

04_figure1_flowchart

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flowchart for data cleaning

```
flowchart1 <- DiagrammeR::grViz("
digraph graph2 {

graph [layout = dot]

# node definitions with substituted label text
node [shape = rectangle, width = 4, fillcolor = Biege]
a [label = 'Raw Data: \n total number of children \n registered in the EPIC dataset \n(n = 1772)']
b [label = 'Eligible Subjects: \n (n = 1370)']
c [label = 'Working Data: \n with all eligible subjects \n randomly split dataset into two subsets']
d [label = 'Training Data:\n serving as a pool for selecting \n the set of information donors \n (n = 9
e [label = 'Testing Data:\n serving as targets for prediction validation \n and evaluationfor model per

c -> {d e}

# These are the main nodes at top of graph
a -> b

[label =
<
  Subjects Excluded:<br ALIGN = 'LEFT'/>
  &nbsp; &#8226; No missing baseline variables<br ALIGN = 'LEFT'/>
  &nbsp; &#8226; Minimal 10 times of visits<br ALIGN = 'LEFT'/>
  &nbsp; &#8226; Minimal 5 years of following up<br ALIGN = 'LEFT'/>
  &nbsp; &#8226; Minimal age of 4 registerd in the study<br ALIGN = 'LEFT'/>
  &nbsp; (n = 402) <br ALIGN = 'LEFT'/>
>
]

b -> c

[label =
<
  Data Cleaning:<br ALIGN = 'LEFT'/>
  &nbsp; &#8226; Remove the time points before age 3 <br ALIGN = 'LEFT'/>
  &nbsp; &#8226; Realign with the earliest age <br ALIGN = 'LEFT'/>
  &nbsp; &#8226; Covert age into time variable<br ALIGN = 'LEFT'/>
>
]
```

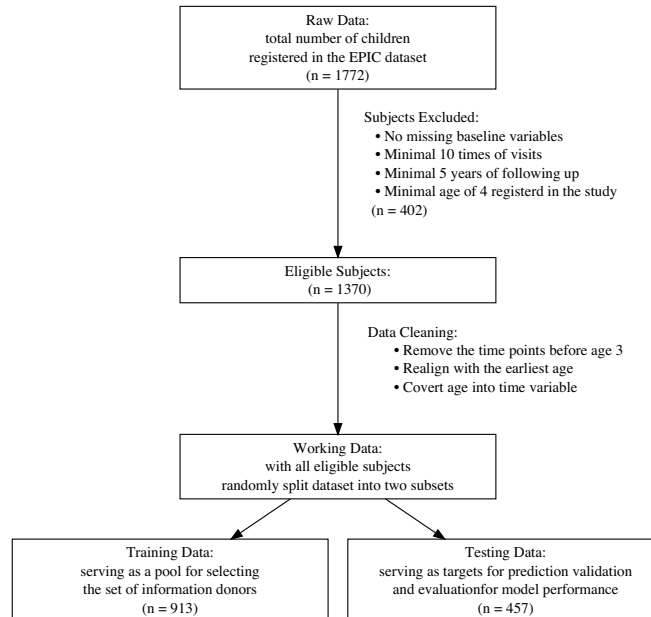
```

}

")

## see the flowchart
flowchart1

```



```

# flowchart1 %>%
#   export_svg() %>%
#   read_xml() %>%
#   write_xml(paste0("~/Desktop/project/plmlmm/paper/figure/00_plmlmm_data_cleaning", Sys.Date(), ".svg"))

## save the flowchart
flowchart1 %>%
  export_svg() %>%
  charToRaw() %>%
  rsvg_png(paste0("figure/S04_plmlmm_data_cleaning_", Sys.Date(), ".png"))
# export_graph(flowchart,
# file_name = "final/flowchart_graph.png",
# file_type = "png")

