara, hypoD3

Usage

```
diseaseSelect(input, output, session)
```

Arguments

input	Shiny inputs
output	Shiny Outputs
session	Session object.

| diseaseSelectUi | *Create a disease selector UI module* |

Description

Contains php1, hypopara, hypoD3

Usage

```
diseaseSelectUi(id)
```

Arguments

id   module id.

| extract_running_sim | *Extract the current running simulation* |

Description

Simulations are currently php1, hypoD3 and hypopara. Takes diseases as input given by the [diseaseSelect](#) module.

Usage

```
extract_running_sim(diseases)
```

Arguments

diseases   Shiny input disease selector. See [diseaseSelect](#).

| fullScreen | *Create a fullScreen server logic* |

Description

Nothing is contained inside for now...

Usage

```
fullScreen(input, output, session)
```

Arguments

input   Shiny inputs
output   Shiny Outputs
session   Session object.

---

fullScreenUI   *Create a fullScreen UI module*

Description

Trigger a fullScreen mode. Based on https://stackoverflow.com/questions/42371164/how-to-run-r-shiny-app-in-full-sized-window

Usage

```
fullScreenUI(id)
```

Arguments

id   module id.

---

generate_edges   *CaPO4 Edges Generator*

Description

Generate edges for the CaPO4 network

Usage

```
generate_edges(
  components,
  organs,
  regulations,
  diseases,
  organs_edges_size,
  hormones_edges_size
)
```

Arguments

components	Shiny input CaPO4 component selector. See networkOptions.
organs	Shiny input to toggle organs display. See networkOptions.
regulations	Shiny input to toggle hormone display. See networkOptions.
diseases	Shiny input disease selector. See diseaseSelect.
organs_edges_size	
	Shiny input for organs edges size. See networkOptions.
hormones_edges_size	
	Shiny input for hormones edges size. See networkOptions.

---

generate_network *CaPO4 Network Generator*

Description

Create a CaPO4 network taking nodes and edges as inputs

Usage

```
generate_network(nodes, edges, usephysics = FALSE, isMobile)
```

Arguments

nodes	A dataframe of nodes provided by generate_nodes.
edges	A dataframe of edges provided by generate_edges.
usephysics	Whether to use physic. FALSE by default. A visNetwork API parameter.
isMobile	Shiny input checking if the app is running on a cellphone/tablet.

---

generate_nodes *CaPO4 Nodes Generator*

Description

Generate nodes for the CaPO4 network

Usage

```
generate_nodes(
  components,
  organs,
  regulations,
  background,
  diseases,
  organs_nodes_size,
  hormones_nodes_size
)
```

Arguments

components	Shiny input CaPO4 component selector. See networkOptions.
organs	Shiny input to toggle organs display. See networkOptions.
regulations	Shiny input to toggle hormone display. See networkOptions.
background	Shiny input background selector. See networkOptions.

diseases   Shiny input disease selector. See diseaseSelect.

organs_nodes_size

                  Shiny input for organs node size. See networkOptions.

hormones_nodes_size

                  Shiny input for hormones node size. See networkOptions..

---

generate_notification   *Notifications Generator for CaPO4 animations*

Description

Generate sequential notification as a function of the selected diseases. All notifications are in the notifications.R file in the inst/entry_level app folder. Used in the infos module.

Usage

```
generate_notification(simulation, counter, allowed)
```

Arguments

simulation   Which disease is currently selected. See extract_running_sim.

counter   To determine which notification to display. We expect a counter returned by the networkCaPO4 module.

allowed   Whether to allow simulations. Expect logical value. See infos module.

---

generate_userFields   *Generate user fields*

Description

Use inside in the userInfo. Function that helps in generating 4 users fields, image, stat1, stat2 and stat3, so as to reinject them in the header userMenu

Usage

```
generate_userFields(diseases, sliderDisease)
```

Arguments

diseases   Shiny input disease selector. See diseaseSelect.

sliderDisease   Shiny slider input related to the current disease severity. See plotBox.

