

```
library(bayesNMF)

data <- readRDS("examples/3_64_1_cosmic.rds")
refit = TRUE

if (refit) {
  res <- bayesNMF(
    data$M, 1:20,
    file = "examples/plot_example",
    overwrite = TRUE
  )
} else {
  res <- readRDS("examples/plot_example.rds")
}
```

All functions return `ggplot2` objects, meaning it is simple to add additional layers to change the theme, axes labels, etc. It also means plots can be combined with packages like `patchwork`, `cowplot`, `gridExtra`, and `ggpubr`.

```
assign <- signature_assignment_inference(res)
assign$assignment
```

```
##      sig score n
## 1 SBS53      1 1
## 2 SBS49      1 2
## 3 SBS88      1 3
```

```
assign$MAP$cos_sim
```

```
##      SBS53      SBS49      SBS88
## 0.9922150 0.9993471 0.9990686
```

```
assign$credible_intervals$cos_sim
```

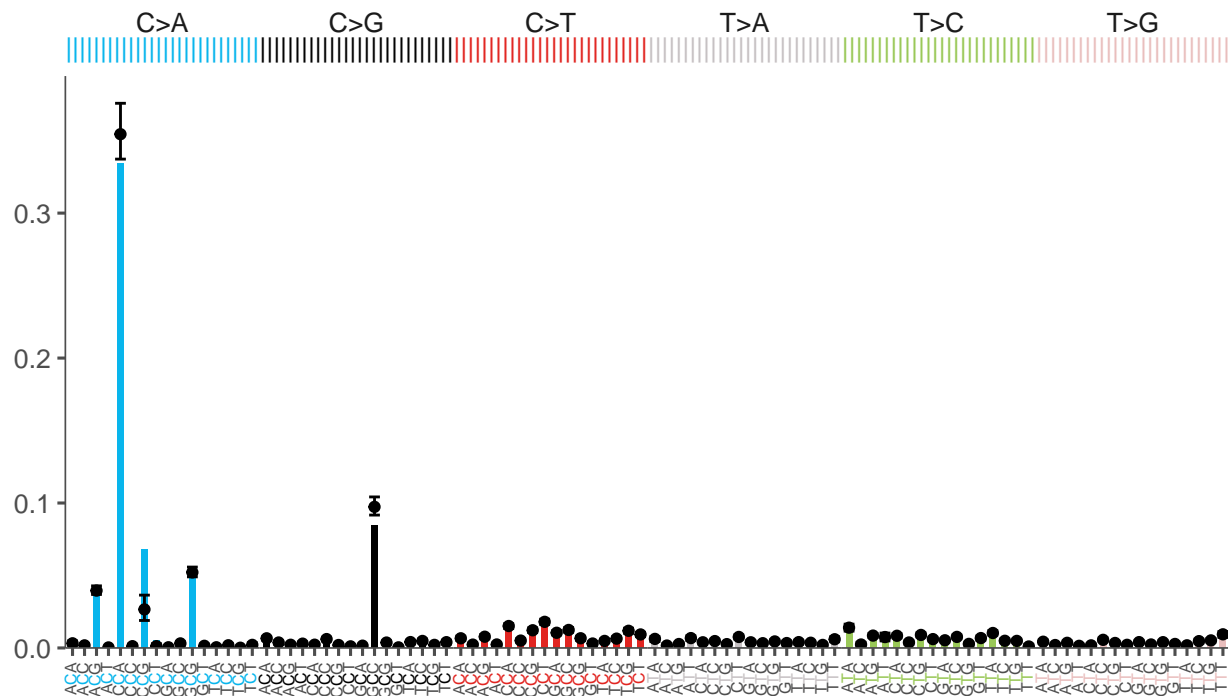
```
## [[1]]
##      SBS53      SBS49      SBS88
## 0.9895613 0.9990197 0.9987624
##
## [[2]]
##      SBS53      SBS49      SBS88
## 0.9950506 0.9996103 0.9993123
```

## Plotting Individual Signatures

Plotting an estimated signature with the best matched COSMIC signature

```
plot_sig(
  res = res, sig = 1,
  title = "Estimated signature with the best matched COSMIC signature"
)
```

