

Package: bboudata (via r-universe)

October 15, 2026

Title Data for bbou Project

Version 0.4.0

Description This package contains boreal caribou demographic data which can be used as validation for the associated shiny-app and analysis. The overall goal of the bbou packages is to develop a more standardized and consistent method for the comparison of boreal caribou survival rates, recruitment and population dynamics across Canada.

License Apache License (>= 2)

URL <https://poissonconsulting.github.io/bboudata/>,
<https://github.com/poissonconsulting/bboudata>

BugReports <https://github.com/poissonconsulting/bboudata/issues>

Depends R (>= 4.1)

Imports chk, tibble

Suggests bbousims, testthat (>= 3.0.0)

Remotes poissonconsulting/bbousims

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Repository <https://poissonconsulting.r-universe.dev>

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bbd_chk_data_recruitment
<i>Check recruitment data structure</i>

Description

The data must follow all requirements to not error. This format is required for usage of the bbou suite of tools.

Usage

```
bbd_chk_data_recruitment(  
  data,  
  x_name = deparse(substitute(data)),  
  multi_population = FALSE,  
  allow_missing = FALSE  
)
```

Arguments

<code>data</code>	The data.frame to check.
<code>x_name</code>	A string of the name of the data.frame.
<code>multi_population</code>	A flag indicating whether to accept multiple populations.
<code>allow_missing</code>	A flag indicating whether to accept placeholder rows for unobserved years. When TRUE, rows with all-NA measurement columns (Month, Day, Cows, Bulls, UnknownAdults, Yearlings, Calves) are permitted. These rows signal unobserved years to the model.

Format

The data must follow the requirements:

PopulationName Name of the herd or population

Year The calendar year the observation occurred. Must be a positive integer.

Month The calendar month the observation occurred. Must be an integer between 1 and 12.

Day The day the observation occurred. Must be an integer between 1 and 31.

Cows The total number of cows counted in each group in a survey/year. Must be a positive integer.

Bulls The total number of bulls counted in each group in a survey/year. Must be a positive integer

UnknownAdults The total number of adults counted that the sex could not be identified in each group in a survey/year. Must be a positive integer.

Yearlings The total number of yearlings that did not have the sex identified in each group in a survey/year. Must be a positive integer.

Calves The total number of calves counted in each group in a survey/year. Must be a positive integer.

Value

An invisible copy of the original data.frame.

Examples

```
bbd_chk_data_recruitment(bbourecruit_a)
bbd_chk_data_recruitment(bbourecruit_b)
bbd_chk_data_recruitment(bbourecruit_c)
# this example will error as it doesn't follow the requirements
x <- bbourecruit_a
x[1, 4] <- 32L
try(bbd_chk_data_recruitment(x))
```

bbd_chk_data_survival *Check survival data structure*

Description

The data must follow all requirements to not error. This format is required for usage of the bbou suite of tools.

Usage

```
bbd_chk_data_survival(
  data,
  x_name = deparse(substitute(data)),
  multi_population = FALSE,
  allow_missing = FALSE
)
```

Arguments

<code>data</code>	The data.frame to check.
<code>x_name</code>	A string of the name of the data.frame.
<code>multi_population</code>	A flag indicating whether to accept multiple populations.
<code>allow_missing</code>	A flag indicating whether to accept placeholder rows for unobserved years. When TRUE, rows with all-NA measurement columns (Month, StartTotal, MortalitiesCertain, MortalitiesUncertain) are permitted. These rows signal unobserved years to the model.

Format

The data must follow the requirements:

PopulationName Name of the herd or population

Year The calendar year the observation occurred. Must be a positive integer.

Month The calendar month the observation occurred. Must be an integer between 1 and 12.

StartTotal The total number of collared caribou at the start of the month. Must be a positive integer.

MortalitiesCertain The total number of confirmed mortalities in that month. Must be a positive integer.

MortalitiesUncertain The total number of mortalities that were not confirmed in that month. Must be a positive integer.

Value

An invisible copy of the original data.frame.

Examples

```
bbd_chk_data_survival(bbousurv_a)
bbd_chk_data_survival(bbousurv_b)
bbd_chk_data_survival(bbousurv_c)

# this example will error as it doesn't follow the requirements
x <- bbousurv_c
x[1, 3] <- 14L
try(bbd_chk_data_survival(x))
```

bbourecruit_a

Sample Data for Population A

Description

The data contains anonymized recruitment information for boreal caribou population 'A', which spans 27 years. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using calf/cow age ratios.