```

flowchart for algorithm

```

flowchart2 <- DiagrammeR::grViz(
"digraph graph2 {

```

```

graph [layout = dot]

# node definitions with substituted label text
node [shape = rectangle, width = 4, fillcolor = Biege]
a [label =
<
  <b> </b> <br ALIGN = 'CENTER' />
  <b>Regularizing time: </b> <br ALIGN = 'CENTER' />
  &nbsp; &#8226; Brokenstick model prediction <br ALIGN = 'LEFT' />
>
]

b [label =
<
  <b> </b> <br ALIGN = 'CENTER' />
  <b>Adding covariates: </b> <br ALIGN = 'CENTER' />
  &nbsp; &#8226; Linear model prediction with the imputes <br ALIGN = 'LEFT' />
>
]

c [label =
<
  <b> </b> <br ALIGN = 'CENTER' />
  <b>Matching: </b> <br ALIGN = 'CENTER' />
  &nbsp; &#8226; Single-time matching <br ALIGN = 'LEFT' />
  &nbsp; &#8226; Multiple-time matching <br ALIGN = 'LEFT' />
  &nbsp; &#8226; Matching criterion <br ALIGN = 'LEFT' />
>
]

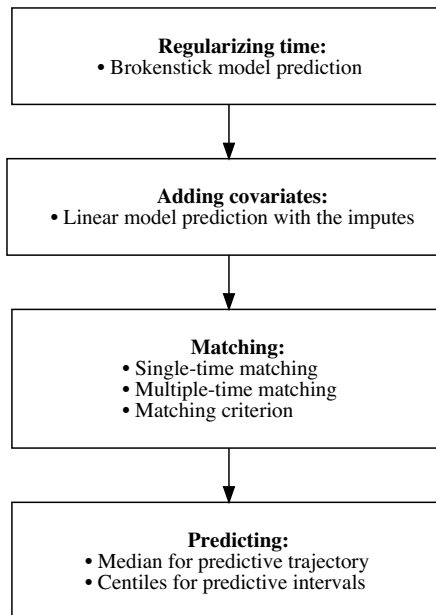
d [label =
<
  <b> </b> <br ALIGN = 'CENTER' />
  <b>Predicting: </b> <br ALIGN = 'CENTER' />
  &nbsp; &#8226; Median for predictive trajectory <br ALIGN = 'LEFT' />
  &nbsp; &#8226; Centiles for predictive intervals <br ALIGN = 'LEFT' />
>
]

# These are the main nodes at top of graph

a -> b -> c -> d
}
")

## see the flowchart
flowchart2

```



```

# flowchart1 %>%
#   export_svg() %>%
#   read_xml() %>%
#   write_xml(paste0("~/Desktop/project/plmlmm/paper/figure/00_plmlmm_data_cleaning", Sys.Date(), ".svg"))

## save the flowchart
flowchart2 %>%
  export_svg() %>%
  charToRaw() %>%
  rsvg_png(paste0("figure/S04_plmlmm_step_algorithm_", Sys.Date(), ".png"))
# export_graph(flowchart,
# file_name = "final/flowchart_graph.png",
# file_type = "png")

```

flowchart for upgraded phd work

```

# install.packages("DiagrammeR")
flowchart3 <- DiagrammeR::grViz(
  "digraph graph2 {

graph [layout = dot]
edge [color = gray]

# node definitions with substituted label text
graph [nodesep = 0.2, ranksep = 0.3]
node [shape = rectangle, width = 3, fillcolor = Biege]
imputation [label =
  <

