Package ‘CaPO4Sim’

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Type Package

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

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Description Explore calcium (Ca) and phosphate (Pi) homeostasis with two novel 'Shiny' apps, building upon 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.

These applications are hosted at <https://rinterface.com/AppsPhysiol.html>.

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## R topics documented:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>arrow_lighting</td>
<td>3</td>
</tr>
<tr>
<td>CaPO4Sim</td>
<td>3</td>
</tr>
<tr>
<td>diseaseCheckBox</td>
<td>4</td>
</tr>
<tr>
<td>diseaseSelect</td>
<td>4</td>
</tr>
<tr>
<td>diseaseSelectUi</td>
<td>4</td>
</tr>
<tr>
<td>extract_running_sim</td>
<td>5</td>
</tr>
<tr>
<td>fullScreen</td>
<td>5</td>
</tr>
<tr>
<td>fullScreenUI</td>
<td>6</td>
</tr>
<tr>
<td>generate_edges</td>
<td>6</td>
</tr>
<tr>
<td>generate_network</td>
<td>7</td>
</tr>
<tr>
<td>generate_nodes</td>
<td>7</td>
</tr>
<tr>
<td>generate_notification</td>
<td>8</td>
</tr>
<tr>
<td>generate_userFields</td>
<td>8</td>
</tr>
<tr>
<td>glossaryCaPO4</td>
<td>9</td>
</tr>
<tr>
<td>glossaryCaPO4Ui</td>
<td>9</td>
</tr>
<tr>
<td>helpCaPO4</td>
<td>10</td>
</tr>
<tr>
<td>helpCaPO4Ui</td>
<td>10</td>
</tr>
<tr>
<td>infos</td>
<td>11</td>
</tr>
<tr>
<td>infosUi</td>
<td>11</td>
</tr>
<tr>
<td>infoSwitch</td>
<td>12</td>
</tr>
<tr>
<td>make_plot_hypoD3</td>
<td>12</td>
</tr>
<tr>
<td>make_plot_hypopara</td>
<td>12</td>
</tr>
<tr>
<td>make_plot_php1</td>
<td>13</td>
</tr>
<tr>
<td>myCarousel</td>
<td>13</td>
</tr>
<tr>
<td>networkCaPO4</td>
<td>14</td>
</tr>
<tr>
<td>networkCaPO4Ui</td>
<td>15</td>
</tr>
<tr>
<td>networkOptions</td>
<td>15</td>
</tr>
<tr>
<td>networkOptionsUi</td>
<td>16</td>
</tr>
<tr>
<td>plotBox</td>
<td>16</td>
</tr>
<tr>
<td>plotBoxUi</td>
<td>17</td>
</tr>
<tr>
<td>run_CaPO4Sim</td>
<td>17</td>
</tr>
<tr>
<td>skinSelect</td>
<td>18</td>
</tr>
<tr>
<td>skinSelectUi</td>
<td>18</td>
</tr>
<tr>
<td>userInfo</td>
<td>19</td>
</tr>
<tr>
<td>userInfoUi</td>
<td>19</td>
</tr>
<tr>
<td>video</td>
<td>20</td>
</tr>
<tr>
<td>videoUi</td>
<td>20</td>
</tr>
</tbody>
</table>

Index 21
arrow_lighting

---

**Highlight arrows for steady state events**

**Description**

Use inside in the `networkCaPO4`. Nothing is returned except that the network is updated via `vis-NetworkProxy`.

**Usage**

```python
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**

---

**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>.
**diseaseCheckBox**

Create a checkbox for `diseaseSelectUi`

**Description**

Create a prettyCheckbox.

**Usage**

```r
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**

```r
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**

```r
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**

```r
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**

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

**Arguments**

- `input` Shiny inputs
- `output` Shiny Outputs
- `session` Session object.
**fullScreenUI** *Create a fullScreen UI module*

**Description**

**Usage**

```r
fullScreenUI(id)
```

**Arguments**

- `id` module id.

---

**generate_edges** *CaPO4 Edges Generator*

**Description**
Generate edges for the CaPO4 network

**Usage**

```r
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 physics. 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`. 
generate_userFields

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**

```r
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**

```r
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

```r
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.
**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

Description
Select the shinydashboard skin you want

Usage
skinSelect(input, output, session)

Arguments
input Shiny inputs
output Shiny Outputs
session Session object.

SkinSelectUi

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

<table>
<thead>
<tr>
<th>input</th>
<th>Shiny inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>output</td>
<td>Shiny Outputs</td>
</tr>
<tr>
<td>session</td>
<td>Session object.</td>
</tr>
</tbody>
</table>

videoUi

Create a movie UI module

Description

Contains php1, hypopara, hypoD3

Usage

videoUi(id, data)

Arguments

<table>
<thead>
<tr>
<th>id</th>
<th>module id.</th>
</tr>
</thead>
<tbody>
<tr>
<td>data</td>
<td>Video data.</td>
</tr>
</tbody>
</table>
Index

arrow_lighting, 3
CaPO4Sim, 3
carouselItem, 13
diseaseCheckBox, 4
diseaseSelect, 4, 5, 6, 8, 11, 14, 16, 19
diseaseSelectUi, 4, 4
extract_running_sim, 3, 5, 8
fullScreen, 5
fullScreenUI, 6
generate_edges, 3, 6, 7
generate_network, 7
generate_nodes, 7, 7
generate_notification, 8
generate_userFields, 8
glossaryCaPO4, 9
glossaryCaPO4Ui, 9
helpCaPO4, 10
helpCaPO4Ui, 10
infos, 8, 11
infosUi, 11, 12
infoSwitch, 12
lapply, 13
make_plot_hypoD3, 12
make_plot_hypopara, 12
make_plot_php1, 13
myCarousel, 13
networkCaPO4, 3, 8, 11, 14
networkCaPO4Ui, 15
networkOptions, 6–8, 11, 14, 15, 15
networkOptionsUi, 16
plotBox, 8, 12, 13, 16, 19
plotBoxUi, 17
prettyCheckbox, 4
prettySwitch, 12
run_CaPO4Sim, 17
skinSelect, 18
skinSelectUi, 18
userInfo, 8, 19
userInfoUi, 19
video, 20
videoUi, 20
visNetworkProxy, 3