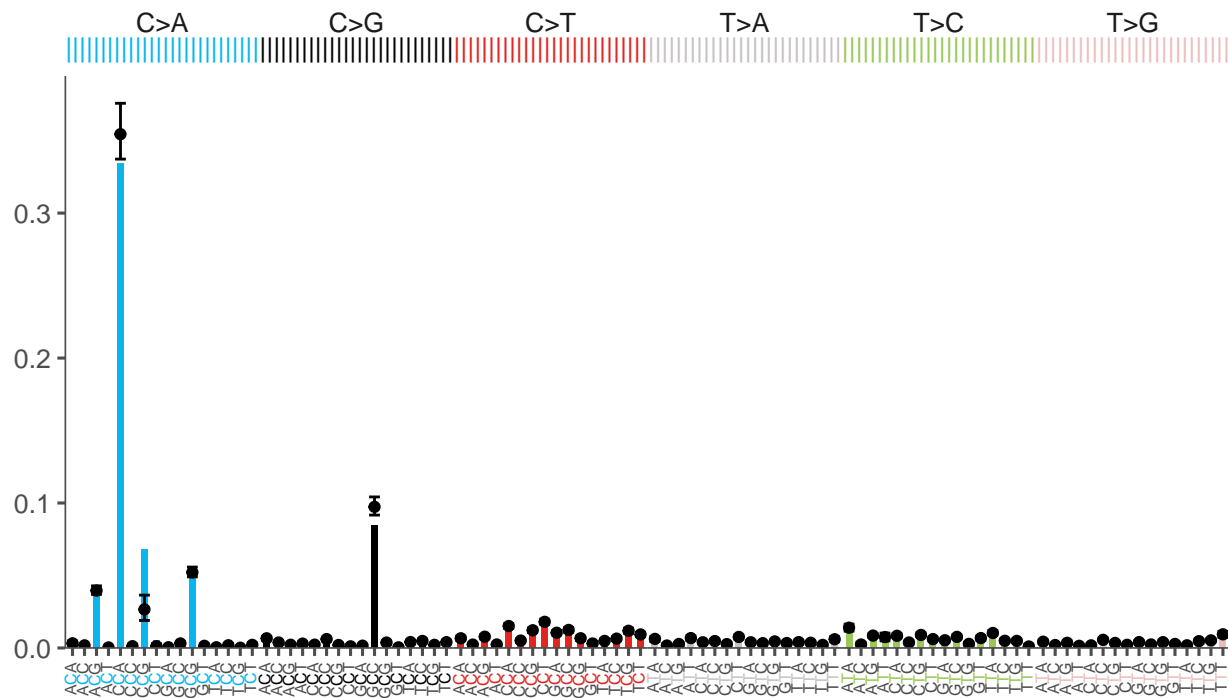
Estimated signature with the best matched COSMIC signature  
 Best match in reference is SBS53  
 Cosine similarity = 0.992



Plotting an estimated signature with the best matched signature from a custom reference

```
plot_sig(  
  res = res, sig = 1, ref_matrix = data$P,  
  title = "Estimated signature with the best matched from a custom reference"  
)
```

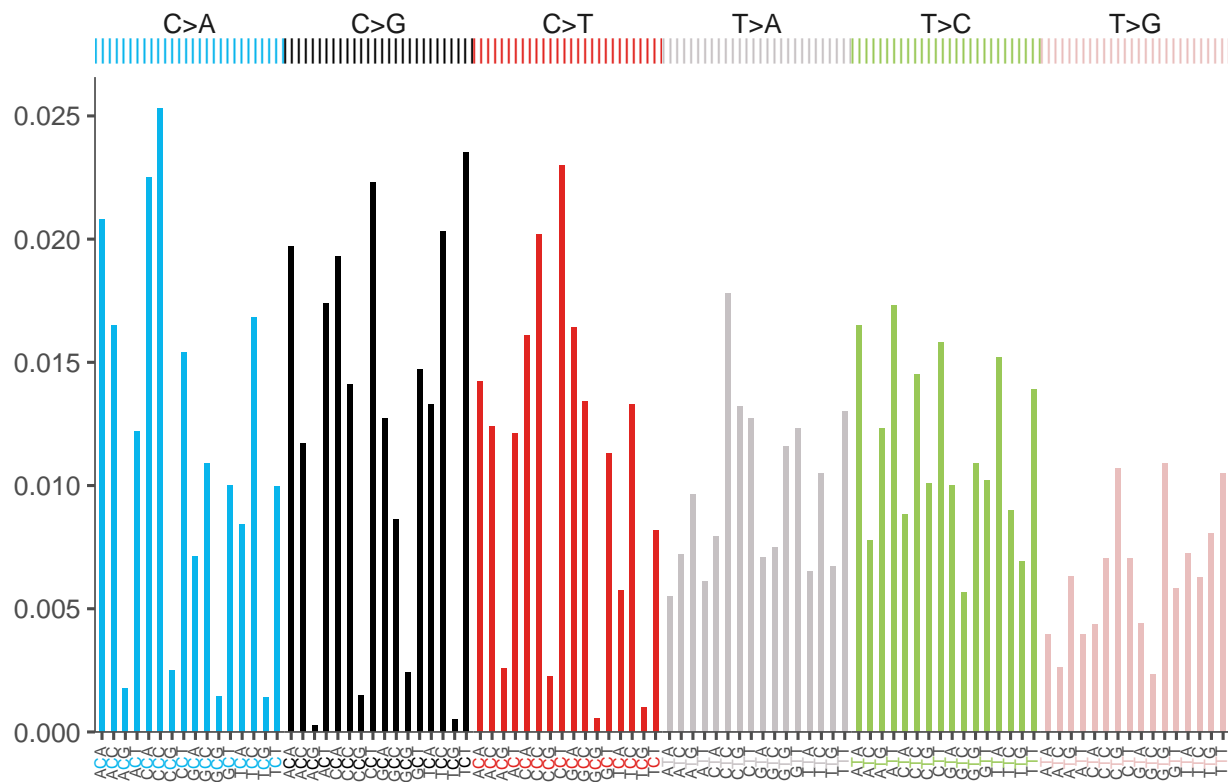
Estimated signature with the best matched from a custom reference  
 Best match in reference is SBS53  
 Cosine similarity = 0.992