```

```

    <b> </b> <br ALIGN = 'CENTER' />
    <b>1. Imputing: </b> <br ALIGN = 'LEFT' />
    &nbsp; &#8226; Brokenstick model prediction <br ALIGN = 'LEFT' />
    &nbsp; &#8226; Linear model prediction <br ALIGN = 'LEFT' />
    >;
    fontcolor = '#5d5d5d'
]
imputation [color = gray]

distance [label =
<
    <b> </b> <br ALIGN = 'CENTER' />
    <b>2. Matching: </b> <br ALIGN = 'LEFT' />
    &nbsp; &#8226; Single-time matching <br ALIGN = 'LEFT' />
    &nbsp; &#8226; Multiple-time matching <br ALIGN = 'LEFT' />
    &nbsp; &#8226; Matching criterion <br ALIGN = 'LEFT' />
    >;
    fontcolor = '#5d5d5d'
]
distance [color = gray]

prediction [label =
<
    <b> </b> <br ALIGN = 'CENTER' />
    <b>3. Predicting: </b> <br ALIGN = 'LEFT' />
    &nbsp; &#8226; Median for predictive trajectory <br ALIGN = 'LEFT' />
    &nbsp; &#8226; Centiles for predictive intervals <br ALIGN = 'LEFT' />
    >;
    fontcolor = '#5d5d5d'
]
prediction [color = gray]

update_imputation [label =
<
    <b> </b> <br ALIGN = 'LEFT' />
    <b>INLA Smoothing: </b> <br ALIGN = 'LEFT' />
    Random Walk (RW)
    <br ALIGN = 'LEFT' />
    Autoregression (AR) <br ALIGN = 'LEFT' />
    <br ALIGN = 'LEFT' />
    <b> Kernel Smoothing: </b> <br ALIGN = 'LEFT' />
    Kernel regression
    <br ALIGN = 'LEFT' />
    <br ALIGN = 'LEFT' />
    <b> Multiple LM: </b> <br ALIGN = 'LEFT' />
    LM at each anchor time point \n <br ALIGN = 'LEFT' />
    >
]

update_distance [label =
<
    <b> </b> <br ALIGN = 'CENTER' />
    <b>Inversed Distance Weights: </b> <br ALIGN = 'LEFT' />

```

```

    For Euclidean distance and single predictive matching
    <br ALIGN = 'LEFT'/>
    <br ALIGN = 'LEFT'/>
    <b> Chi-squared Weights: </b> <br ALIGN = 'LEFT'/>
    For Mahalanobis distance matching <br ALIGN = 'LEFT'/>
  >
]

update_model [label =
<
  <b> </b> <br ALIGN = 'CENTER'/>
  <b>Weighted Regression: </b> <br ALIGN = 'LEFT'/>
  Using inversed distance weights or Chi-squared p-values
  <br ALIGN = 'LEFT'/>
  <br ALIGN = 'LEFT'/>
  <b> Penalized Regression: </b> <br ALIGN = 'LEFT'/>
  Lasso or Ridge regression Penalization on the Distance
  <br ALIGN = 'LEFT'/>
  >
]

# These are the main nodes at top of graph

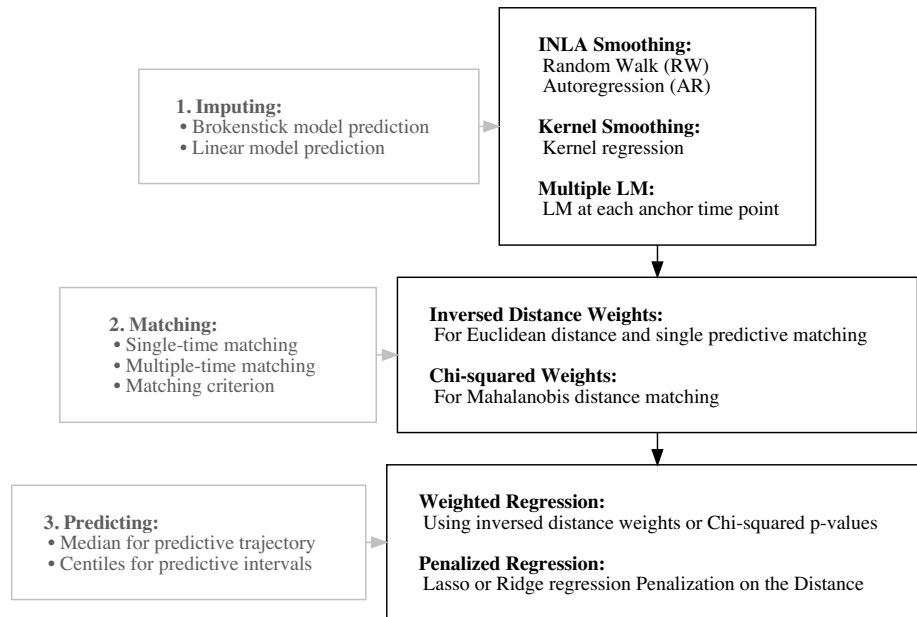
imputation -> update_imputation
{rank = same; imputation; update_imputation}

distance -> update_distance
{rank = same; distance; update_distance}

prediction -> update_model
{rank = same; prediction; update_model}

update_imputation -> update_distance -> update_model [color = black]
}
")
## see the flowchart
flowchart3