Usage

```
bbourecruit_a
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

Day The day the observation occurred

Cows The number of cows counted in the group

Bulls The number of bulls counted in the group

UnknownAdults The number of adults which could not be sexed in the group

Yearlings The number of yearlings counted in the group

Calves The number of calves counted in the group

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbourecruit_b*Sample Data for Population B*

Description

The data contains anonymized recruitment information for boreal caribou population 'B' which spans 15 years. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using calf/cow age ratios.

Usage

bbourecruit_b

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

Day The day the observation occurred

Cows The number of cows counted in the group

Bulls The number of bulls counted in the group

UnknownAdults The number of adults which could not be sexed in the group

Yearlings The number of yearlings counted in the group

Calves The number of calves counted in the group

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbourecruit_c*Sample Data for Population C*

Description

The data contains anonymized recruitment information for boreal caribou population 'C', which spans 9 years. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using calf/cow age ratios.

Usage

bbourecruit_c

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

Day The day the observation occurred

Cows The number of cows counted in the group

Bulls The number of bulls counted in the group

UnknownAdults The number of adults which could not be sexed in the group

Yearlings The number of yearlings counted in the group

Calves The number of calves counted in the group

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbourecruit_missing *Sample Data with Unobserved Years*

Description

The data contains anonymized recruitment information for boreal caribou population 'C', with years 2010-2013 represented as single placeholder rows with all-NA measurement columns. These placeholder rows signal unobserved years to the model: the data pipeline uses them to set Annual factor levels, then strips them before building the likelihood. Random effects for unobserved years are estimated purely from the hierarchical prior. The dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using calf/cow age ratios.

Usage

```
bbourecruit_missing
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

Day The day the observation occurred

Cows The number of cows counted in the group

Bulls The number of bulls counted in the group

UnknownAdults The number of adults which could not be sexed in the group

Yearlings The number of yearlings counted in the group

Calves The number of calves counted in the group

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbourecruit_multi

*Sample Data for Multiple Populations***Description**

The data contains anonymized recruitment information for boreal caribou populations 'A', 'B' and 'C' with staggered year ranges, an internal gap (B missing 2009-2010), and unobserved year placeholder rows (2016 for all populations). Designed to test multi-population analysis, latent random effects for missing year-population combos, and unobserved year prediction. Filter to single population or remove placeholder rows (where Month is NA) as needed. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using calf/cow age ratios.

Usage

bbourecruit_multi

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

Day The day the observation occurred

Cows The number of cows counted in the group

Bulls The number of bulls counted in the group

UnknownAdults The number of adults which could not be sexed in the group

Yearlings The number of yearlings counted in the group

Calves The number of calves counted in the group

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbourecruit_sim1	<i>Simulated Data for Scenario 1</i>
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Description

Data are simulated with **bbousims** package. This is a stable population spanning 20 years with annual variation on female adult survival and female calf survival. Coverage is low, with 20% of groups observed and 10 collars. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using calf/cow age ratios.

Usage

```
bbourecruit_sim1
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

Day The day the observation occurred

Cows The number of cows counted in the group

Bulls The number of bulls counted in the group

UnknownAdults The number of adults which could not be sexed in the group

Yearlings The number of yearlings counted in the group

Calves The number of calves counted in the group

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbourecruit_sim2	<i>Simulated Data for Scenario 2</i>
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Description

Data are simulated with **bbousims** package. This is a stable population spanning 20 years with annual variation on female adult survival and female calf survival. Coverage is high, with 70% of groups observed and 40 collars. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using calf/cow age ratios.

Usage

```
bbourecruit_sim2
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

Day The day the observation occurred

Cows The number of cows counted in the group

Bulls The number of bulls counted in the group

UnknownAdults The number of adults which could not be sexed in the group

Yearlings The number of yearlings counted in the group

Calves The number of calves counted in the group

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbourecruit_sim3	<i>Simulated Data for Scenario 3</i>
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Description

Data are simulated with **bbousims** package. This is a population spanning 20 years with negative trend on female adult survival and additional annual variation on female adult survival and female calf survival. Coverage is medium, with 50% of groups observed and 25 collars. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using calf/cow age ratios.