Plotting a reference signature alone

```
plot_sig(ref = "SBS3", title = "Plotting a reference signature alone")
```

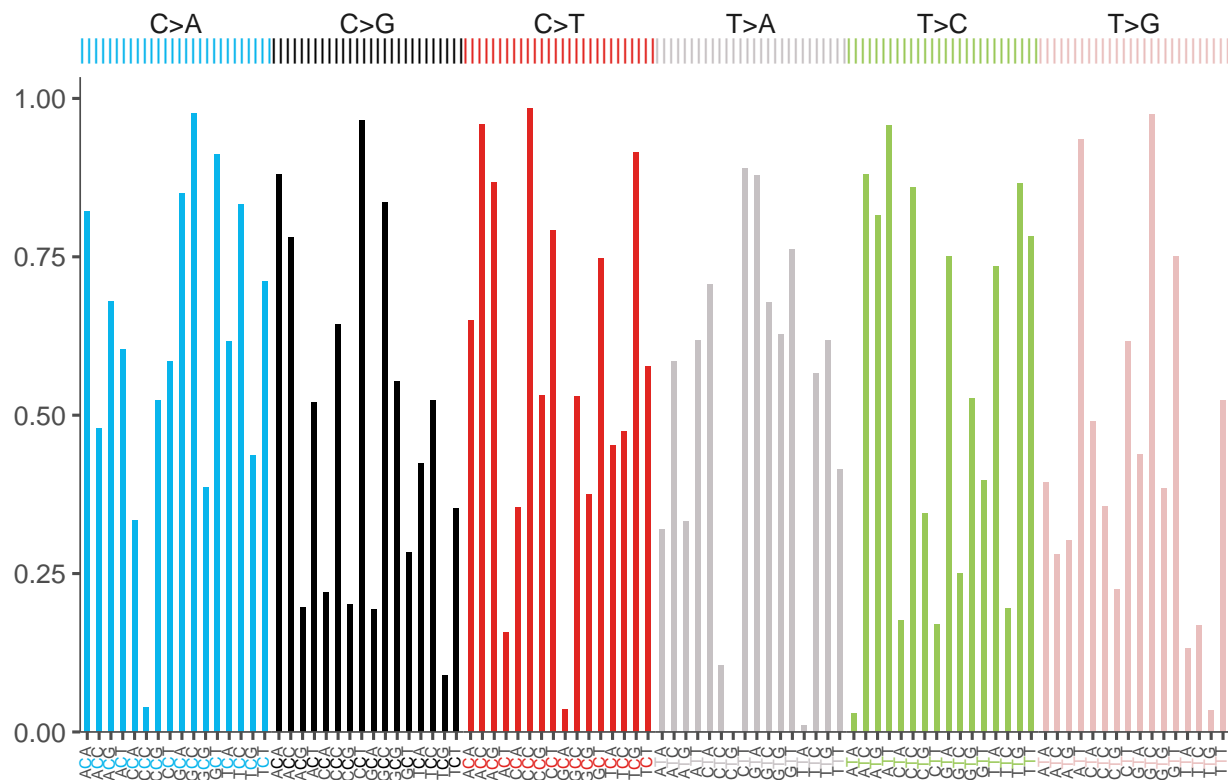
## Plotting a reference signature alone



Plotting a custom reference signature alone

```
plot_sig(ref = runif(96), title = "Plotting a custom reference signature alone")
```

