

Model Performance Results for Practicum: Scenarios 11 & 12

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Data Import & Wrangling

Data Processing

- Scenario 11: simple exposures, complex confounding, moderate collinearity
- Scenario 12: complex exposures, complex confounding, moderate collinearity

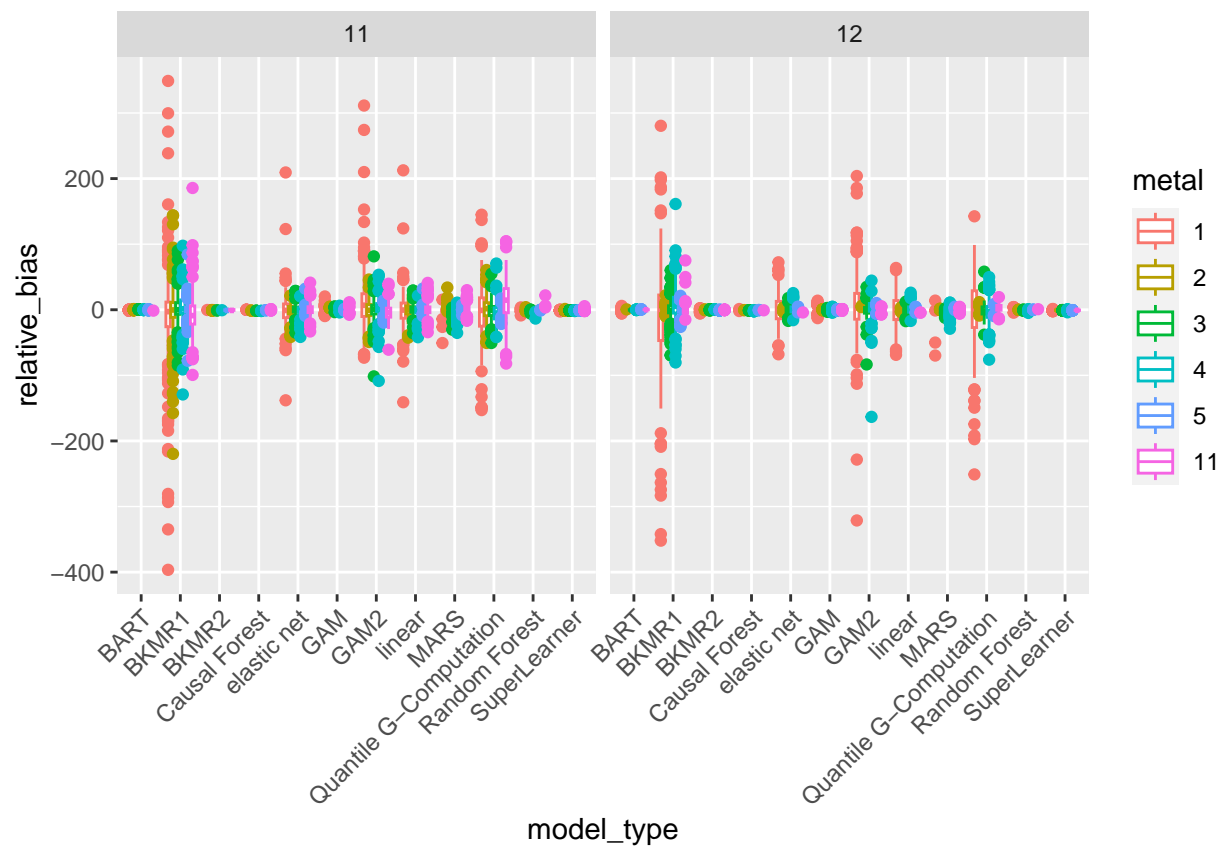
Note: besides confounders, exposure metals 1-5 are specified in the functional form for each scenario, while metals 6-10 are excluded. “Metal” 11 is the complete metal mixture.

Results

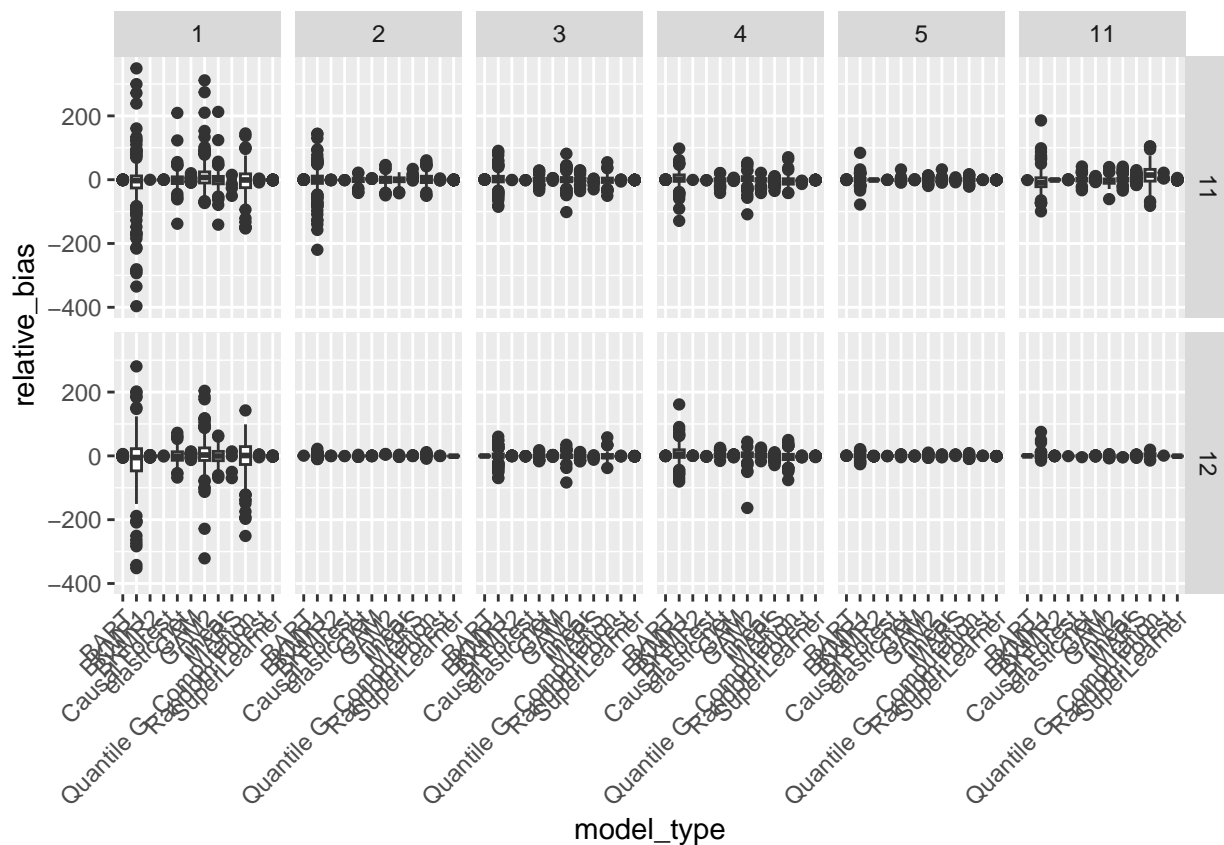
Relative Bias

Visualizations at Dataset Level

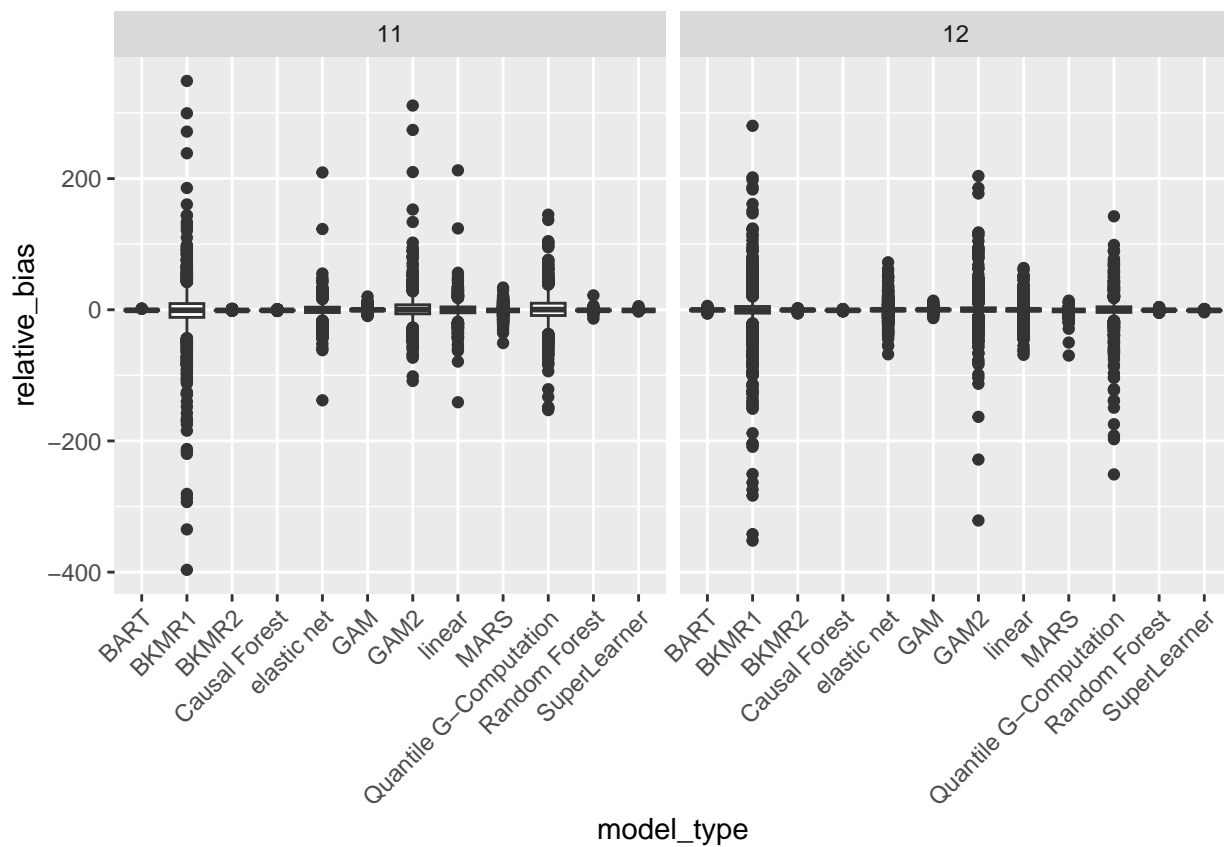
```
## Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').
```



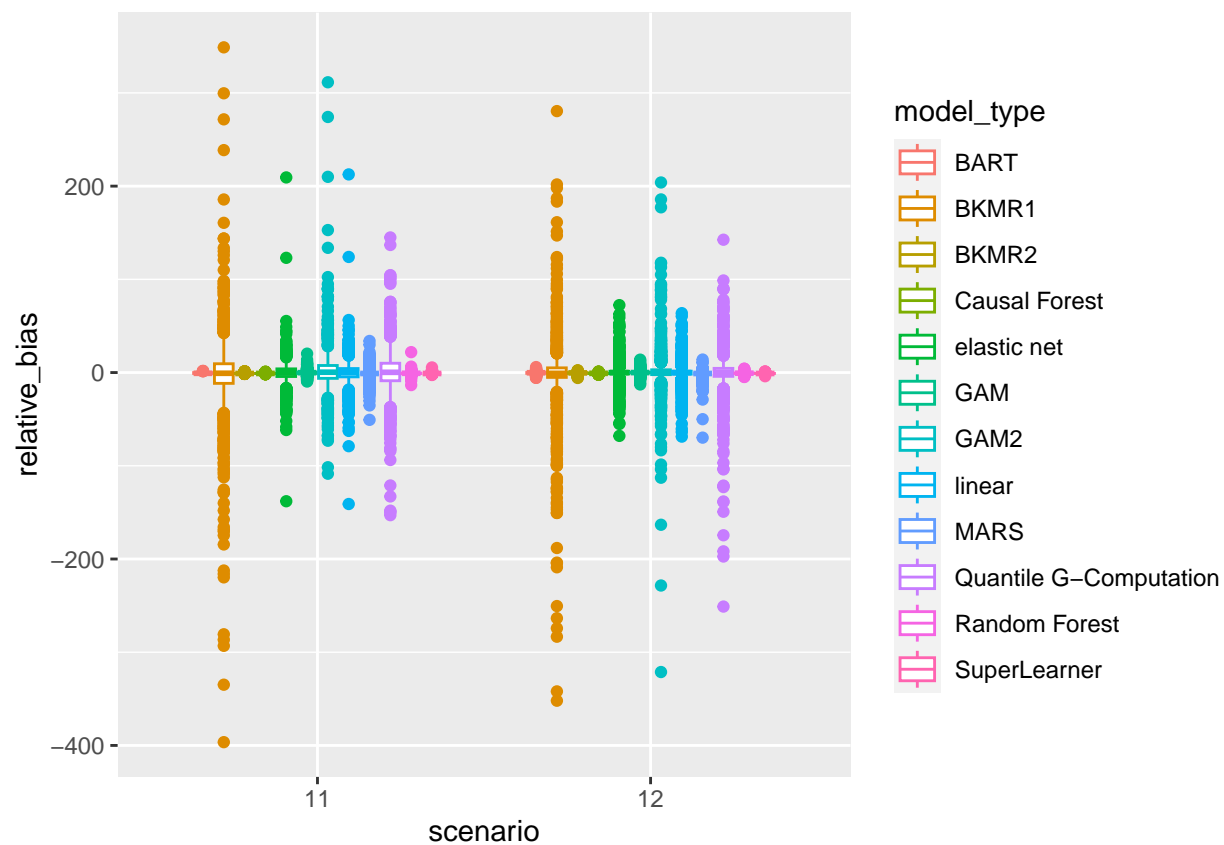
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



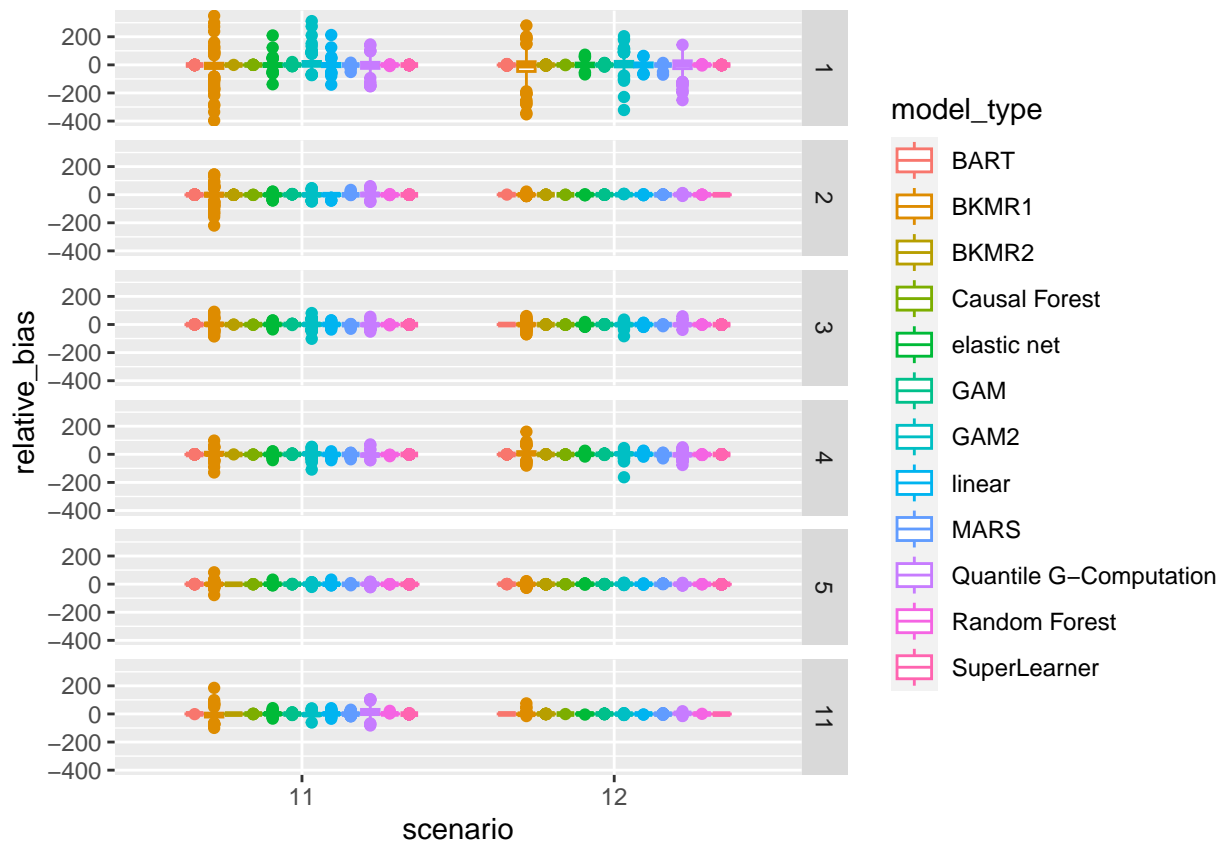
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