---

glossaryCaPO4 *CaPO4 glossary server module*

Description

Create a CaPO4 glossary

Usage

```
glossaryCaPO4(input, output, session)
```

Arguments

input	Shiny inputs
output	Shiny Outputs
session	Session object.

---

glossaryCaPO4Ui *CaPO4 glossary UI module*

Description

Create a CaPO4 glossary

Usage

```
glossaryCaPO4Ui(id)
```

Arguments

id	module id.

---

helpCaPO4 *Help server module*

Description

Create the help section

Usage

```
helpCaPO4(input, output, session)
```

Arguments

input	Shiny inputs
output	Shiny Outputs
session	Session object.

---

helpCaPO4Ui *Help UI module*

Description

Create a help button

Usage

```
helpCaPO4Ui(id)
```

Arguments

id	module id.

---

infos *Info server module*

Description

Create modals, alerts, ...

Usage

```
infos(input, output, session, diseases, animation_counter, regulations)
```

Arguments

input	Shiny inputs
output	Shiny Outputs
session	Session object.
diseases	Shiny input disease selector. See diseaseSelect.
animation_counter	
	Give the current temporal state of the animation. See networkCaPO4.
regulations	Shiny input to toggle hormone display. See networkOptions.

---

infosUi *Info UI module*

Description

Create modals, alerts, ...

Usage

```
infosUi(id)
```

Arguments

id	module id.

---

infoSwitch   *Create a switch input for infosUi*

Description

Create a prettySwitch.

Usage

```
infoSwitch(inputId, label)
```

Arguments

inputId	Checkbox Input id.
label	Checkbox label.

---

make_plot_hypoD3   *Produce plots related to vitamin D3 deficiency (hypoD3)*

Description

Use inside the plotBox module.

Usage

```
make_plot_hypoD3(sliderVal, isMobile)
```

Arguments

sliderVal	Shiny slider input related to the current disease severity. See plotBox.
isMobile	Shiny input useful to scale elements based on the device screen size.

---

make_plot_hypopara   *Produce plots related to hypoparathyroidism (hypopara)*

Description

Use inside the plotBox module.

Usage

```
make_plot_hypopara(sliderVal, isMobile)
```

Arguments

sliderVal	Shiny slider input related to the current disease severity. See plotBox.
isMobile	Shiny input useful to scale elements based on the device screen size.

---

make_plot_php1 *Produce plots related to primary hyperparathyroidism (php1)*

Description

Use inside the [plotBox](#) module.

Usage

```
make_plot_php1(sliderVal, isMobile)
```

Arguments

sliderVal	Shiny slider input related to the current disease severity. See [plotBox](#).
isMobile	Shiny input useful to scale elements based on the device screen size.

---

myCarousel *carousel container*

Description

Creates a carousel. Adapted from shinydashboardplus to also allow control of the carousel animation

Usage

```
myCarousel(
  ...,
  id,
  indicators = TRUE,
  width = 6,
  .list = NULL,
  data.interval = 5000,
  data.ride = "carousel"
)
```

Arguments

...	Slot for [carouselItem](#)
id	Carousel id. Must be unique.
indicators	Whether to display left and right indicators.
width	Carousel width. 6 by default.
.list	Should you need to pass [carouselItem](#) via [lapply](#) or similar, put these item here instead of passing them in ...

data.interval	specify data-interval in ms. 5000ms by default, set to "false" to prevent automated animation of the slides.
data.ride	specify data-ride. "carousel" by default.