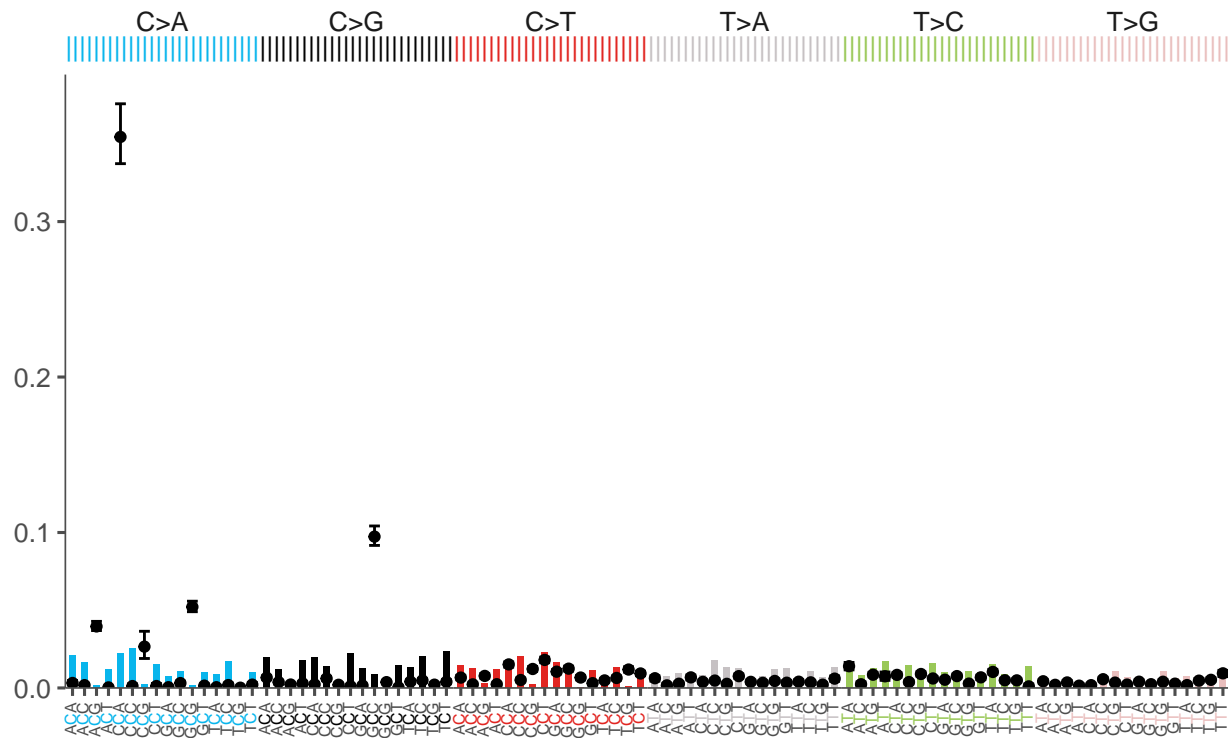
## Plotting a custom reference signature alone



Plot an estimated signature with a specific COSMIC signature

```
plot_sig(
  res = res, sig = 1, ref = "SBS3",
  title = "Estimated signature with a specific COSMIC signature"
)
```