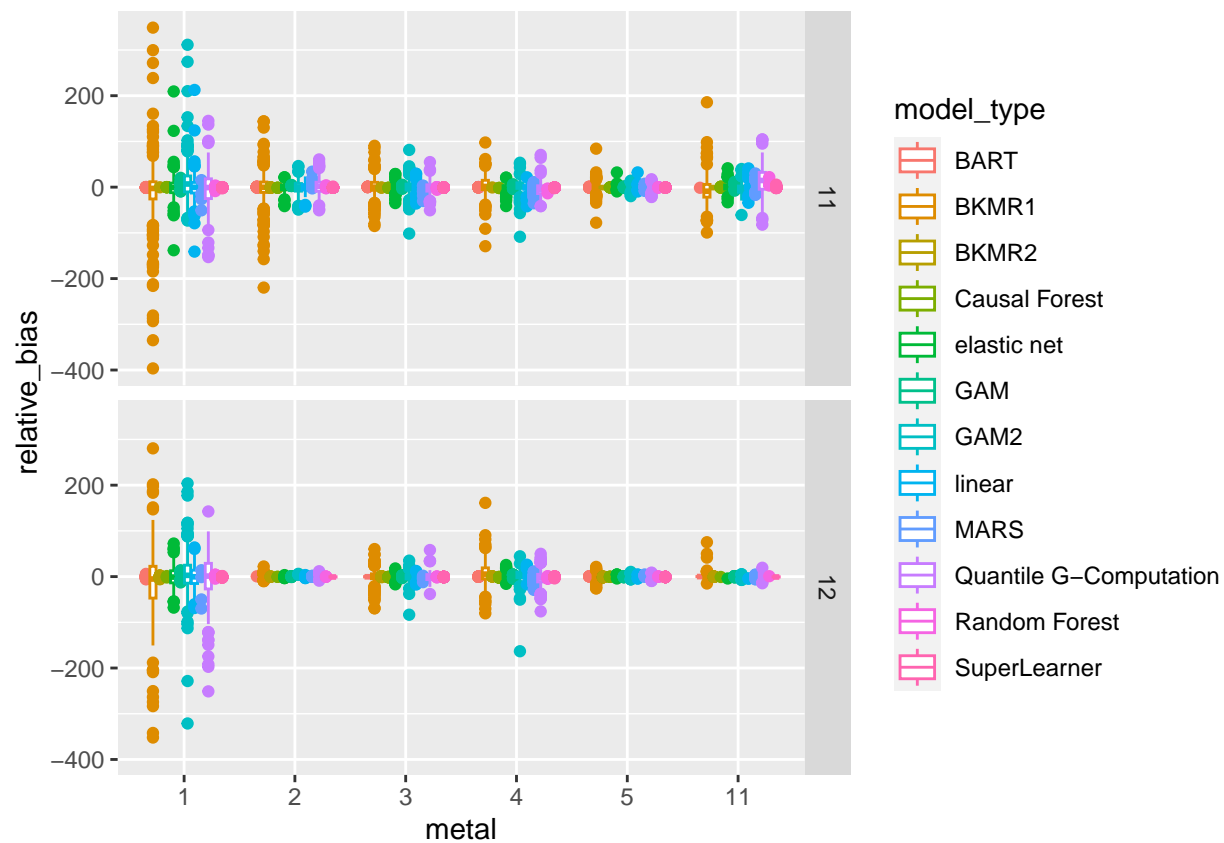
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



```
## Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').
```

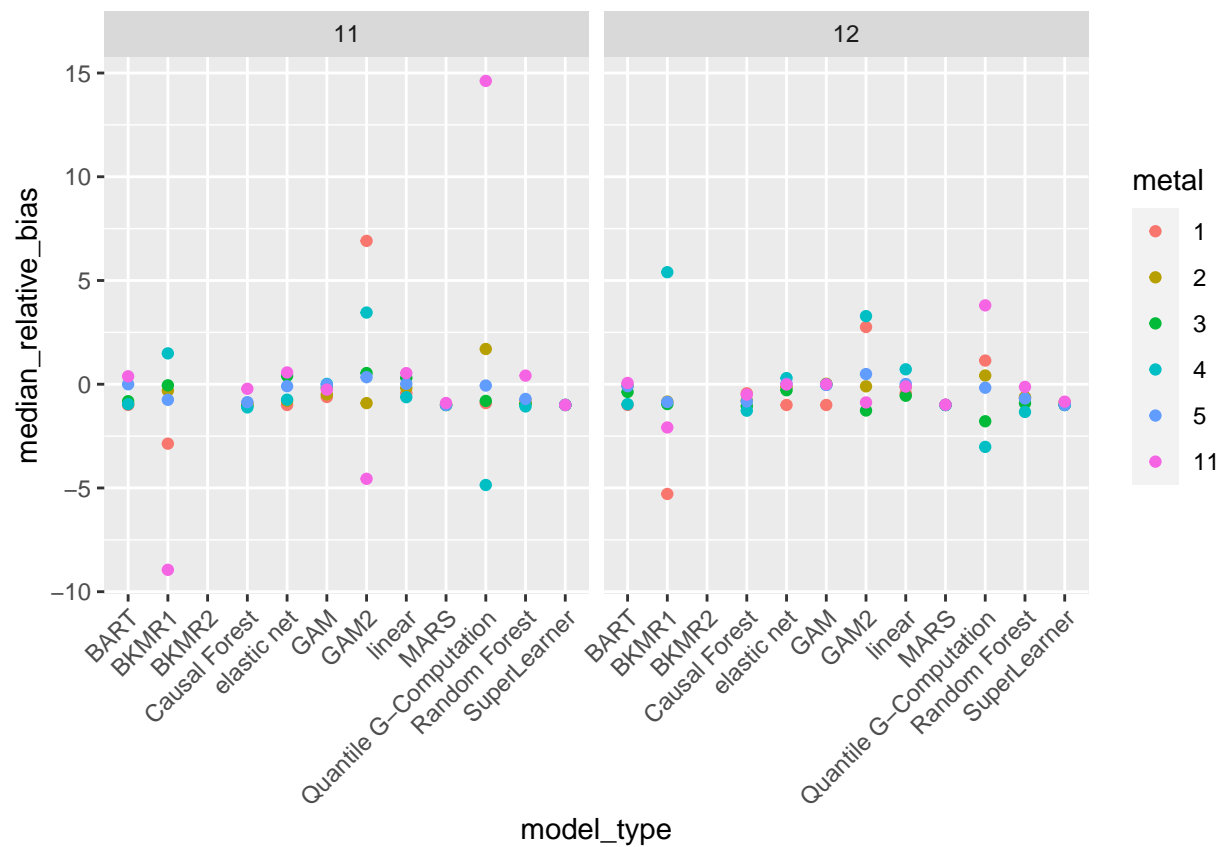


Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').

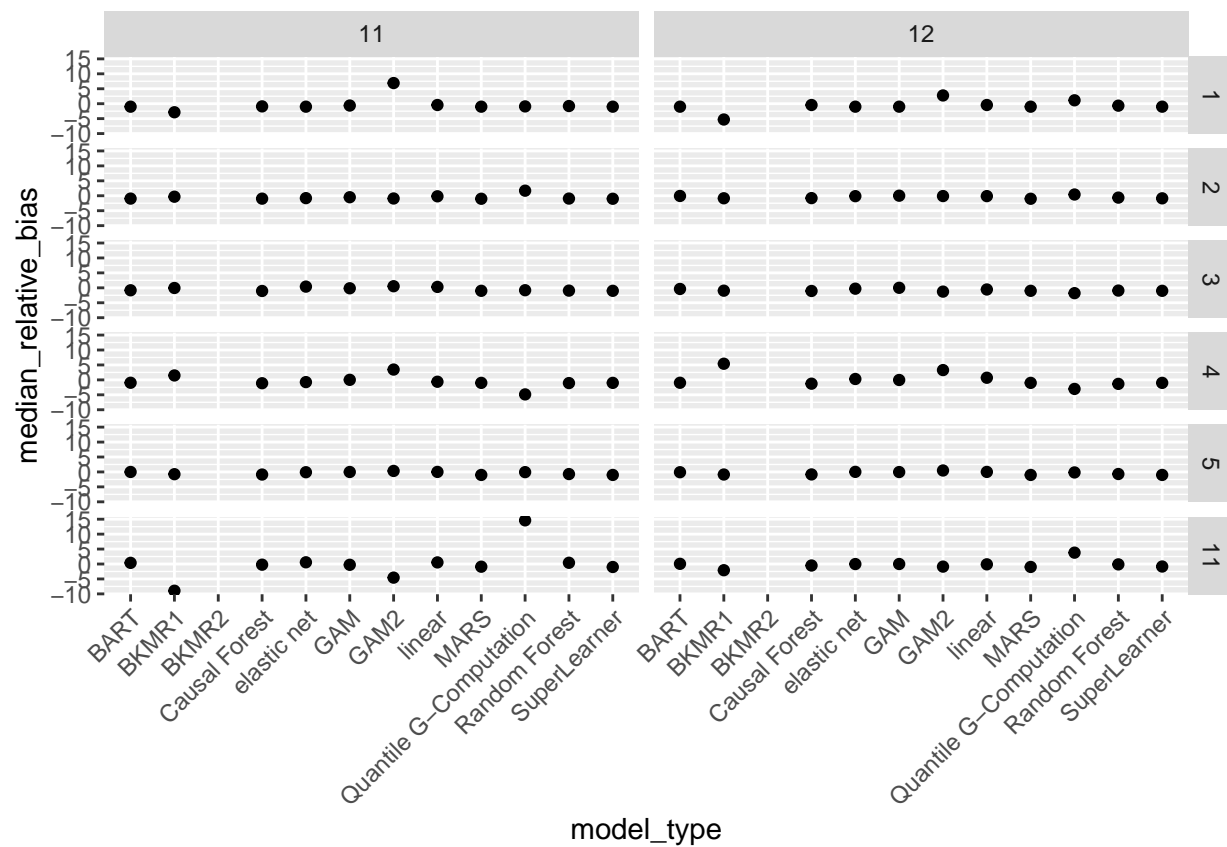


Visualizations at Scenario Level

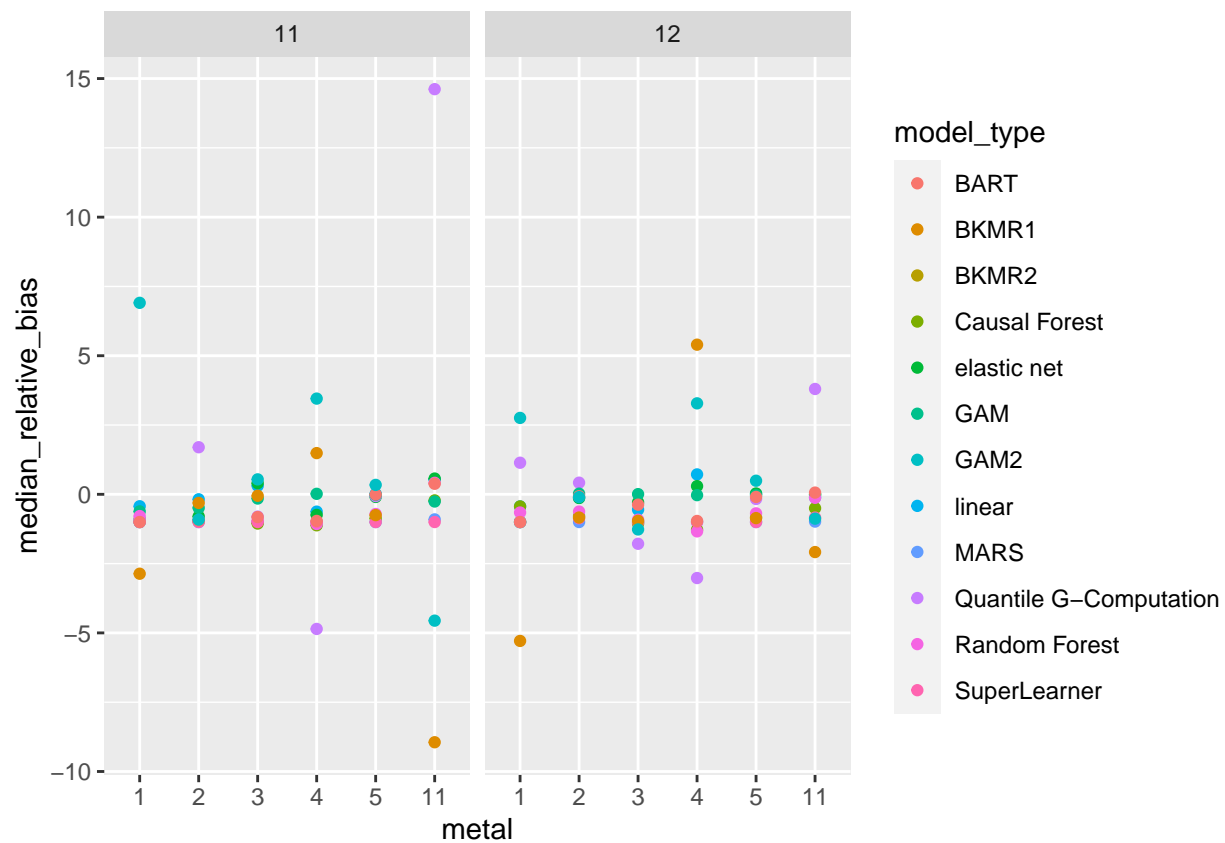
Warning: Removed 12 rows containing missing values ('geom_point()').