```



```

# flowchart1 %>%
#   export_svg() %>%
#   read_xml() %>%
#   write_xml(paste0("~/Desktop/project/plmlmm/paper/figure/00_plmlmm_data_cleaning", Sys.Date(), ".svg"))

## save the flowchart
flowchart3 %>%
  export_svg() %>%
  charToRaw() %>%
  rsvg_png(paste0("figure/S04_plmlmm_updated_work_", Sys.Date(), ".png"))
# export_graph(flowchart,
# file_name = "final/flowchart_graph.png",
# file_type = "png")

```

```
sessionInfo()
```

```

## R version 4.2.2 (2022-10-31)
## Platform: aarch64-apple-darwin20 (64-bit)
## Running under: macOS 14.2.1
##
## Matrix products: default
## BLAS: /Library/Frameworks/R.framework/Versions/4.2-arm64/Resources/lib/libRblas.0.dylib
## LAPACK: /Library/Frameworks/R.framework/Versions/4.2-arm64/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats graphics grDevices utils datasets methods base
##

```

```

## other attached packages:
## [1] DiagrammeRsvg_0.1 DiagrammeR_1.0.10 xml2_1.3.5      rsvg_2.4.0
## [5] lubridate_1.9.2   forcats_1.0.0   stringr_1.5.0   dplyr_1.1.2
## [9] purrr_1.0.1       readr_2.1.4     tidyr_1.3.0     tibble_3.2.1
## [13] ggplot2_3.4.3     tidyverse_2.0.0 here_1.0.1
##
## loaded via a namespace (and not attached):
## [1] tidyselect_1.2.0   xfun_0.39         V8_4.3.2         colorspace_2.1-0
## [5] vctrs_0.6.3        generics_0.1.3    htmltools_0.5.5  yaml_2.3.7
## [9] utf8_1.2.3         rlang_1.1.1       pillar_1.9.0     glue_1.6.2
## [13] withr_2.5.0        RColorBrewer_1.1-3 lifecycle_1.0.3   munsell_0.5.0
## [17] gtable_0.3.3       visNetwork_2.1.2  htmlwidgets_1.6.2 evaluate_0.21
## [21] knitr_1.43         tzdb_0.4.0        callr_3.7.3      fastmap_1.1.1
## [25] ps_1.7.5           curl_5.0.1        fansi_1.0.4      highr_0.10
## [29] Rcpp_1.0.11        scales_1.2.1      webshot_0.5.5    jsonlite_1.8.7
## [33] freshr_1.0.2       hms_1.1.3         digest_0.6.33    stringi_1.7.12
## [37] processx_3.8.2     grid_4.2.2        rprojroot_2.0.3  cli_3.6.1
## [41] tools_4.2.2        magrittr_2.0.3    pkgconfig_2.0.3  ellipsis_0.3.2
## [45] timechange_0.2.0   rmarkdown_2.23    rstudioapi_0.15.0 R6_2.5.1
## [49] compiler_4.2.2

```