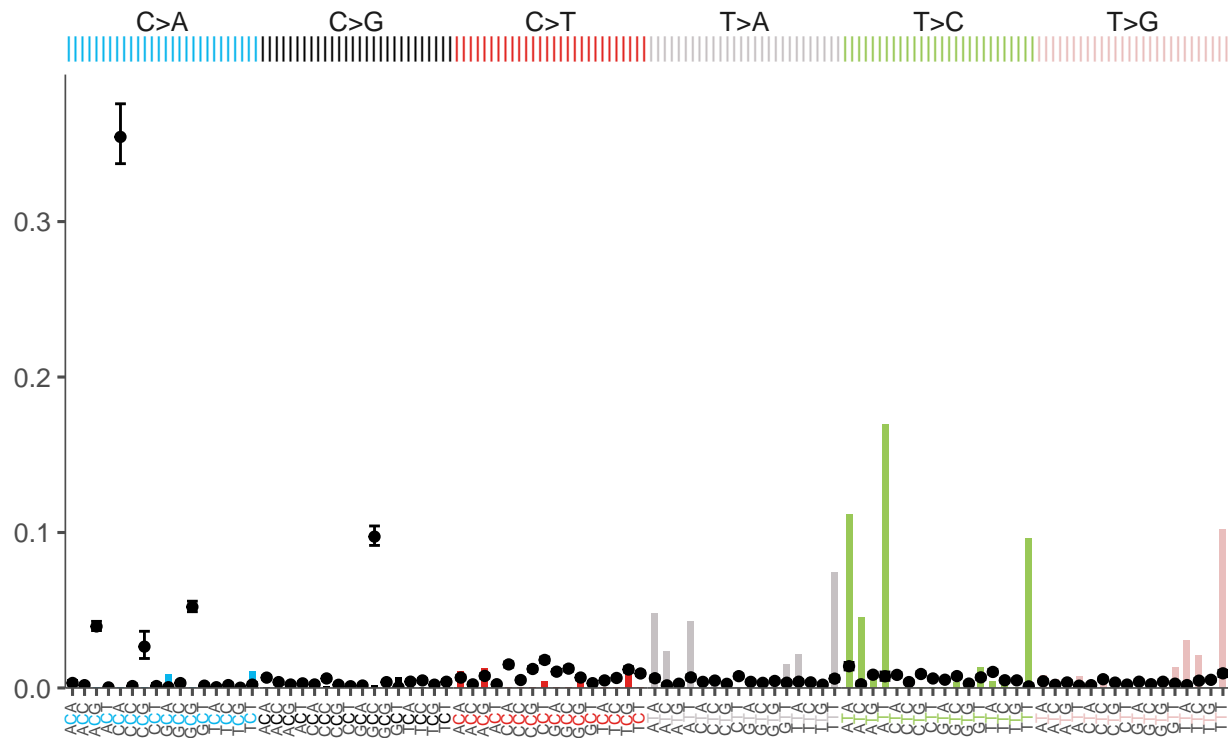
Estimated signature with a specific COSMIC signature  
Cosine similarity = 0.311



Plot an estimated signature with a specific signature from a custom reference

```
plot_sig(
  res = res, sig = 1, ref = "SBS88", ref_matrix = data$P,
  title = "Estimated signature with a specific signature from a custom reference"
)
```

Estimated signature with a specific signature from a custom reference  
Cosine similarity = 0.062