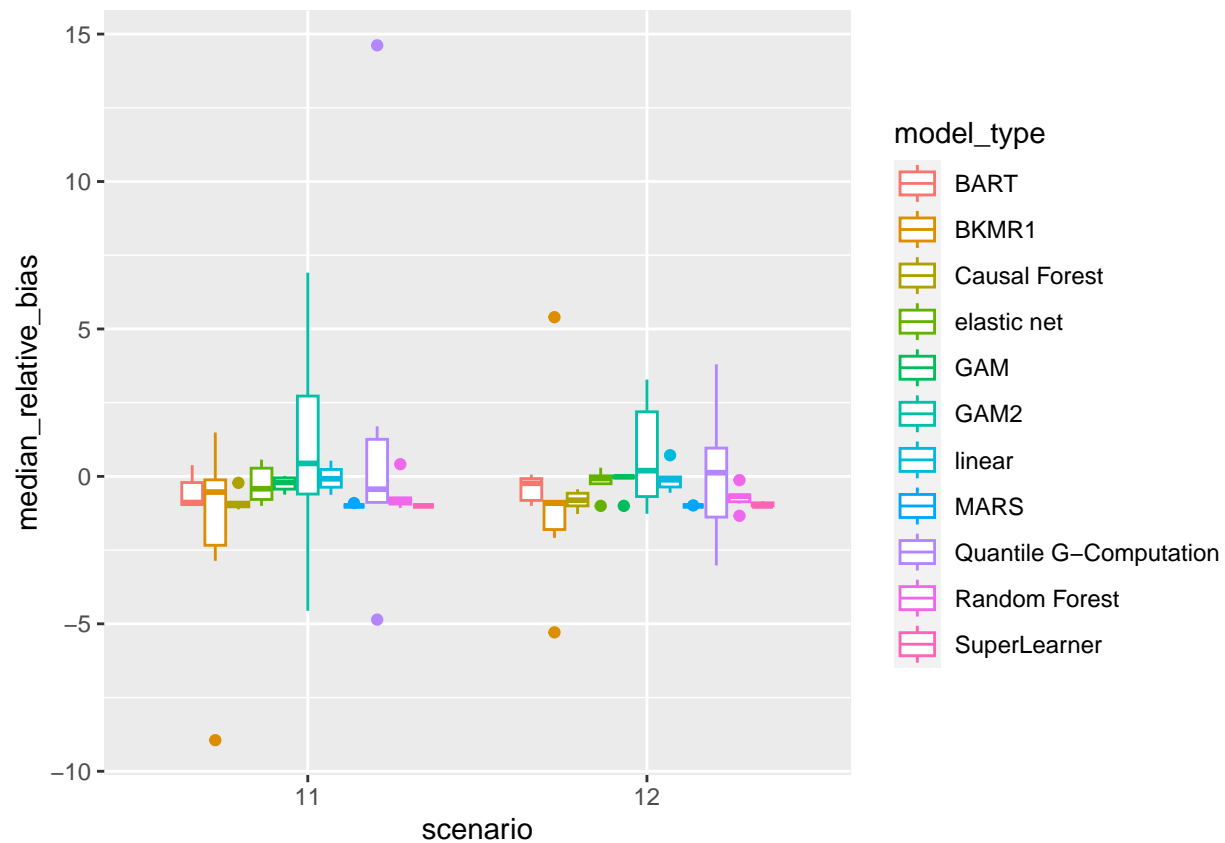
Warning: Removed 12 rows containing missing values ('geom_point()').



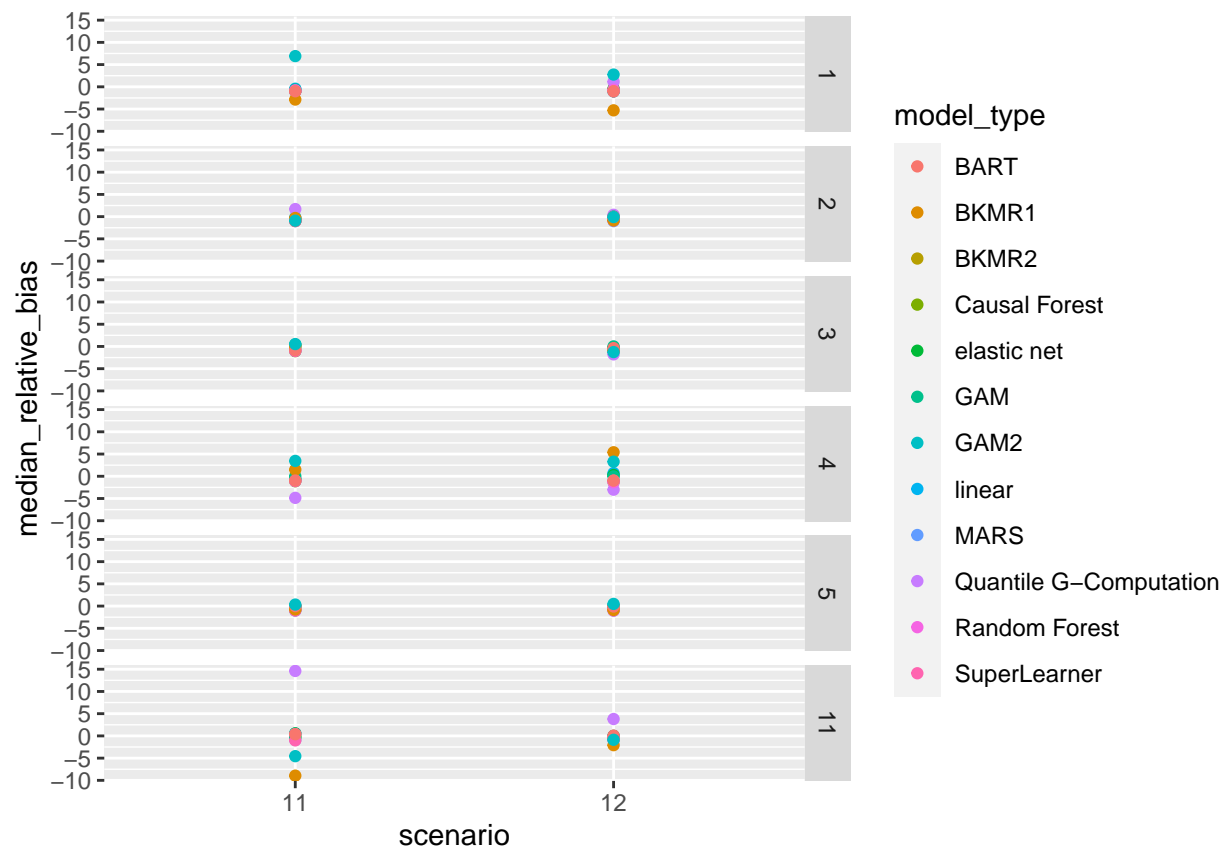
Warning: Removed 12 rows containing missing values ('geom_point()').



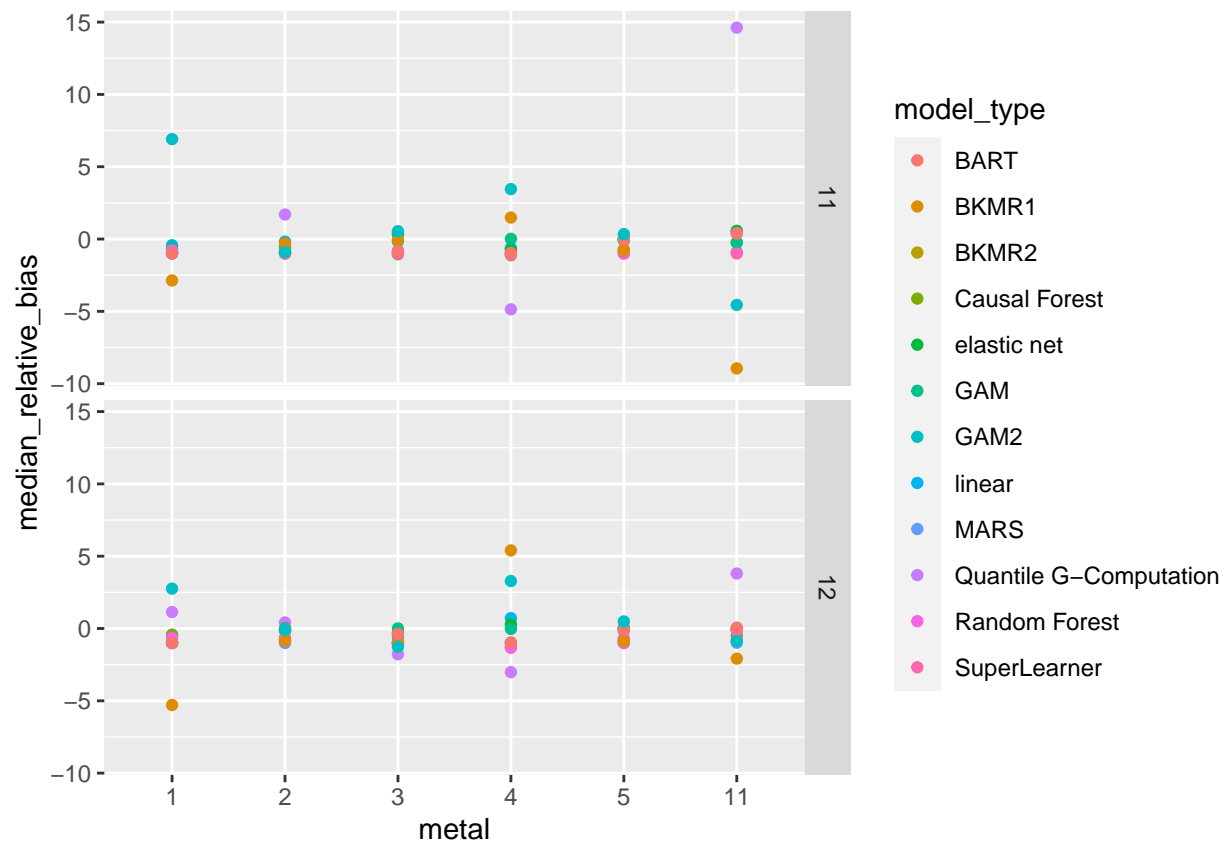
Warning: Removed 12 rows containing non-finite values ('stat_boxplot()').



Warning: Removed 12 rows containing missing values ('geom_point()').



Warning: Removed 12 rows containing missing values ('geom_point()').



Tables

'summarise()' has grouped output by 'scenario'. You can override using the
'.groups' argument.

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal min_relative_bias model_type
##   <fct>      <fct>          <dbl> <chr>
## 1 11         1              NA BKMR2
## 2 11         2              NA BKMR2
## 3 11         3              NA BKMR2
## 4 11         4              NA BKMR2
## 5 11         5              NA BKMR2
## 6 11        11              NA BKMR2
```

'summarise()' has grouped output by 'scenario'. You can override using the
'.groups' argument.

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal max_relative_bias model_type
##   <fct>      <fct>          <dbl> <chr>
## 1 11         1              NA BKMR2
```

```
## 2 11      2      NA BKMR2
## 3 11      3      NA BKMR2
## 4 11      4      NA BKMR2
## 5 11      5      NA BKMR2
## 6 11     11      NA BKMR2
```

```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
```

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal min_relative_bias model_type
##   <fct>    <fct>          <dbl> <chr>
## 1 12      1      NA BKMR2
## 2 12      2      NA BKMR2
## 3 12      3      NA BKMR2
## 4 12      4      NA BKMR2
## 5 12      5      NA BKMR2
## 6 12     11      NA BKMR2
```

```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
```

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal max_relative_bias model_type
##   <fct>    <fct>          <dbl> <chr>
## 1 12      1      NA BKMR2
## 2 12      2      NA BKMR2
## 3 12      3      NA BKMR2
## 4 12      4      NA BKMR2
## 5 12      5      NA BKMR2
## 6 12     11      NA BKMR2
```

```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
```

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal min_relative_bias model_type
##   <fct>    <fct>          <dbl> <chr>
## 1 11      1      NA BKMR2
## 2 11      2      NA BKMR2
## 3 11      3      NA BKMR2
## 4 11      4      NA BKMR2
## 5 11      5      NA BKMR2
## 6 11     11      NA BKMR2
```

```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
```

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal max_relative_bias model_type
##   <fct>    <fct>          <dbl> <chr>
## 1 11      1              NA BKMR2
## 2 11      2              NA BKMR2
## 3 11      3              NA BKMR2
## 4 11      4              NA BKMR2
## 5 11      5              NA BKMR2
## 6 11     11              NA BKMR2
```

'summarise()' has grouped output by 'scenario'. You can override using the
'.groups' argument.

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal min_relative_bias model_type
##   <fct>    <fct>          <dbl> <chr>
## 1 12      1              NA BKMR2
## 2 12      2              NA BKMR2
## 3 12      3              NA BKMR2
## 4 12      4              NA BKMR2
## 5 12      5              NA BKMR2
## 6 12     11              NA BKMR2
```

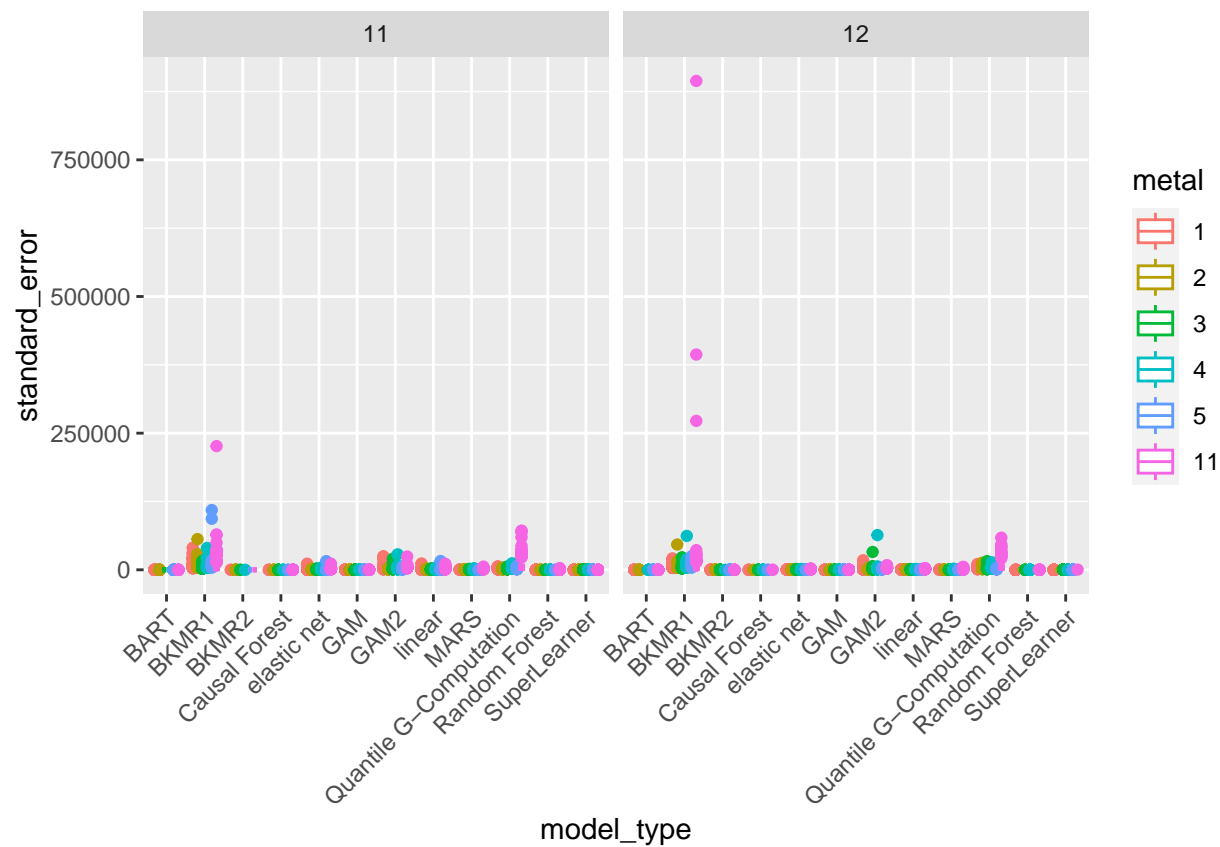
'summarise()' has grouped output by 'scenario'. You can override using the
'.groups' argument.

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal max_relative_bias model_type
##   <fct>    <fct>          <dbl> <chr>
## 1 12      1              NA BKMR2
## 2 12      2              NA BKMR2
## 3 12      3              NA BKMR2
## 4 12      4              NA BKMR2
## 5 12      5              NA BKMR2
## 6 12     11              NA BKMR2
```