Usage

```
bbourecruit_sim3
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

Day The day the observation occurred

Cows The number of cows counted in the group

Bulls The number of bulls counted in the group

UnknownAdults The number of adults which could not be sexed in the group

Yearlings The number of yearlings counted in the group

Calves The number of calves counted in the group

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbourecruit_sim4	<i>Simulated Data for Scenario 4</i>
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Description

Data are simulated with **bbousims** package. This is a stable population spanning 20 years with small population size (50 initial adult females) and annual variation on female adult survival and female calf survival. Coverage is medium, with 40% of groups observed and 20 collars. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using calf/cow age ratios.

Usage

```
bbourecruit_sim4
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

Day The day the observation occurred

Cows The number of cows counted in the group

Bulls The number of bulls counted in the group

UnknownAdults The number of adults which could not be sexed in the group

Yearlings The number of yearlings counted in the group

Calves The number of calves counted in the group

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbousurv_a

*Sample Data for Population A***Description**

The data contains anonymized survival information for boreal caribou population 'A', which spans 31 years. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

bbousurv_a

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbousurv_annual

*Sample Data for Annual Survival Data***Description**

The data contains anonymized survival information for boreal caribou populations 'A' and 'C', aggregated to annual resolution with staggered year ranges. Designed to test the combination of multi-population analysis with aggregate annual data. Filter to single population for simple annual-only testing. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

```
bbousurv_annual
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbousurv_b

Sample Data for Population B

Description

The data contains anonymized survival information for boreal caribou population 'B', which spans 18 years. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

```
bbousurv_b
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

 bbousurv_c

Sample Data for Population C

Description

The data contains anonymized survival information for boreal caribou population 'C', which spans 11 years. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

bbousurv_c

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbousurv_missing	<i>Sample Data with Unobserved Years</i>
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Description

The data contains anonymized survival information for boreal caribou population 'C', with years 2010-2013 represented as single placeholder rows with all-NA measurement columns. These placeholder rows signal unobserved years to the model: the data pipeline uses them to set Annual factor levels, then strips them before building the likelihood. Random effects for unobserved years are estimated purely from the hierarchical prior. The dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

```
bbousurv_missing
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbousurv_multi

*Sample Data for Multiple Populations***Description**

The data contains anonymized survival information for boreal caribou populations 'A', 'B' and 'C' with staggered year ranges, an internal gap (B missing 2008-2009), and unobserved year placeholder rows (2015 for all populations). Designed to test multi-population analysis, latent random effects for missing year-population combos, and unobserved year prediction. Filter to single population or remove placeholder rows (where Month is NA) as needed. This dataset follows the methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

bbousurv_multi

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

Details

The data is released under the [Open Government Licence - Alberta](#)

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbousurv_sim1	<i>Simulated Data for Scenario 1</i>
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Description

Data are simulated with the **bbousims** package. This is a stable population spanning 20 years with annual variation on female adult survival and female calf survival. Coverage is low, with 20% of groups observed and 10 collars. The dataset follows methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

```
bbousurv_sim1
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbousurv_sim2	<i>Simulated Data for Scenario 2</i>
---------------	--------------------------------------

Description

Data are simulated with **bbousims** package. This is a stable population spanning 20 years with annual variation on female adult survival and female calf survival. Coverage is high, with 70% of groups observed and 40 collars. The dataset follows methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

```
bbousurv_sim2
```

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbousurv_sim3

Simulated Data for Scenario 3

Description

Data are simulated with **bbousims** package. This is a population spanning 20 years with negative trend on female adult survival and additional annual variation on female adult survival and female calf survival. Coverage is medium, with 50% of groups observed and 25 collars. The dataset follows methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

bbousurv_sim3

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

bbousurv_sim4

*Simulated Data for Scenario 4***Description**

Data are simulated with **bbousims** package. This is a stable population spanning 20 years with small population size (50 initial adult females) and annual variation on female adult survival and female calf survival. Coverage is medium, with 40% of groups observed and 20 collars. The dataset follows methodology described in DeCesare et al. (2012) for estimating population growth rates using adult female survival data.

Usage

bbousurv_sim4

Format

A tibble with columns:

PopulationName Name of the population

Year The year the observation occurred

Month The month the observation occurred

StartTotal The total number of collared caribou at the start of the month

MortalitiesCertain The number of confirmed caribou mortalities in the month

MortalitiesUncertain The total number of mortalities that were not confirmed in that month

References

DeCesare, N.J., Hebblewhite, M., Bradley, M., Smith, K.G., Hervieux, D., & Neufeld, L. (2012). Estimating ungulate recruitment and growth rates using age ratios. *The Journal of Wildlife Management*, 76(1), 144-153. doi:10.1002/jwmg.244

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