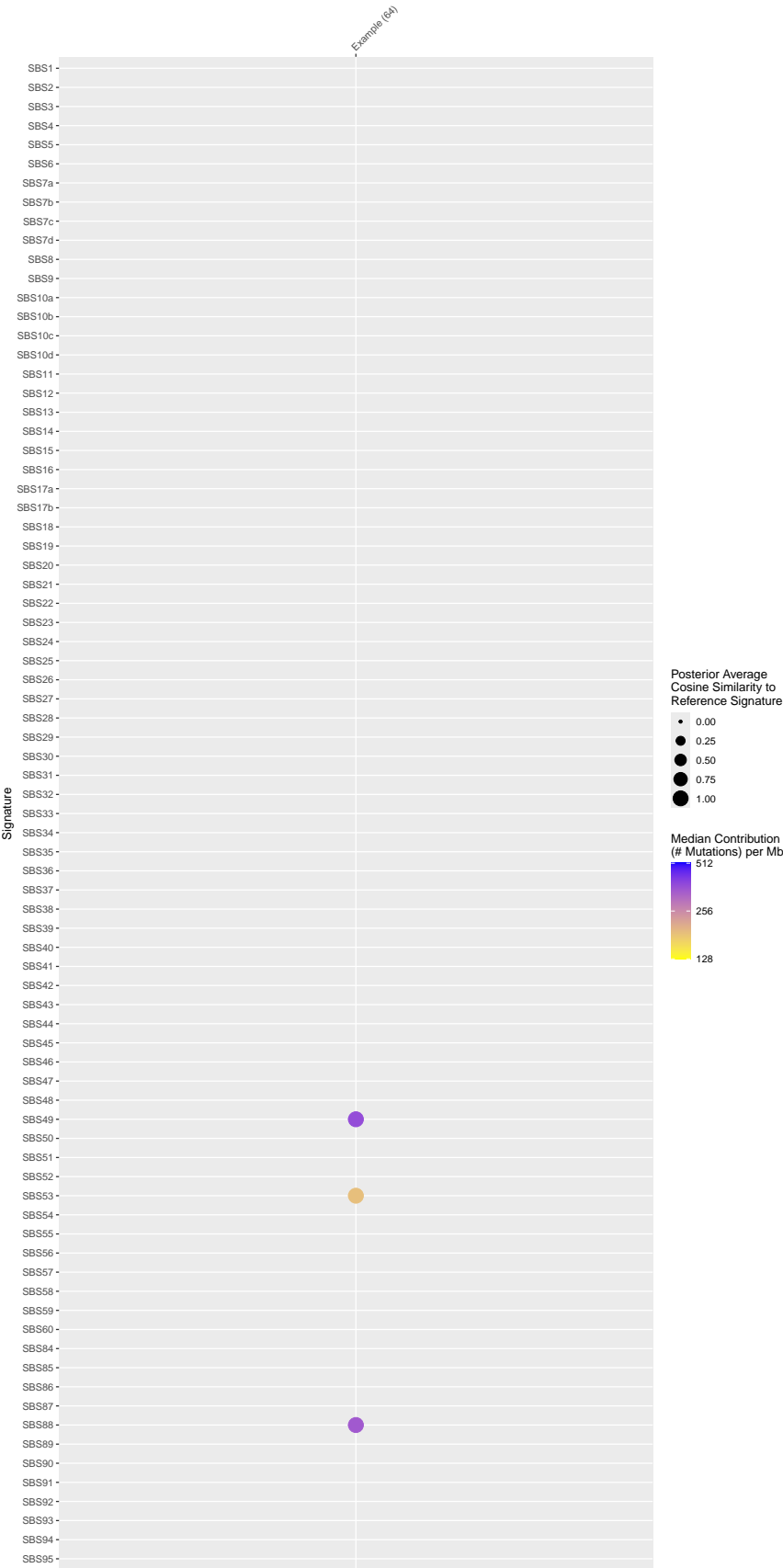


## Plotting all signatures

Results of a single run with respect to COSMIC reference

```
plot_results(
  list("Example" = res),
  title = "Results of a single run"
)
```