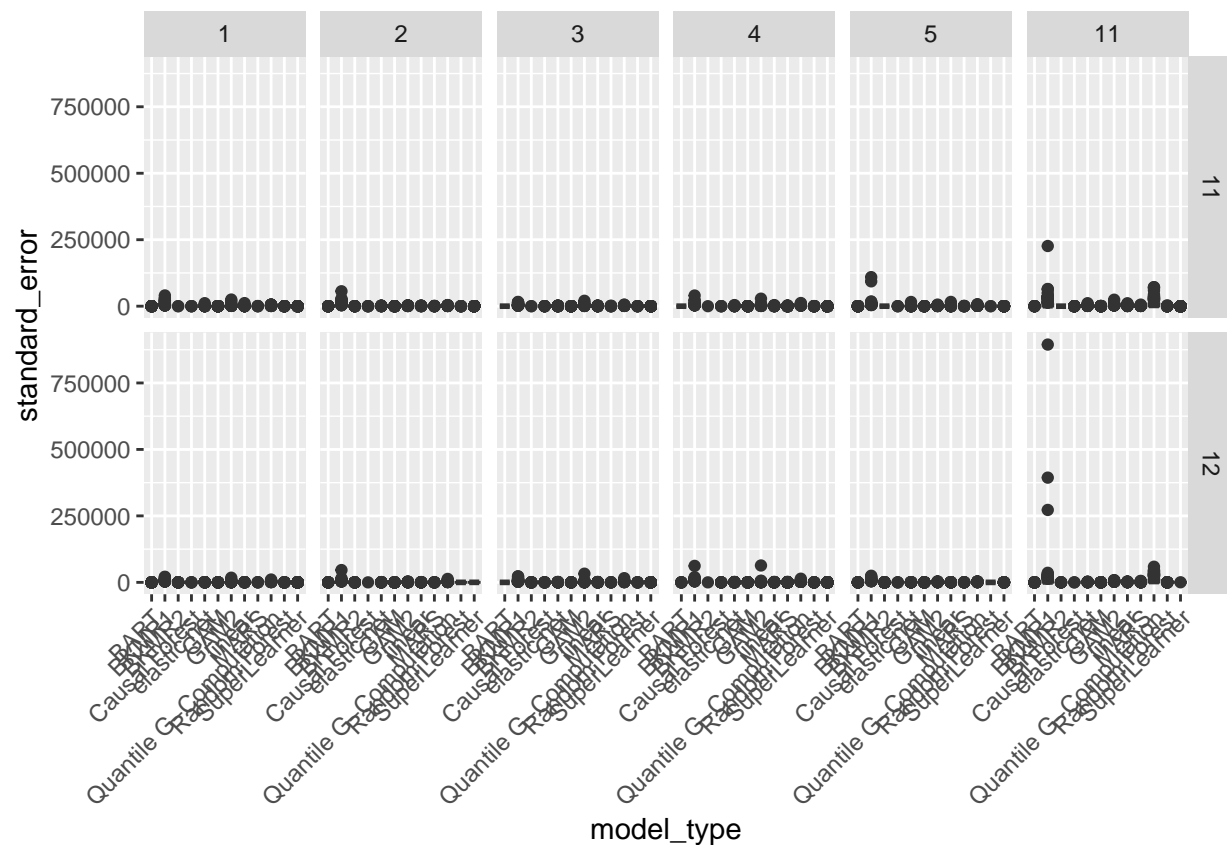
Standard Error / RMSE

Visualizations at Dataset Level

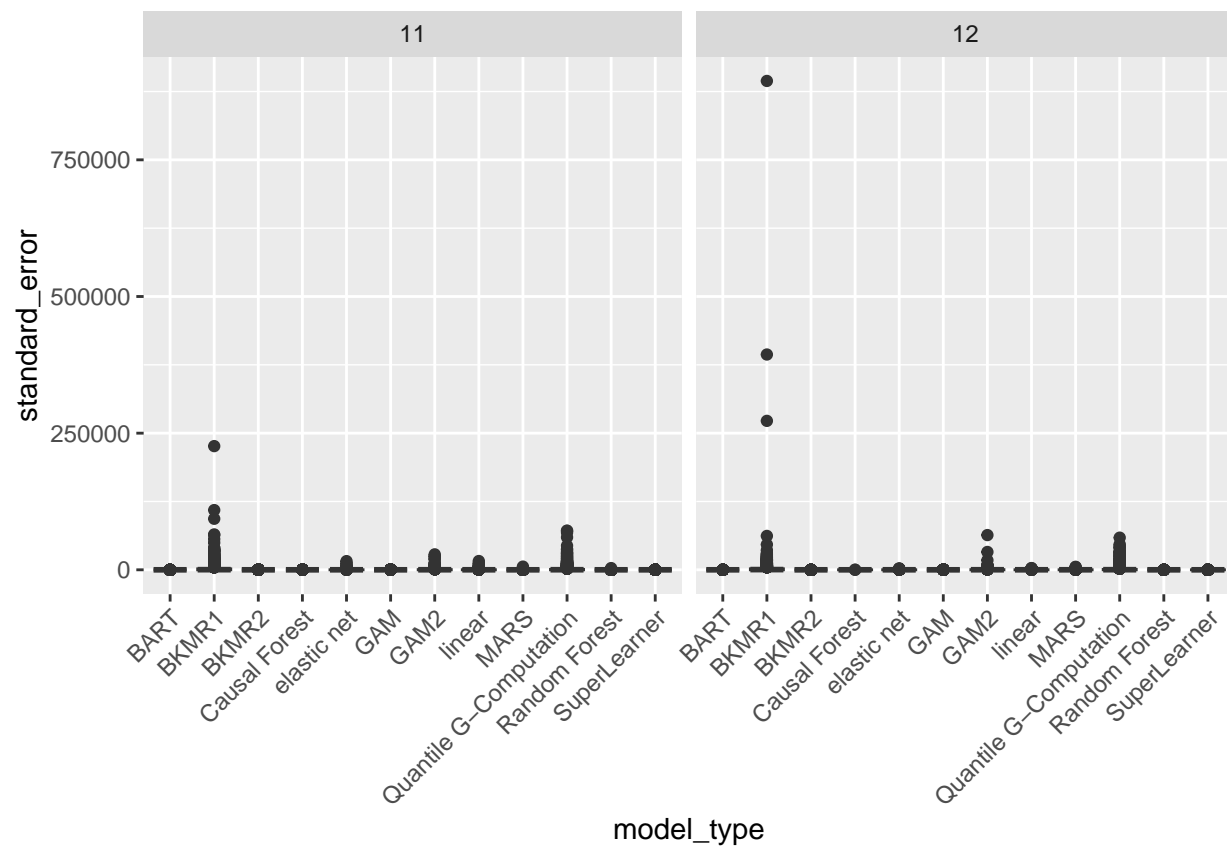
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



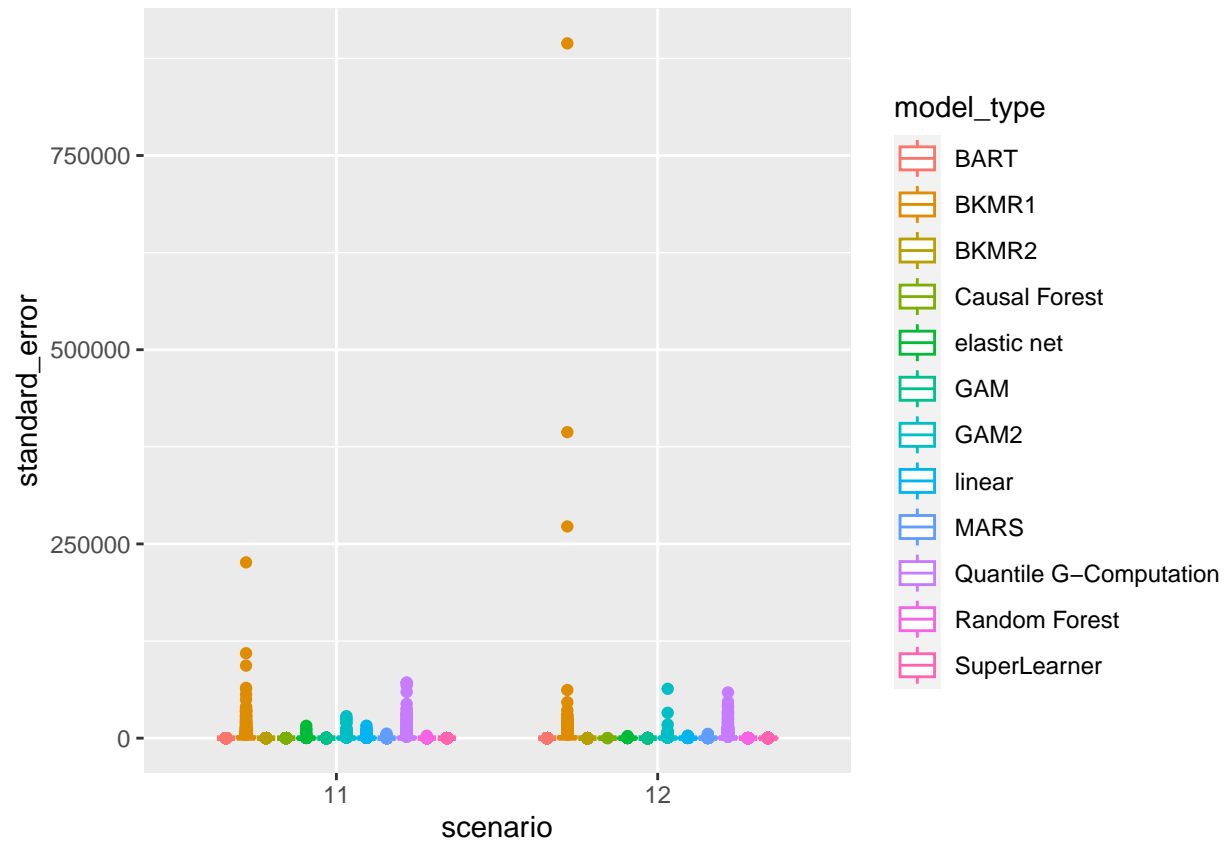
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



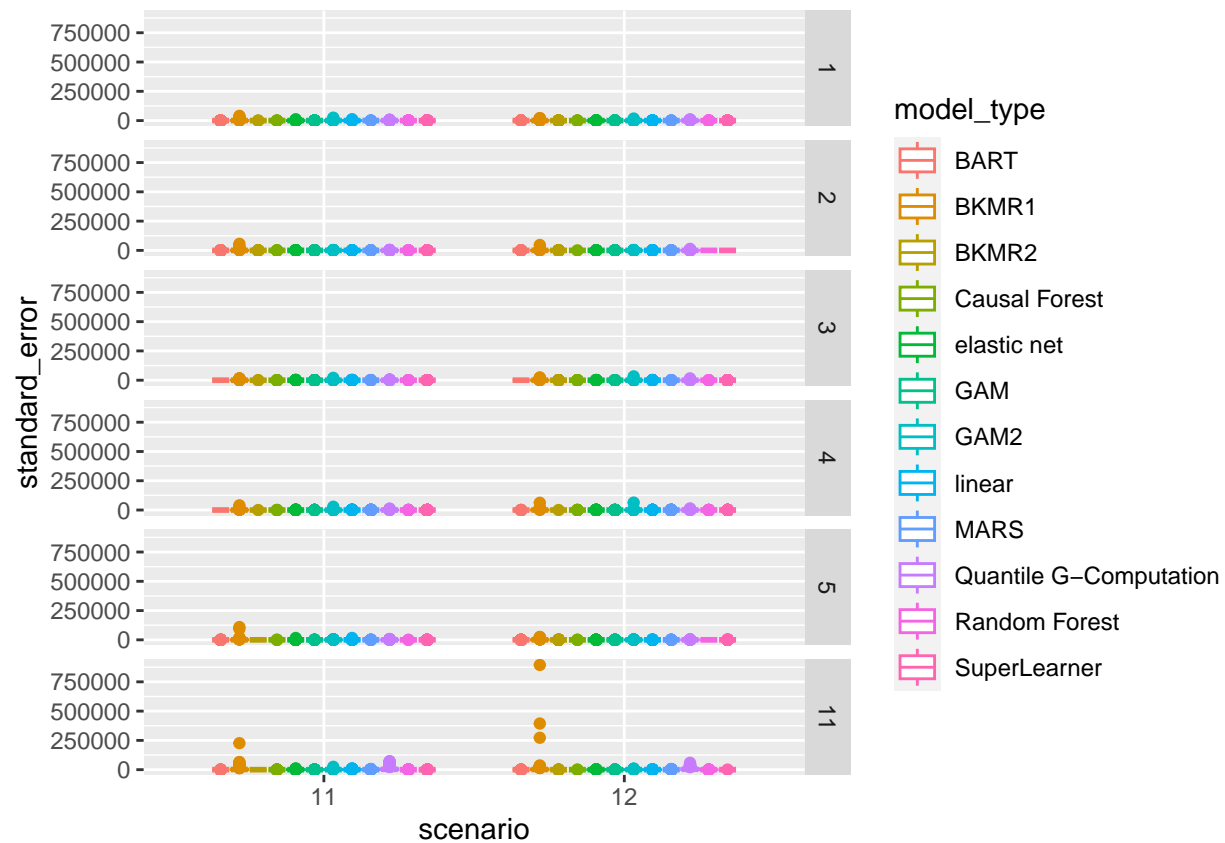
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



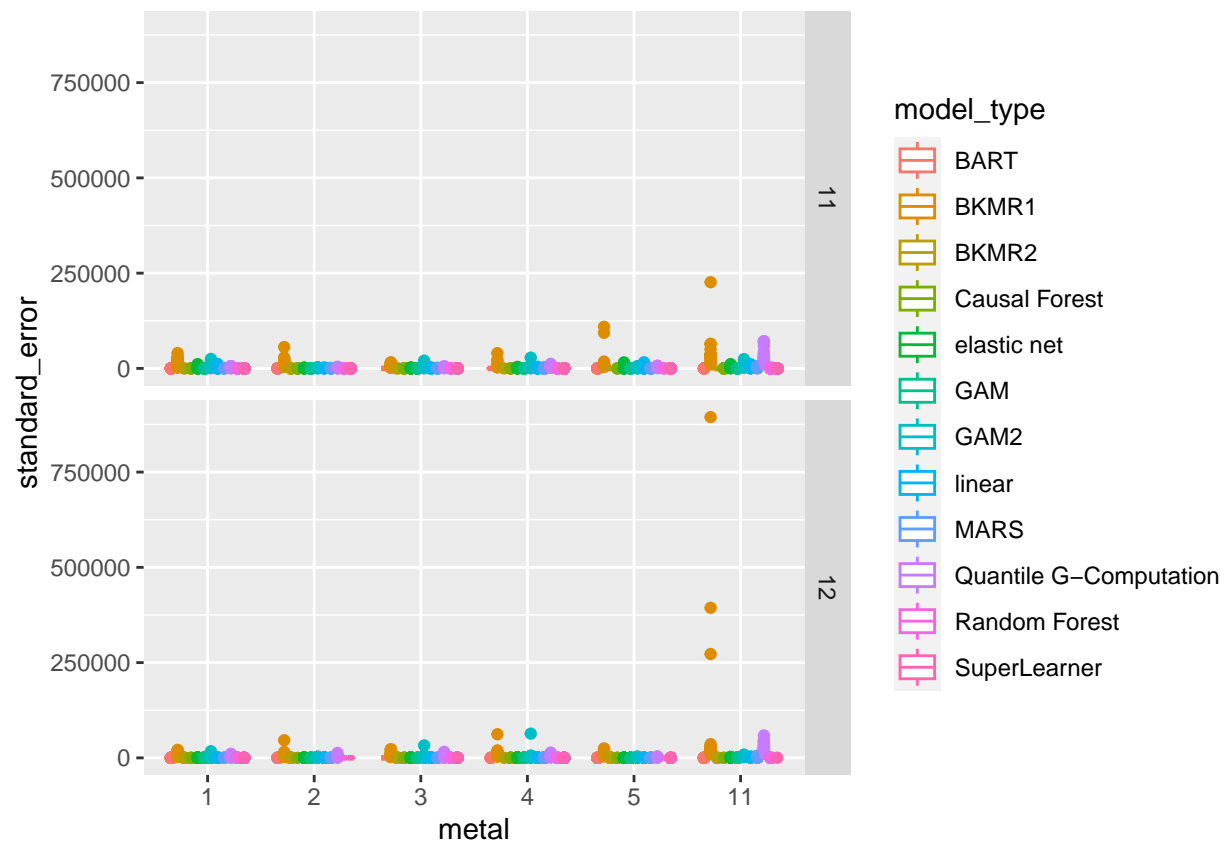
Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').



Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').

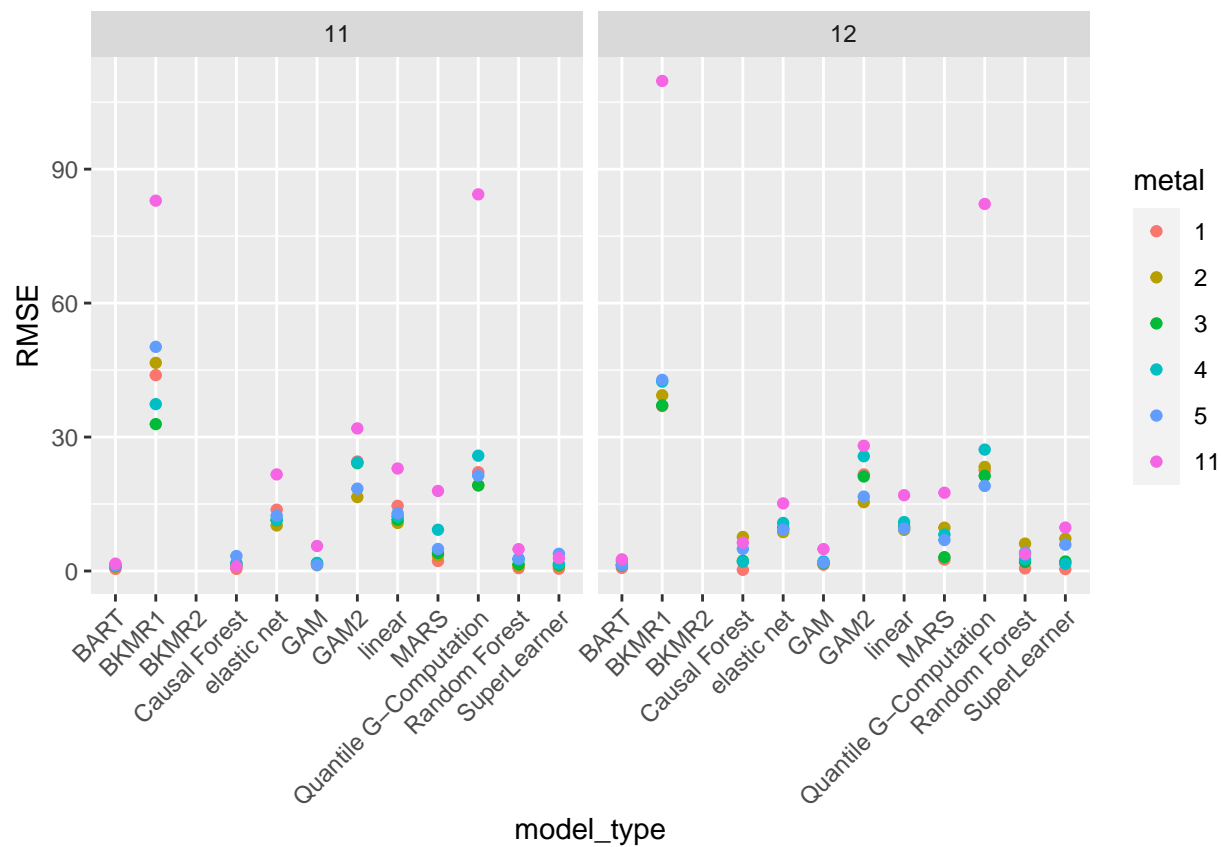


Warning: Removed 144 rows containing non-finite values ('stat_boxplot()').

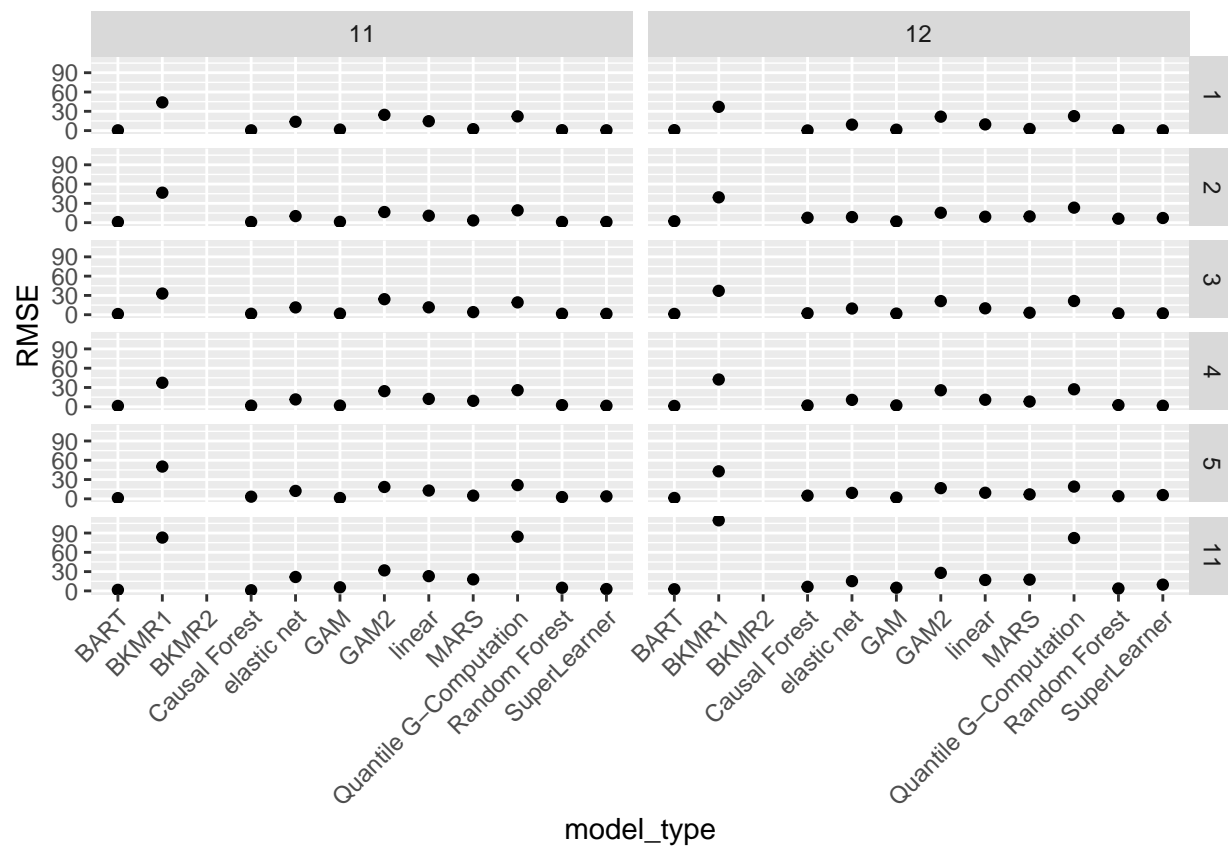


Visualizations at Scenario Level

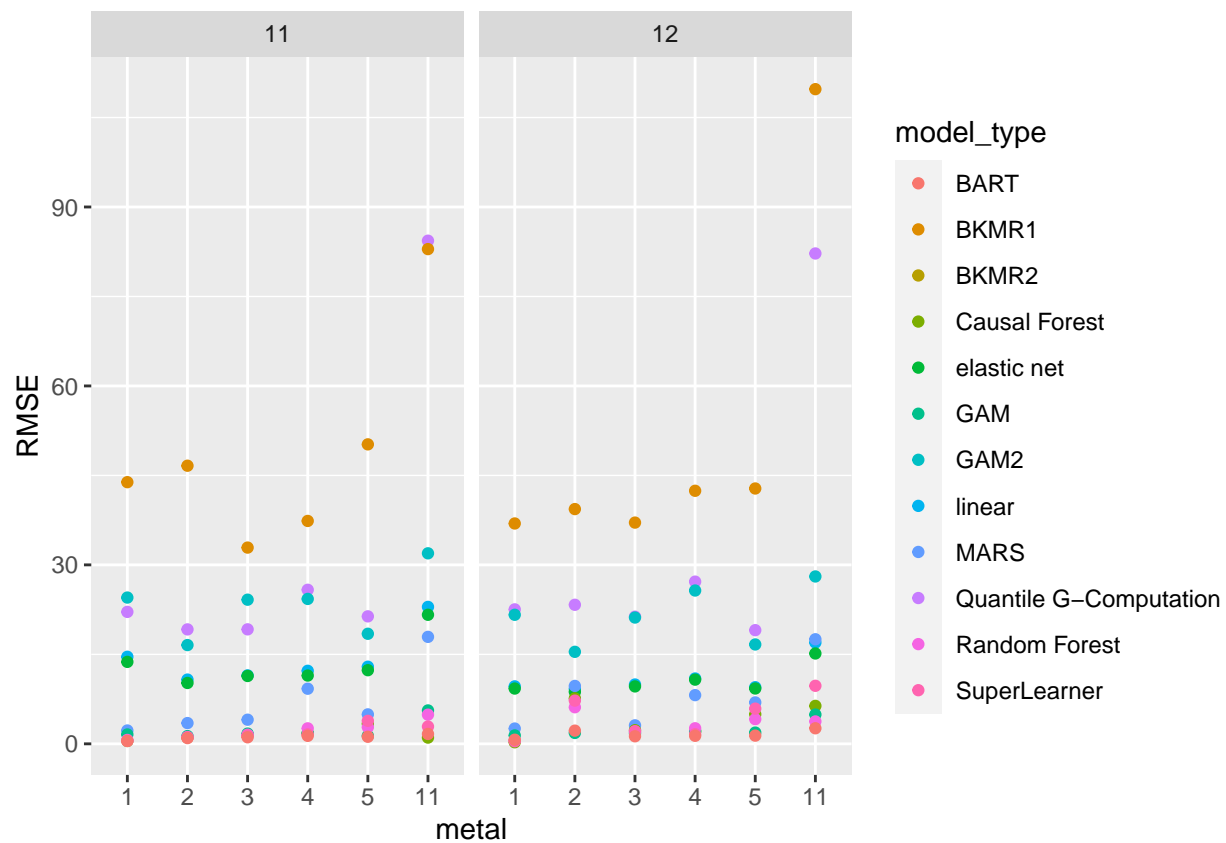
Warning: Removed 12 rows containing missing values ('geom_point()').



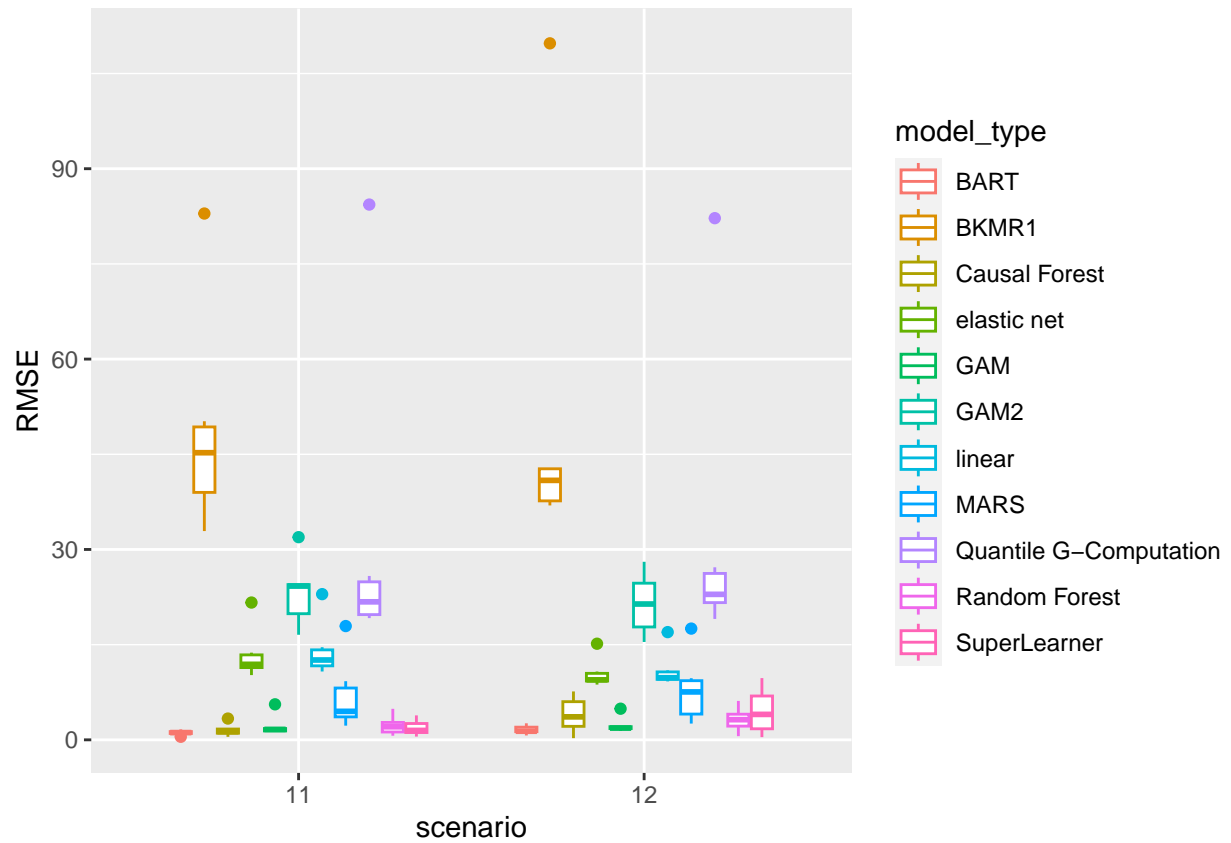
Warning: Removed 12 rows containing missing values ('geom_point()').