---

networkCaPO4 *CaPO4 Network server module*

Description

Create a CaPO4 network

Usage

```
networkCaPO4(
  input,
  output,
  session,
  isMobile,
  components,
  organs,
  regulations,
  background,
  diseases,
  organs_nodes_size,
  hormones_nodes_size,
  organs_edges_size,
  hormones_edges_size,
  help
)
```

Arguments

input	Shiny inputs
output	Shiny Outputs
session	Session object.
isMobile	Shiny input checking if the app is running on a cellphone/tablet.
components	Shiny input CaPO4 component selector. See networkOptions.
organs	Shiny input to toggle organs display. See networkOptions.
regulations	Shiny input to toggle hormone display. See networkOptions.
background	Shiny input background selector. See networkOptions.
diseases	Shiny input disease selector. See diseaseSelect.
organs_nodes_size	
	Shiny input for organs node size. See networkOptions.

hormones_nodes_size
:   Shiny input for hormones node size. See [networkOptions](#).

organs_edges_size
:   Shiny input for organs edges size. See [networkOptions](#).

hormones_edges_size
:   Shiny input for hormones edges size. See [networkOptions](#).

help
:   Help input.

---

networkCaPO4Ui *CaPO4 Network UI module*

Description

Create a CaPO4 network

Usage

```
networkCaPO4Ui(id)
```

Arguments

id
:   module id.

---

networkOptions *CaPO4 Network Options server module*

Description

Create a CaPO4 network options

Usage

```
networkOptions(input, output, session, mobile)
```

Arguments

input
:   Shiny inputs

output
:   Shiny Outputs

session
:   Session object.

mobile
:   Whether we are on cellphone/tablets or not. Slot for input$ismobile().

---

networkOptionsUi   *CaPO4 Network Options UI module*

Description

Options for the network

Usage

```
networkOptionsUi(id)
```

Arguments

id   module id

---

plotBox   *plot box server module*

Description

Create modals, alerts, ...

Usage

```
plotBox(input, output, session, diseases, help, isMobile)
```

Arguments

input	Shiny inputs
output	Shiny Outputs
session	Session object.
diseases	Shiny input disease selector. See diseaseSelect.
help	Help input.
isMobile	Shiny input useful to scale elements based on the device screen size.

---

plotBoxUi	*plot box UI module*

Description

Create modals, alerts, ...

Usage

```
plotBoxUi(id)
```

Arguments

id   module id.

---

run_CaPO4Sim	*Launch the virtual patient simulator*

Description

Unleash the virtual patient simulator

Usage

```
run_CaPO4Sim(context = c("introduction", "virtual-patient"))
```

Arguments

context   Choose between c("introduction", "virtual-patient").

Examples

```
if (interactive()) {
 run_CaPO4Sim(context = "introduction")
 run_CaPO4Sim(context = "virtual-patient")
}
```

---

skinSelect   *Dashboard skin selector, server side*

Description

Select the shinydashboard skin you want

Usage

```
skinSelect(input, output, session)
```

Arguments

input   Shiny inputs

output   Shiny Outputs

session   Session object.

---

skinSelectUi   *Dashboard skin selector, ui side*

Description

Select the shinydashboard skin you want

Usage

```
skinSelectUi(id)
```

Arguments

id   module id.

---

userInfo *CaPO4 user info server module*

Description

Create a CaPO4 user info card

Usage

```
userInfo(input, output, session, diseases, sliderDisease, help)
```

Arguments

input	Shiny inputs
output	Shiny Outputs
session	Session object.
diseases	Shiny input disease selector. See diseaseSelect.
sliderDisease	Shiny input disease severity selector. See plotBox.
help	Help input.

---

userInfoUi *CaPO4 user info UI module*

Description

Create a CaPO4 user info card

Usage

```
userInfoUi(id)
```

Arguments

id	module id.

---

video *Create a video server logic*

Description

Nothing is contained inside for now...

Usage

```
video(input, output, session)
```

Arguments

input	Shiny inputs
output	Shiny Outputs
session	Session object.

---

videoUi *Create a movie UI module*

Description

Contains php1, hypopara, hypoD3

Usage

```
videoUi(id, data)
```

Arguments

id	module id.
data	Video data.

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