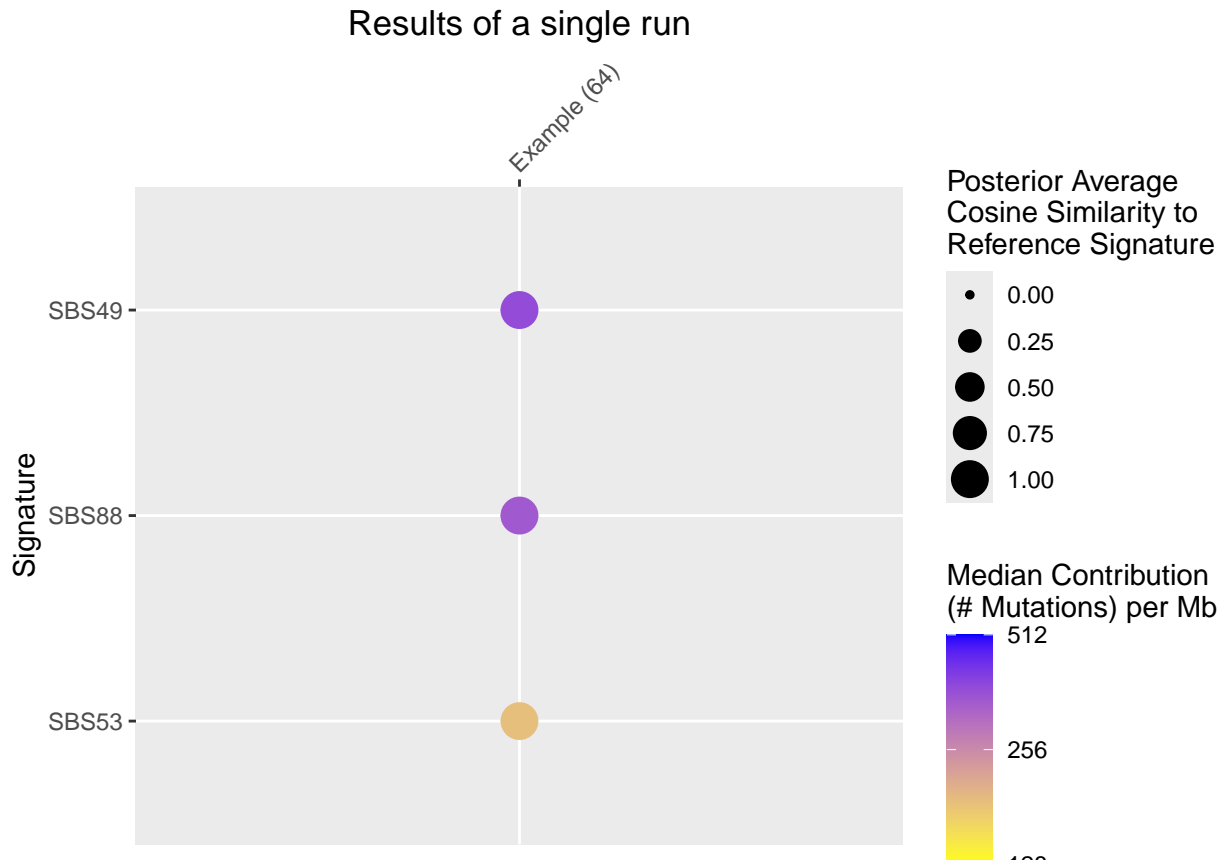
Results of a single run





Results of a single run with respect to a custom reference

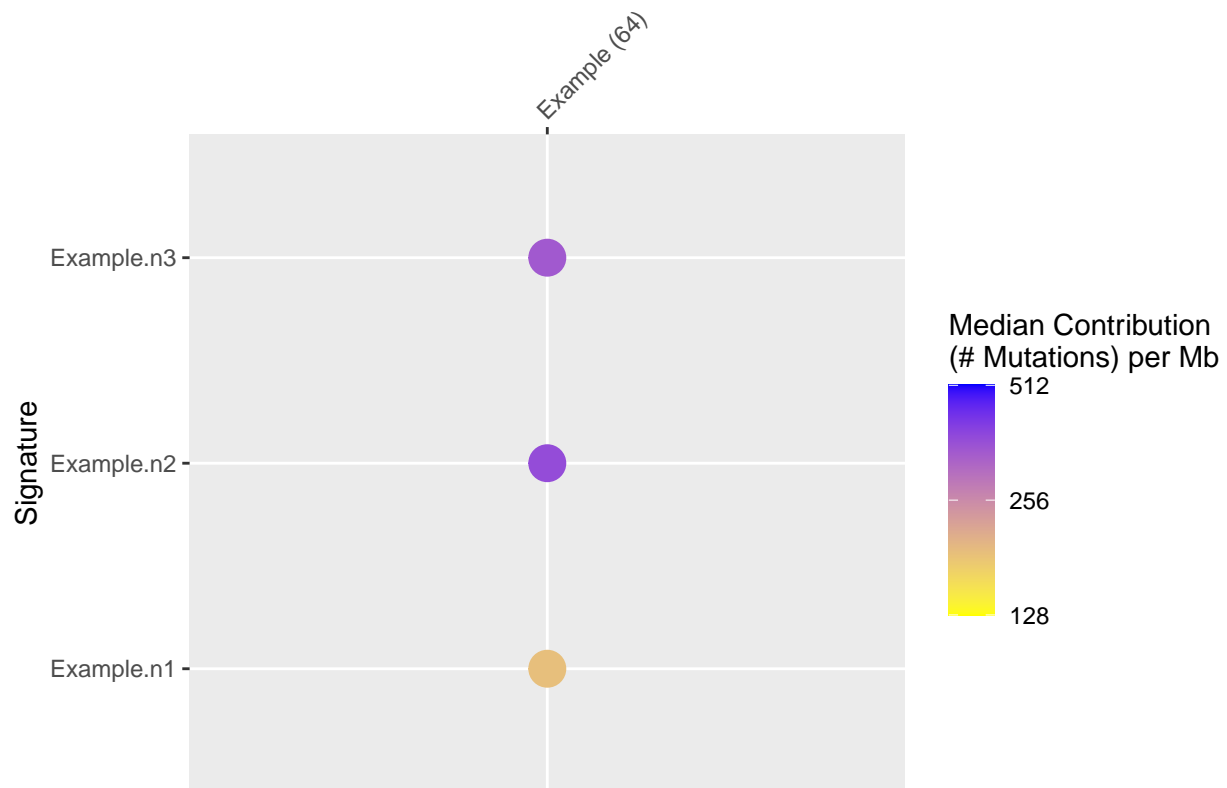
```
plot_results(  
  list("Example" = res), reference = data$P,  
  title = "Results of a single run"  
)
```