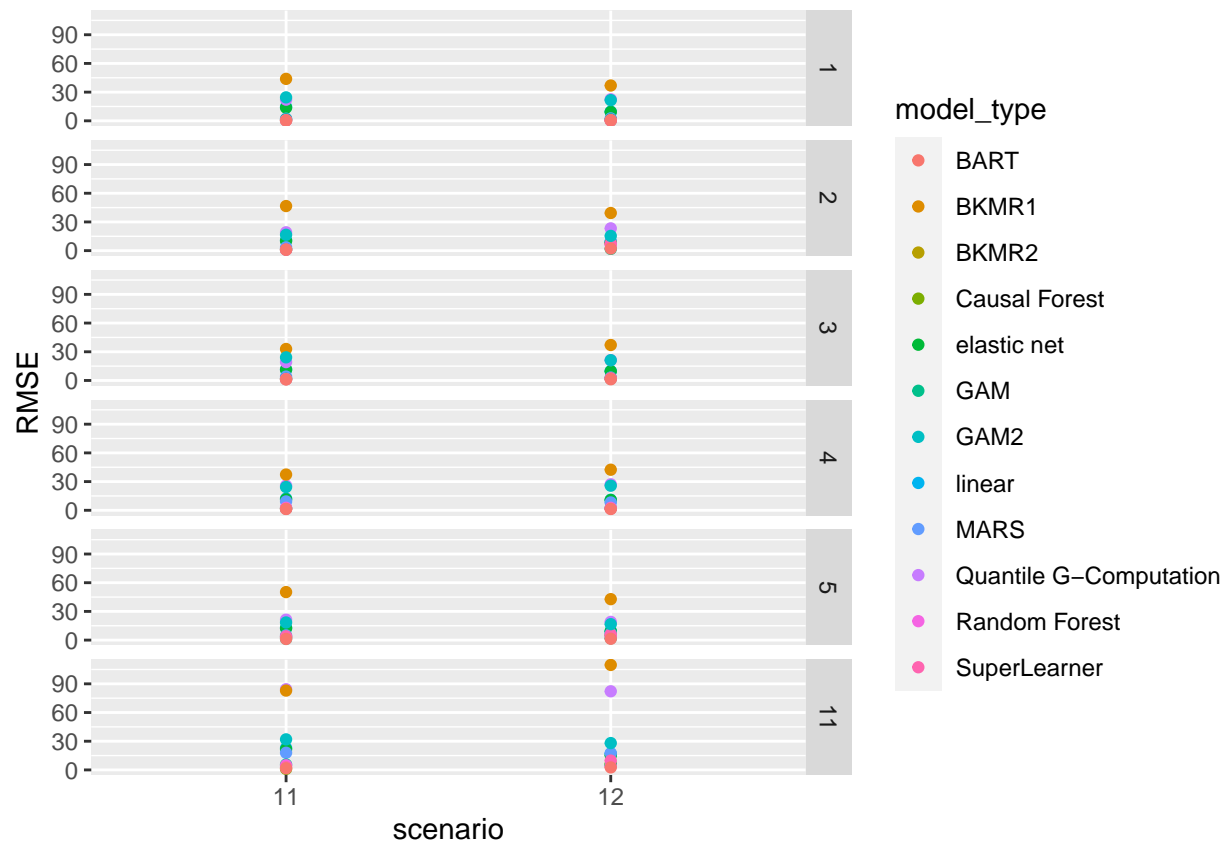
Warning: Removed 12 rows containing missing values ('geom_point()').



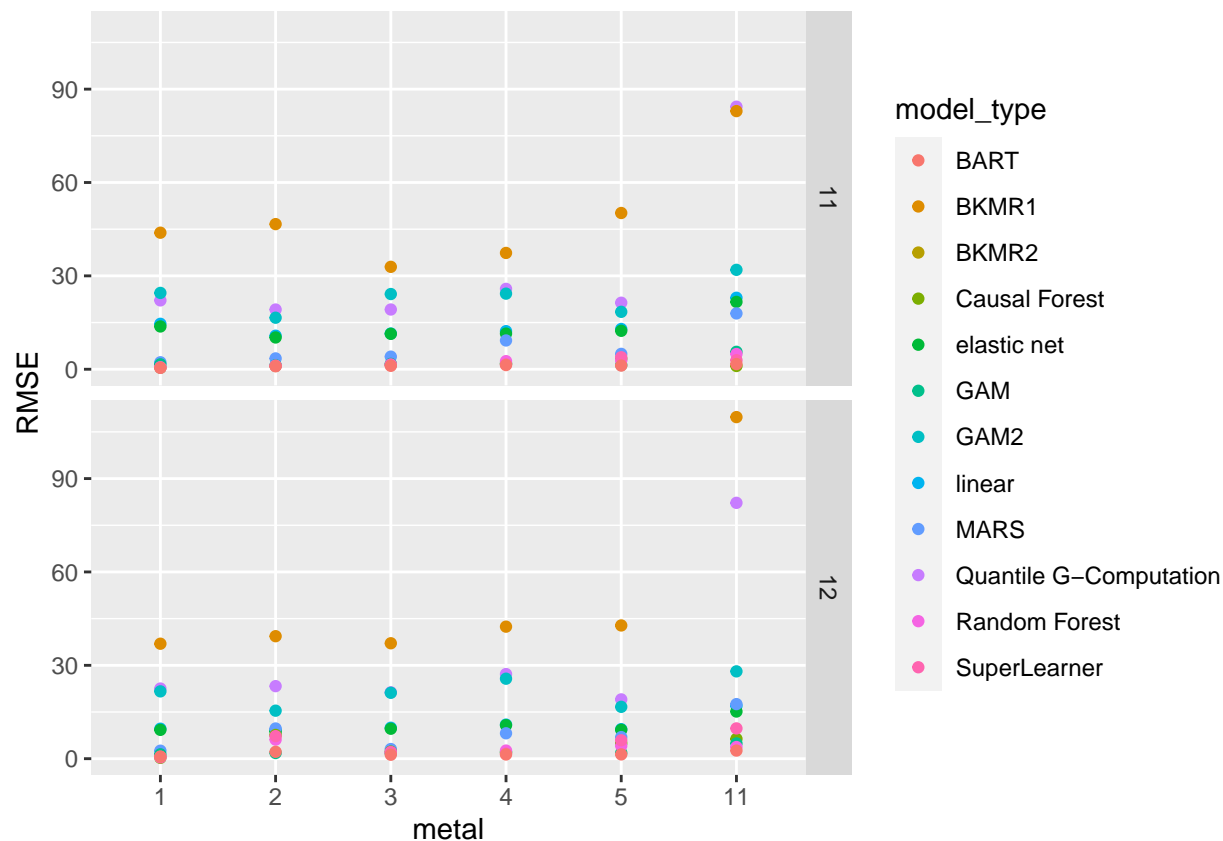
Warning: Removed 12 rows containing non-finite values ('stat_boxplot()').



Warning: Removed 12 rows containing missing values ('geom_point()').



Warning: Removed 12 rows containing missing values ('geom_point()').



Tables

'summarise()' has grouped output by 'scenario'. You can override using the
'.groups' argument.

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal min_RMSE model_type
##   <fct>     <fct>     <dbl> <chr>
## 1 11         1         NA BKMR2
## 2 11         2         NA BKMR2
## 3 11         3         NA BKMR2
## 4 11         4         NA BKMR2
## 5 11         5         NA BKMR2
## 6 11        11         NA BKMR2
```

'summarise()' has grouped output by 'scenario'. You can override using the
'.groups' argument.

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal max_RMSE model_type
##   <fct>     <fct>     <dbl> <chr>
## 1 11         1         NA BKMR2
```

```
## 2 11      2      NA BKMR2
## 3 11      3      NA BKMR2
## 4 11      4      NA BKMR2
## 5 11      5      NA BKMR2
## 6 11     11      NA BKMR2
```

```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
```

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal min_RMSE model_type
##   <fct>    <fct>    <dbl> <chr>
## 1 12      1      NA BKMR2
## 2 12      2      NA BKMR2
## 3 12      3      NA BKMR2
## 4 12      4      NA BKMR2
## 5 12      5      NA BKMR2
## 6 12     11      NA BKMR2
```

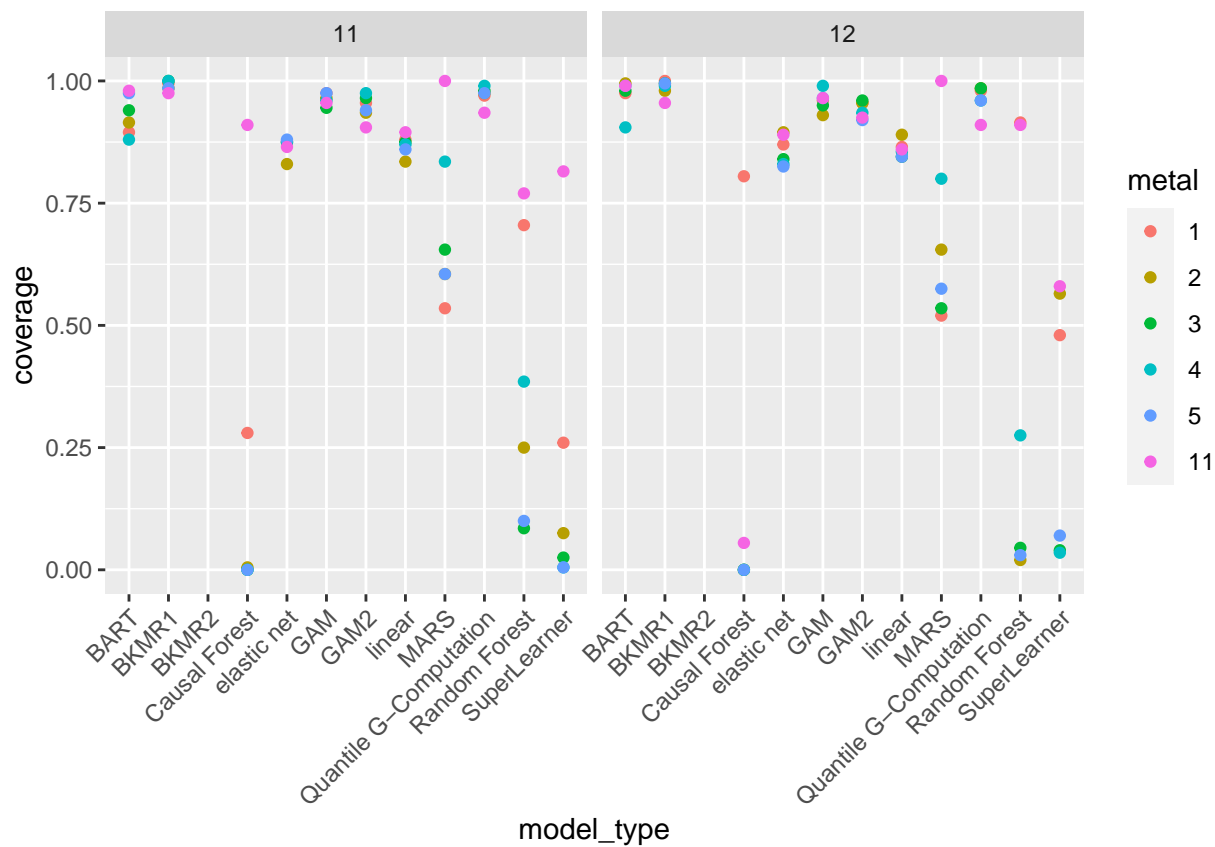
```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
```

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal max_RMSE model_type
##   <fct>    <fct>    <dbl> <chr>
## 1 12      1      NA BKMR2
## 2 12      2      NA BKMR2
## 3 12      3      NA BKMR2
## 4 12      4      NA BKMR2
## 5 12      5      NA BKMR2
## 6 12     11      NA BKMR2
```

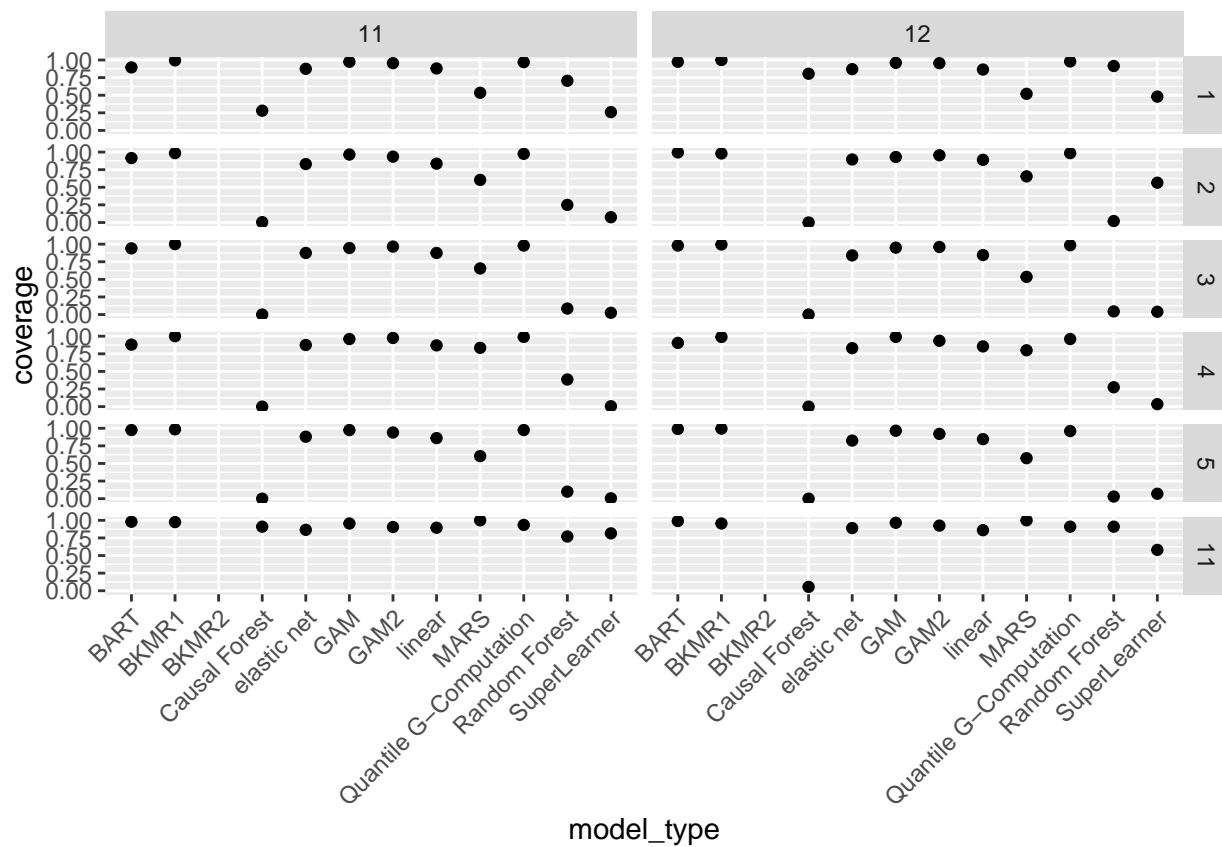
Coverage

Visualizations at Scenario Level

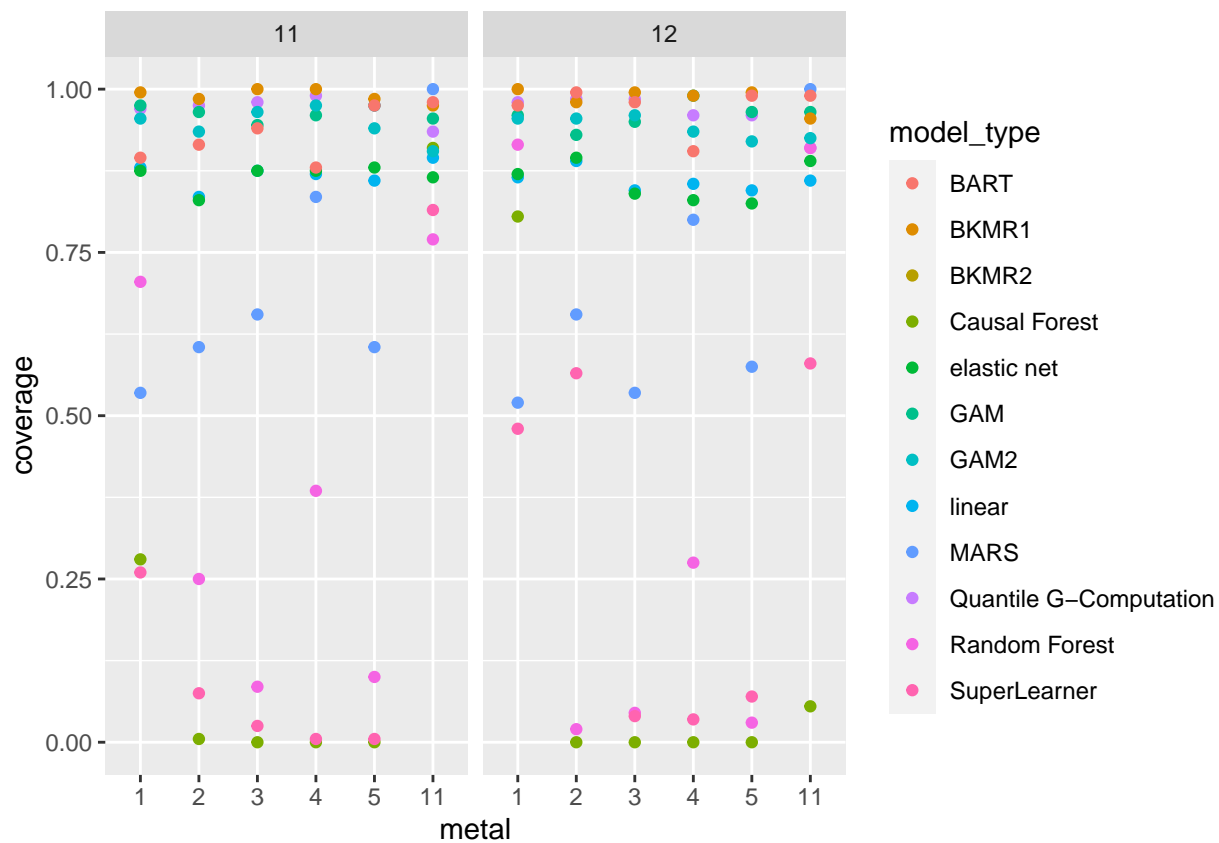
```
## Warning: Removed 12 rows containing missing values ('geom_point()').
```



