Workflow Example

2023-11-14

Quick checklist summary

1. Setup a repository
    a. create a repository from template
    b. add the configuration files
    c. validate the configuration files
2. Add Submission files
3. Load the data
4. Calculate the ensembles
5. Plot the output

Library and System setup:

To use full administrator functionality please ensure you install full list of package dependencies including Suggests with:

```
> remotes::install_github("Infectious-Disease-Modeling-Hubs/hubAdmin")
> remotes::install_github("Infectious-Disease-Modeling-Hubs/hubData")
> remotes::install_github("Infectious-Disease-Modeling-Hubs/hubEnsembles")
> remotes::install_github("Infectious-Disease-Modeling-Hubs/hubVis")
```

```
> library(hubAdmin)
> library(hubData)
> library(hubEnsembles)
> library(hubVis)
>
> library(arrow)
```

```
Warning: package 'arrow' was built under R version 4.2.3
```

```
> library(dplyr)
```

```
> # Store the path of the hub
> hub_path <- getwd()
```

Setup a repository

See vignette "hub-setup" on hubUtils package

Create the config files: `hub-config/admin.json` and `hub_config/tasks.json` and validate them:

```
> hubAdmin::validate_config(hub_path)
```

```
Loading required namespace: jsonvalidate
```

```
v Successfully validated config file '/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-
```

```
[1] TRUE
attr(,"config_path")
/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-scenario-hub/hub-config/tasks.json
attr(,"schema_version")
[1] "v2.0.0"
attr(,"schema_url")
https://raw.githubusercontent.com/Infectious-Disease-Modeling-Hubs/schemas/main/v2.0.0/tasks-schema.jso
```

```
> hubAdmin::validate_config(hub_path, config = "admin")
```

```
v Successfully validated config file '/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-s
```

```
[1] TRUE
attr(,"config_path")
/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-scenario-hub/hub-config/admin.json
attr(,"schema_version")
[1] "v2.0.0"
attr(,"schema_url")
https://raw.githubusercontent.com/Infectious-Disease-Modeling-Hubs/schemas/main/v2.0.0/admin-schema.jso
```

or

```
> hubAdmin::validate_hub_config(hub_path)
```

```
v Hub correctly configured!
'admin.json', 'tasks.json' and 'model-metadata-schema.json' all valid.
```

```
$tasks
[1] TRUE
attr(,"config_path")
/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-scenario-hub/hub-config/tasks.json
attr(,"schema_version")
[1] "v2.0.0"
attr(,"schema_url")
https://raw.githubusercontent.com/Infectious-Disease-Modeling-Hubs/schemas/main/v2.0.0/tasks-schema.jso

$admin
[1] TRUE
attr(,"config_path")
/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-scenario-hub/hub-config/admin.json
attr(,"schema_version")
[1] "v2.0.0"
attr(,"schema_url")
https://raw.githubusercontent.com/Infectious-Disease-Modeling-Hubs/schemas/main/v2.0.0/admin-schema.jso

$`model-metadata-schema`
[1] TRUE
attr(,"config_path")
/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-scenario-hub/hub-config/model-metadata-

attr(,"config_dir")
/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-scenario-hub/hub-config
attr(,"schema_version")
[1] "v2.0.0"
attr(,"schema_url")
[1] "https://github.com/Infectious-Disease-Modeling-Hubs/schemas/tree/main/v2.0.0"
```

Load the submission files

```
> hub_con <- hubData::connect_hub(hub_path)
> hub_con
```

```
-- <hub_connection/UnionDataset> --

* hub_name: "Complex Scenario Hub"
* hub_path:
  '/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-scenario-hub'
* file_format: "csv(2/2)" and "parquet(4/4)"
* file_system: "LocalFileSystem"
* model_output_dir:
  "/Users/contamin/Documents/SMH/hub_infrastructure/example-complex-scenario-hub/model-output"
* config_admin: 'hub-config/admin.json'
* config_tasks: 'hub-config/tasks.json'

-- Connection schema
hub_connection
origin_date: date32[day]
scenario_id: string
location: string
target: string
horizon: int32
output_type: string
output_type_id: double
value: double
model_id: string
age_group: string
target_date: date32[day]
```

```
> # Round 1 for example
> round1 <- hub_con %>%
+   dplyr::filter(origin_date == as.Date("2021-03-07")) %>%
+   dplyr::collect()
> round1
```

```
# A tibble: 1,677,312 x 11
   origin_date scenario_id  location target   horizon output_type output_type_id
   <date>      <chr>        <chr>    <chr>      <int> <chr>                 <dbl>
 1 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile              0.01
 2 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile              0.025
 3 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile              0.05
 4 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile              0.1
 5 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile              0.15
 6 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile              0.2
 7 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile              0.25
 8 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile              0.3
```

```
 9 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile             0.35
10 2021-03-07  A-2021-03-05 02       inc dea~       1 quantile             0.4
# i 1,677,302 more rows
# i 4 more variables: value <dbl>, model_id <chr>, age_group <chr>,
#   target_date <date>
```