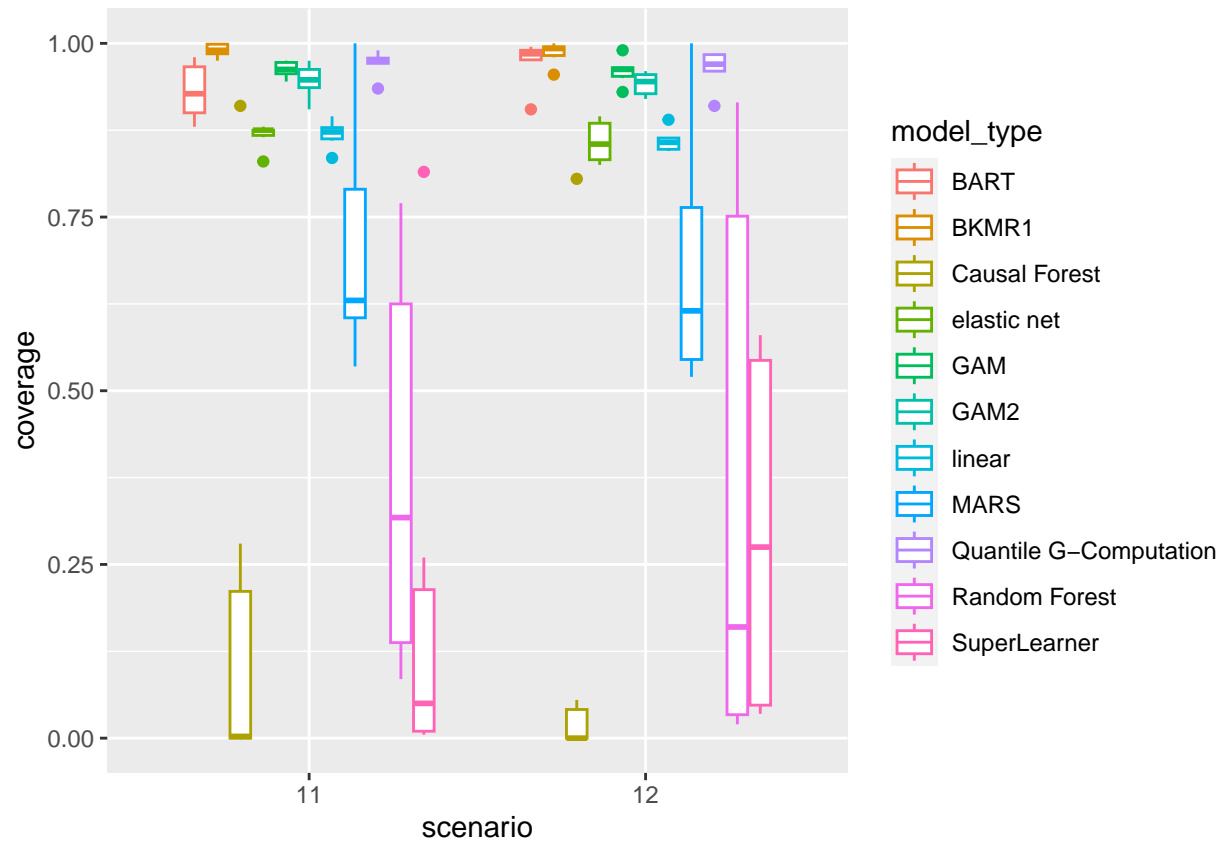
Warning: Removed 12 rows containing missing values ('geom_point()').



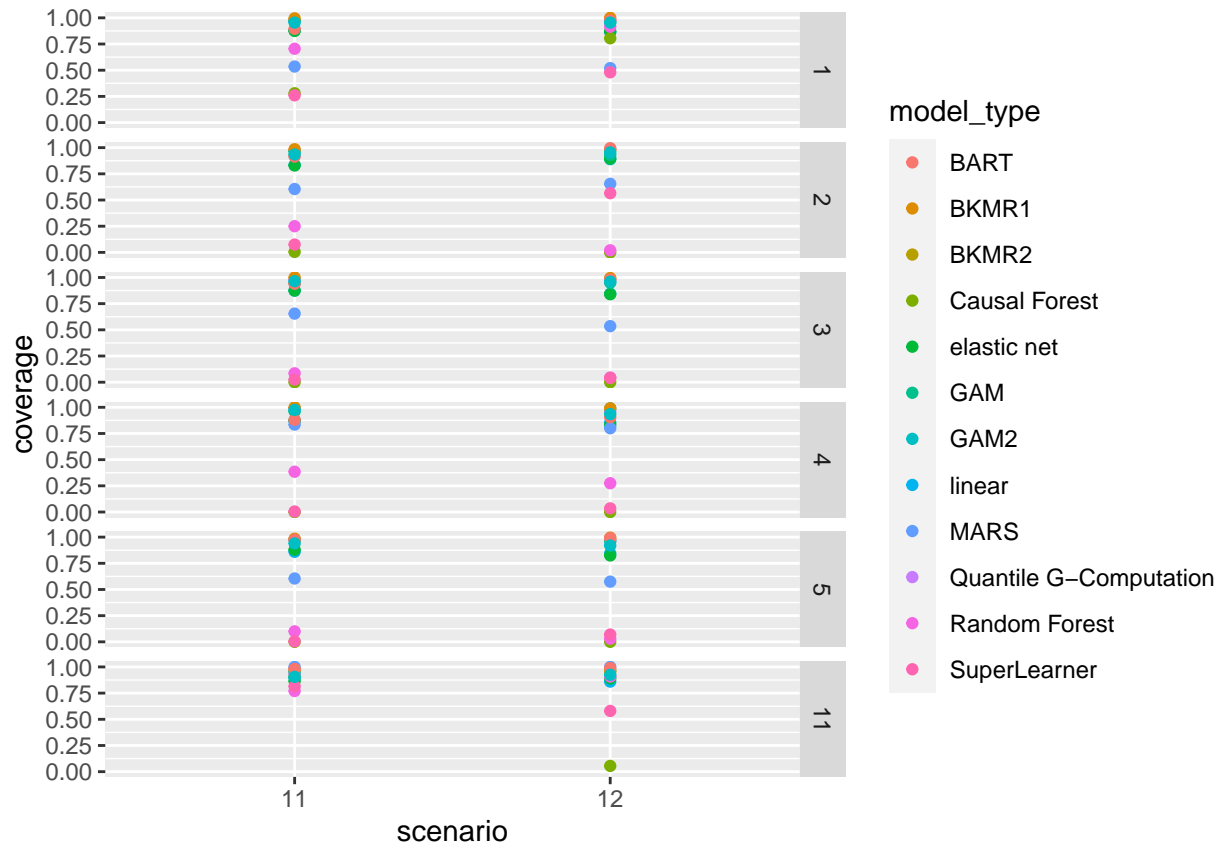
Warning: Removed 12 rows containing missing values ('geom_point()').



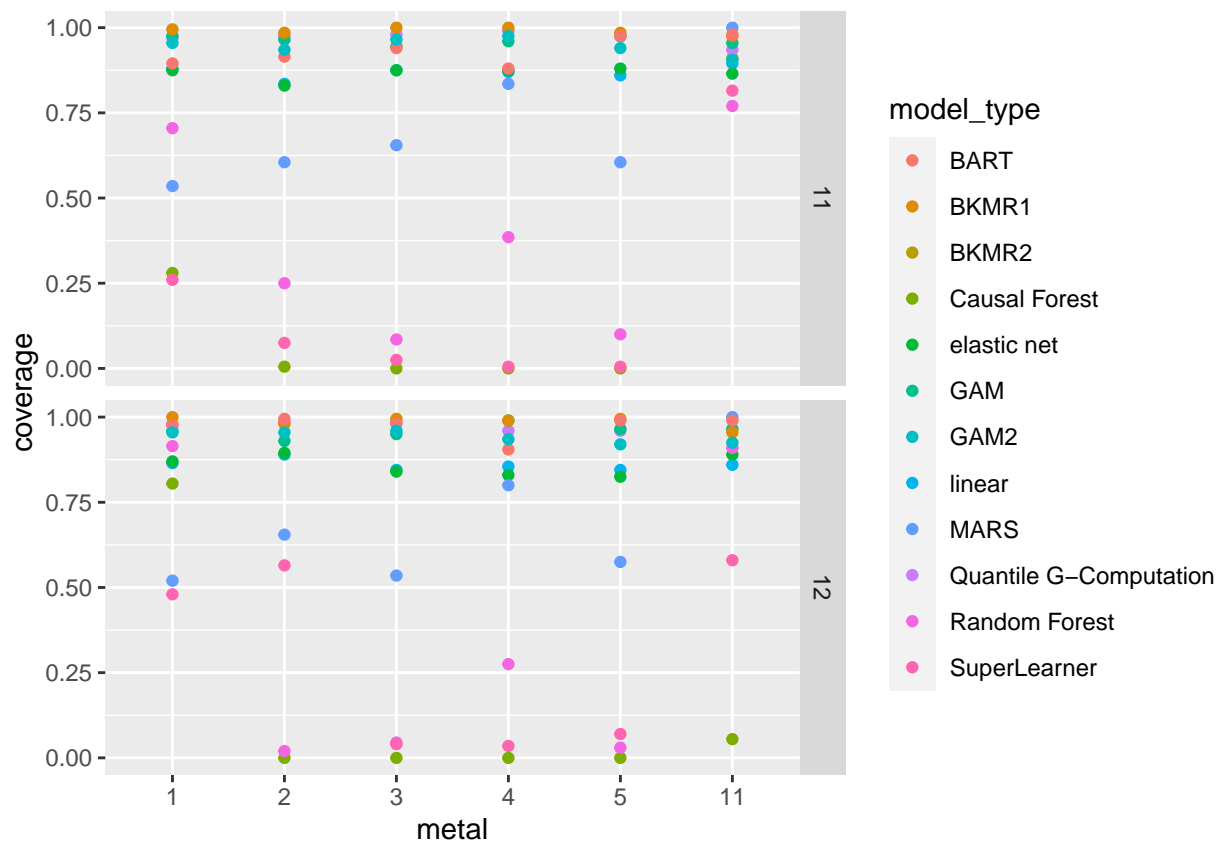
Warning: Removed 12 rows containing non-finite values (‘stat_boxplot()’).



Warning: Removed 12 rows containing missing values ('geom_point()').



Warning: Removed 12 rows containing missing values ('geom_point()').



Tables

'summarise()' has grouped output by 'scenario'. You can override using the
'.groups' argument.

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal min_coverage model_type
##   <fct>      <fct>      <dbl> <chr>
## 1 11         1          NA BKMR2
## 2 11         2          NA BKMR2
## 3 11         3          NA BKMR2
## 4 11         4          NA BKMR2
## 5 11         5          NA BKMR2
## 6 11        11          NA BKMR2
```

'summarise()' has grouped output by 'scenario'. You can override using the
'.groups' argument.

```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal max_coverage model_type
##   <fct>      <fct>      <dbl> <chr>
## 1 11         1          NA BKMR2
```

```
## 2 11      2      NA BKMR2
## 3 11      3      NA BKMR2
## 4 11      4      NA BKMR2
## 5 11      5      NA BKMR2
## 6 11     11      NA BKMR2
```

```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
```

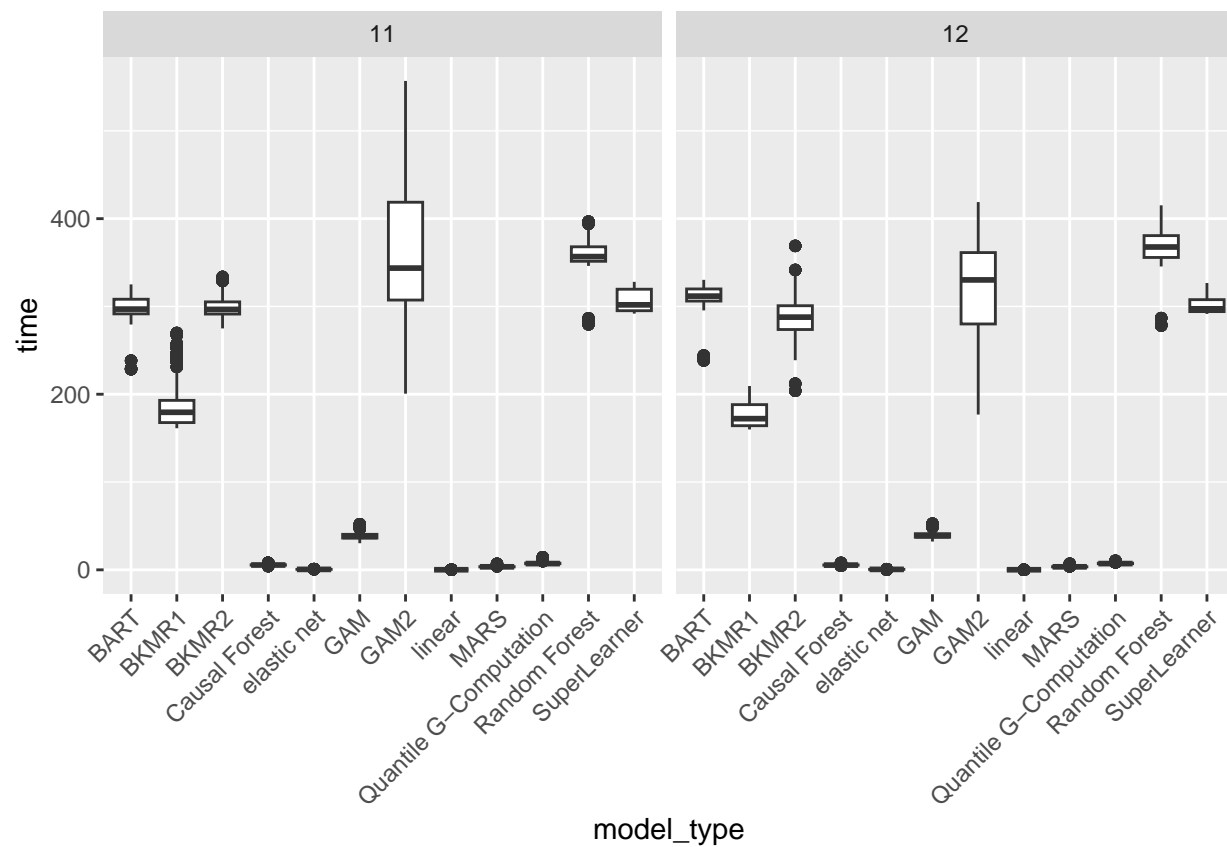
```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal min_coverage model_type
##   <fct>    <fct>      <dbl> <chr>
## 1 12      1          NA BKMR2
## 2 12      2          NA BKMR2
## 3 12      3          NA BKMR2
## 4 12      4          NA BKMR2
## 5 12      5          NA BKMR2
## 6 12     11          NA BKMR2
```

```
## 'summarise()' has grouped output by 'scenario'. You can override using the
## '.groups' argument.
```

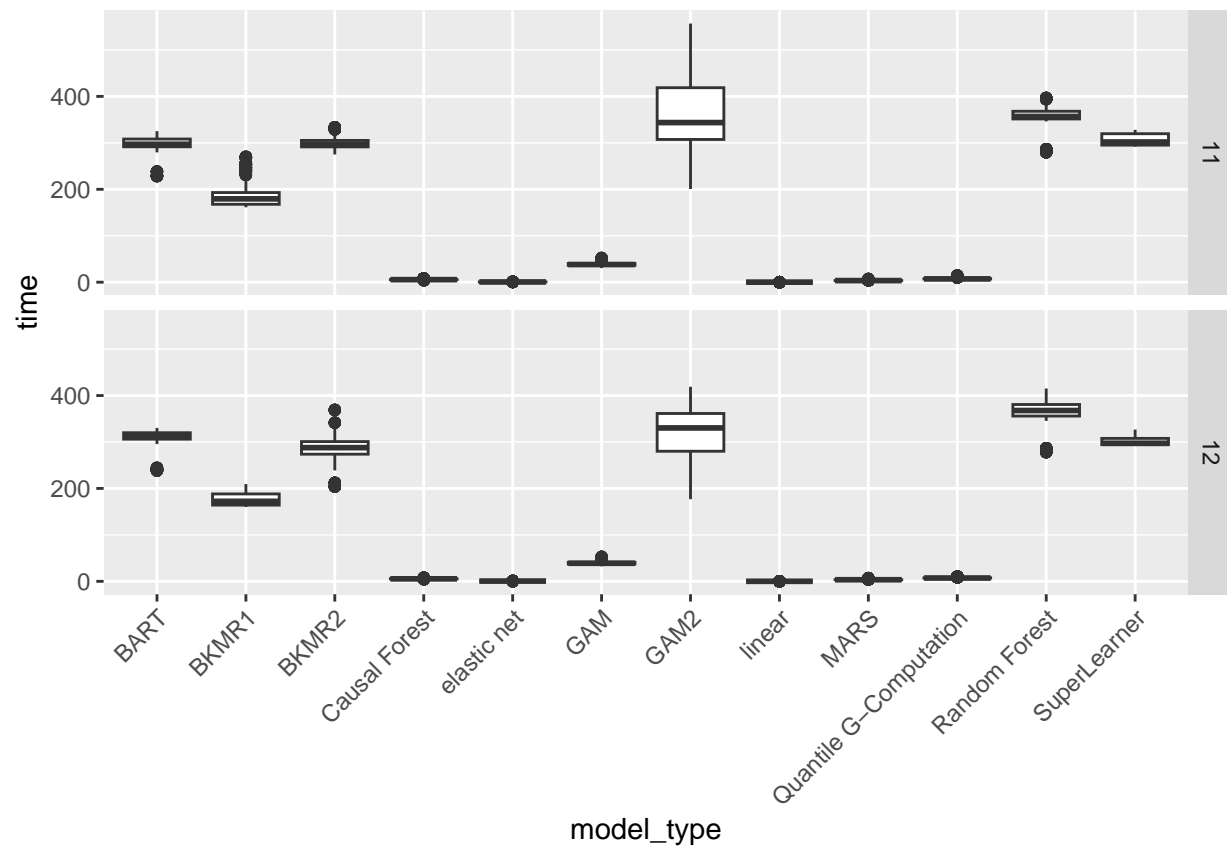
```
## # A tibble: 6 x 4
## # Groups:   scenario [1]
##   scenario metal max_coverage model_type
##   <fct>    <fct>      <dbl> <chr>
## 1 12      1          NA BKMR2
## 2 12      2          NA BKMR2
## 3 12      3          NA BKMR2
## 4 12      4          NA BKMR2
## 5 12      5          NA BKMR2
## 6 12     11          NA BKMR2
```

Time

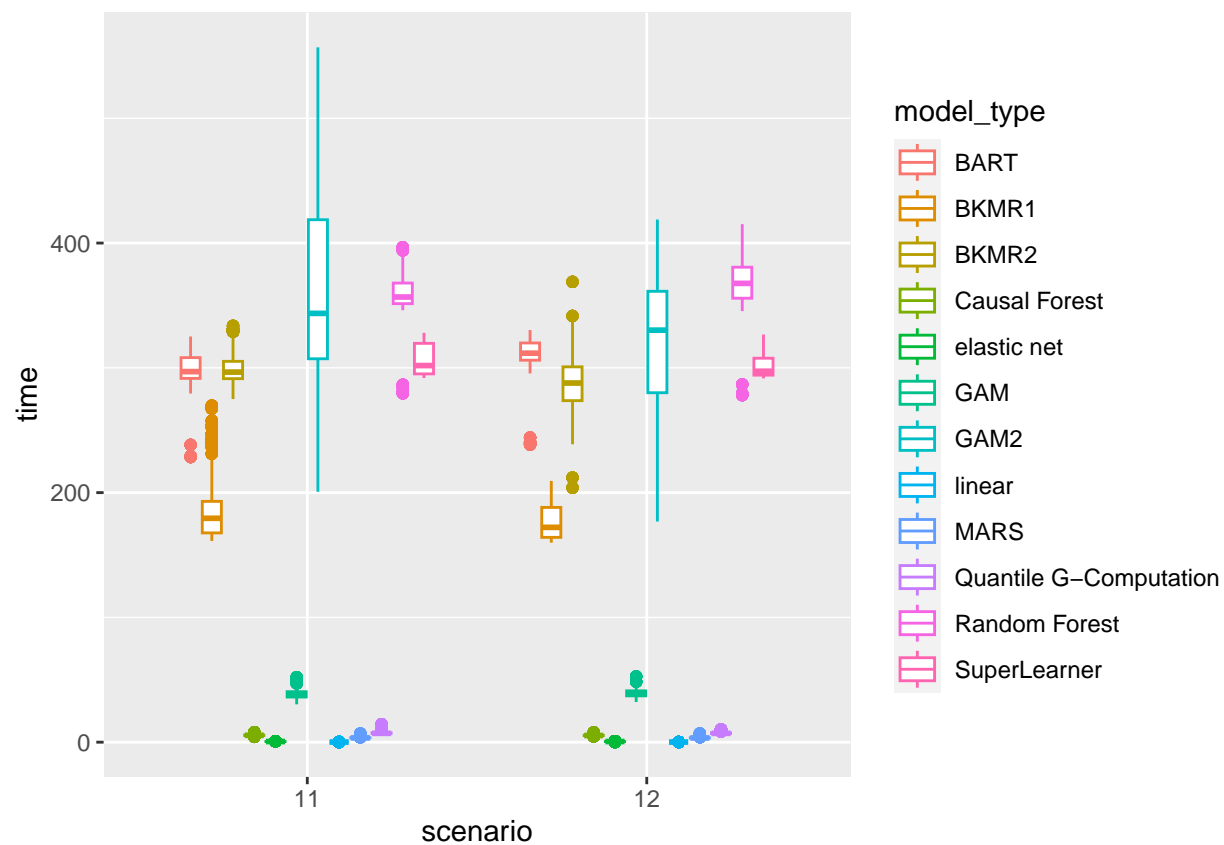
```
## Warning: Removed 264 rows containing non-finite values ('stat_boxplot()').
```



Warning: Removed 264 rows containing non-finite values ('stat_boxplot()').

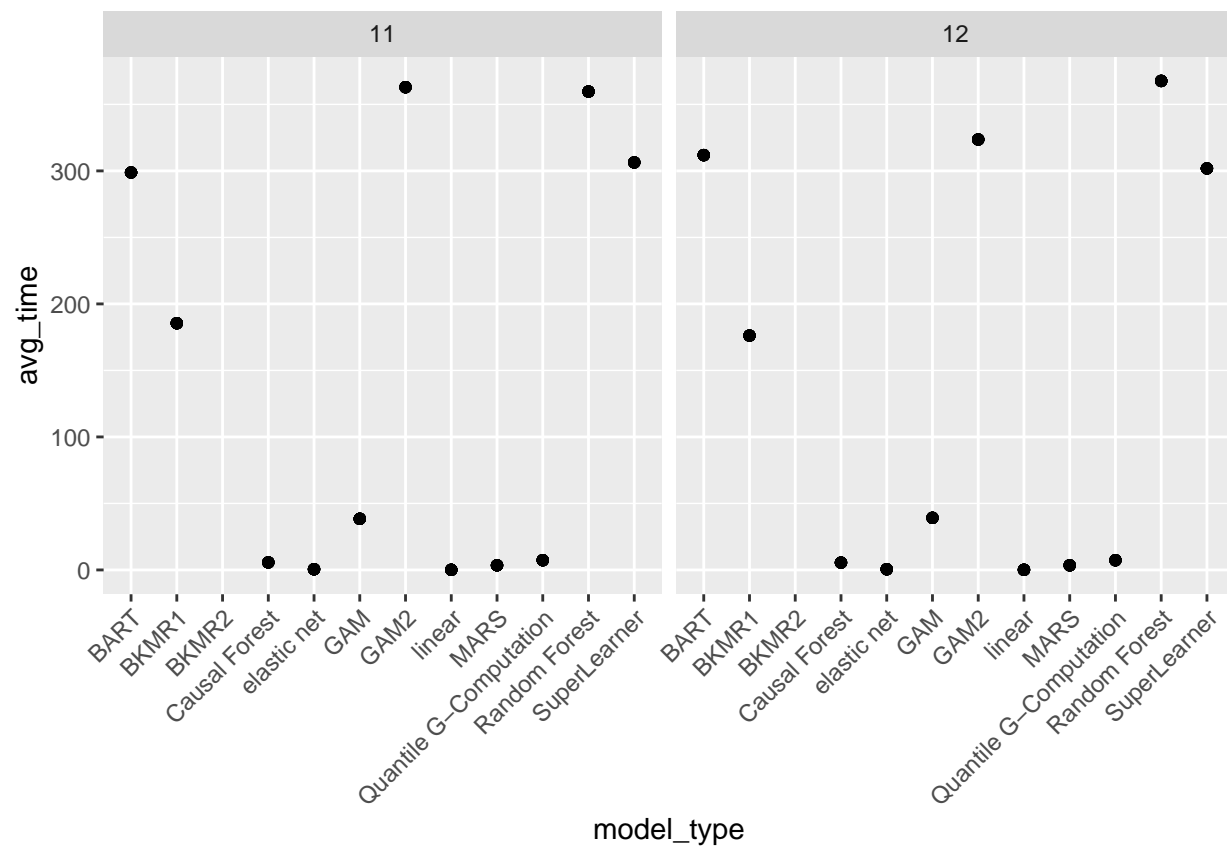


Warning: Removed 264 rows containing non-finite values ('stat_boxplot()').

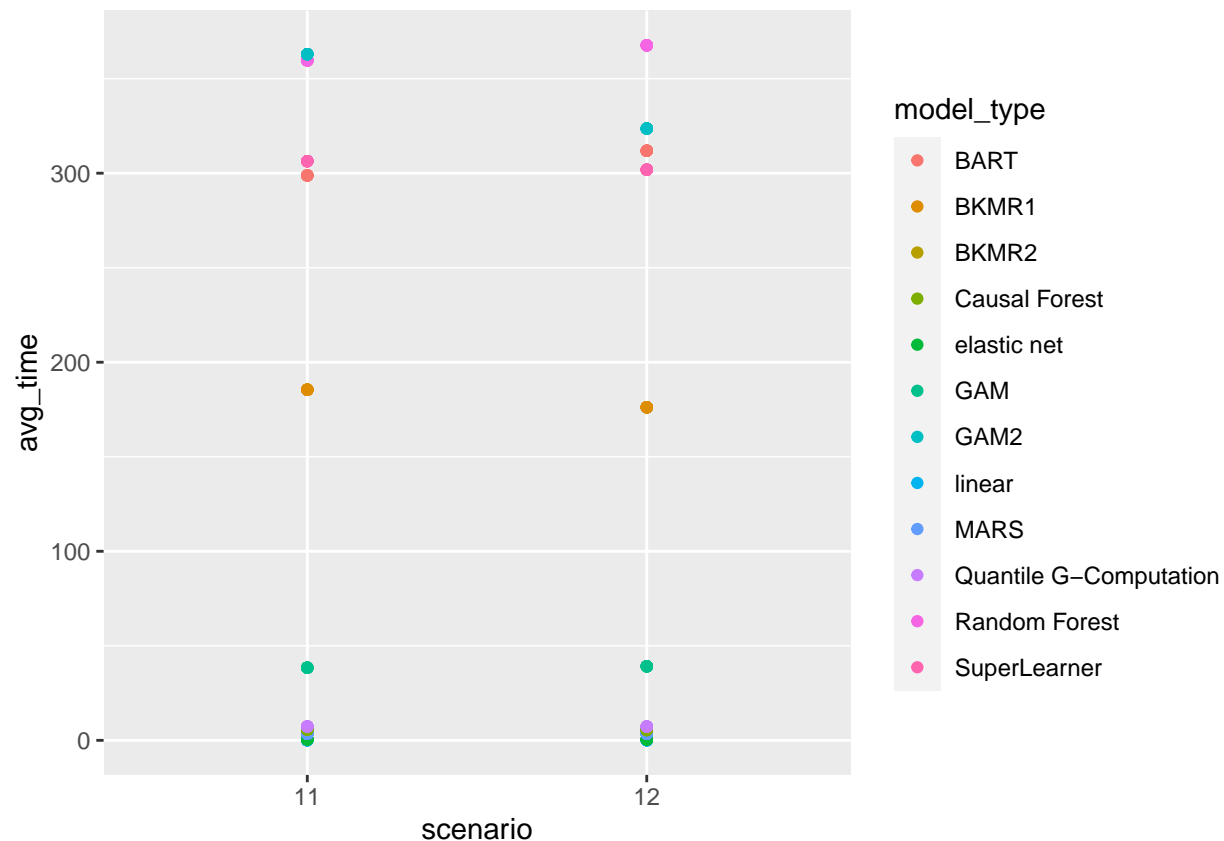


Visualizations at Scenario Level

Warning: Removed 22 rows containing missing values ('geom_point()').



Warning: Removed 22 rows containing missing values ('geom_point()').



Tables

```
## # A tibble: 4 x 4
##   scenario metric      time model_type
##   <fct>    <chr>    <dbl> <chr>
## 1 11      min_time    NA BKMR2
## 2 11      max_time    NA BKMR2
## 3 12      min_time    NA BKMR2
## 4 12      max_time    NA BKMR2
```

Appendix

```
## 'summarise()' has grouped output by 'scenario', 'metal'. You can override using
## the '.groups' argument.
```

```
## Warning: Removed 120 rows containing missing values ('geom_point()').
```


Median Relative Bias by Model and Metal, Colored by Scenario
For Exposures in Functional Form (Metals 1–5)