Calculate ensemble

See hubEnsembles package for more information

```
> # Mean ensemble
> round1_ens <- hubEnsembles::simple_ensemble(round1)
> head(round1_ens)
```

```
# A tibble: 6 x 11
  model_id origin_date scenario_id location target horizon age_group target_date
  <chr>    <date>      <chr>       <chr>    <chr>    <int> <chr>     <date>
1 hub-ens~ 2021-03-07  A-2021-03-~ 01       cum c~       1 <NA>      NA
2 hub-ens~ 2021-03-07  A-2021-03-~ 01       cum c~       1 <NA>      NA
3 hub-ens~ 2021-03-07  A-2021-03-~ 01       cum c~       1 <NA>      NA
4 hub-ens~ 2021-03-07  A-2021-03-~ 01       cum c~       1 <NA>      NA
5 hub-ens~ 2021-03-07  A-2021-03-~ 01       cum c~       1 <NA>      NA
6 hub-ens~ 2021-03-07  A-2021-03-~ 01       cum c~       1 <NA>      NA
# i 3 more variables: output_type <chr>, output_type_id <dbl>, value <dbl>
```

Plot

See hubVis package for more information

Data processing: Projection:

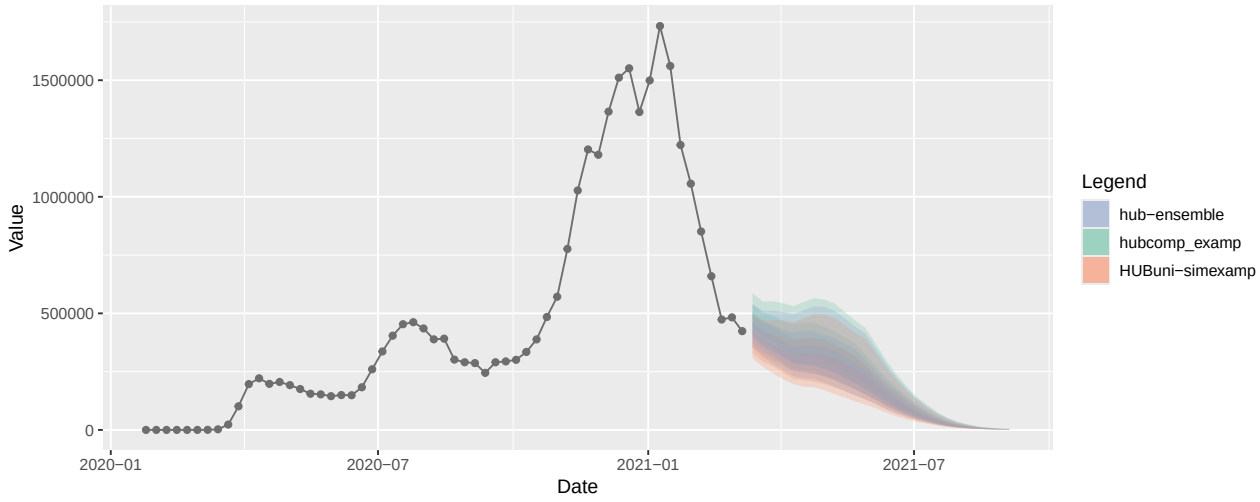
```
> # Aggregate the data (projection + ensemble)
> plot_df <- rbind(round1, round1_ens)
> # Add the target_data column for x-axis
> plot_df <- dplyr::mutate(plot_df, target_date = as.Date(origin_date) +
+                            (horizon * 7) - 1)
```

Target Data:

```
> target_data <- arrow::read_parquet("target-data/time-series.parquet")
> target_data <- dplyr::filter(target_data, location == "US",
+                              target == "inc case",
+                              date < min(plot_df$target_date))
```

Plot:

```
> plot_a_inccase <- dplyr::filter(plot_df, scenario_id == "A-2021-03-05",
+                                 location == "US", target == "inc case")
> plot <- hubVis::plot_step_ahead_model_output(plot_a_inccase, target_data,
+                                              interactive = FALSE,
+                                              x_target_col_name = "date")
> plot
```




```
> plot_inccase <- dplyr::filter(plot_df, location == "US", target == "inc case")
> plot <- hubVis::plot_step_ahead_model_output(plot_inccase, target_data,
+                                              facet = "scenario_id",
+                                              interactive = FALSE,
+                                              x_target_col_name = "date")
> plot
```