Results of a single run with no reference

```
plot_results(  
  list("Example" = res), reference = NULL,  
  title = "Results of a single run"  
)
```

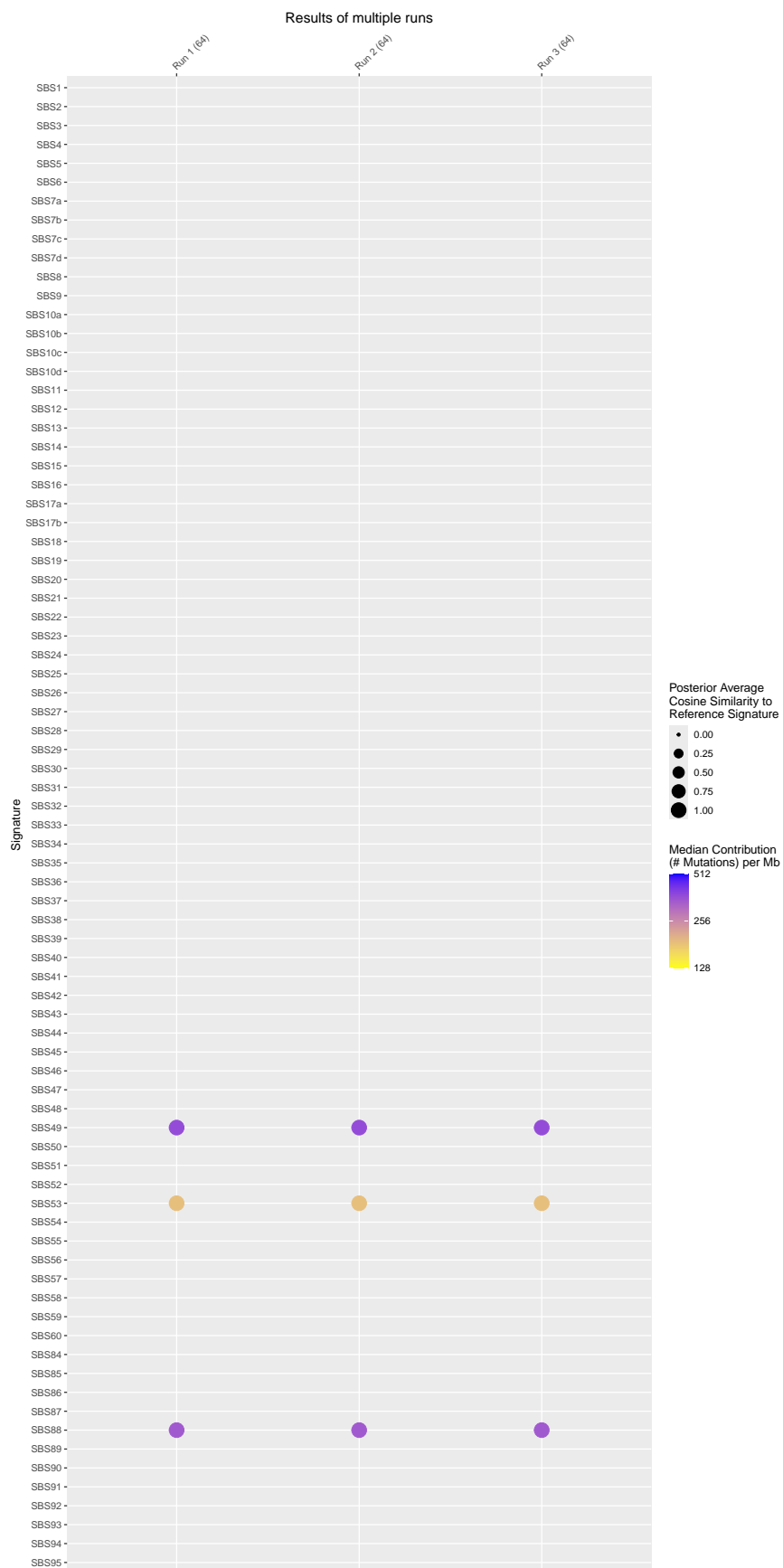
## Results of a single run



Results of multiple runs against COSMIC reference

For the sake of example, we are just using the same run three times, but in practice you could have results of bayesNMF on different cancer types as we show in the paper, across technical batches, etc.

```
plot_results(  
  list("Run 1" = res, "Run 2" = res, "Run 3" = res),  
  title = "Results of multiple runs"  
)
```

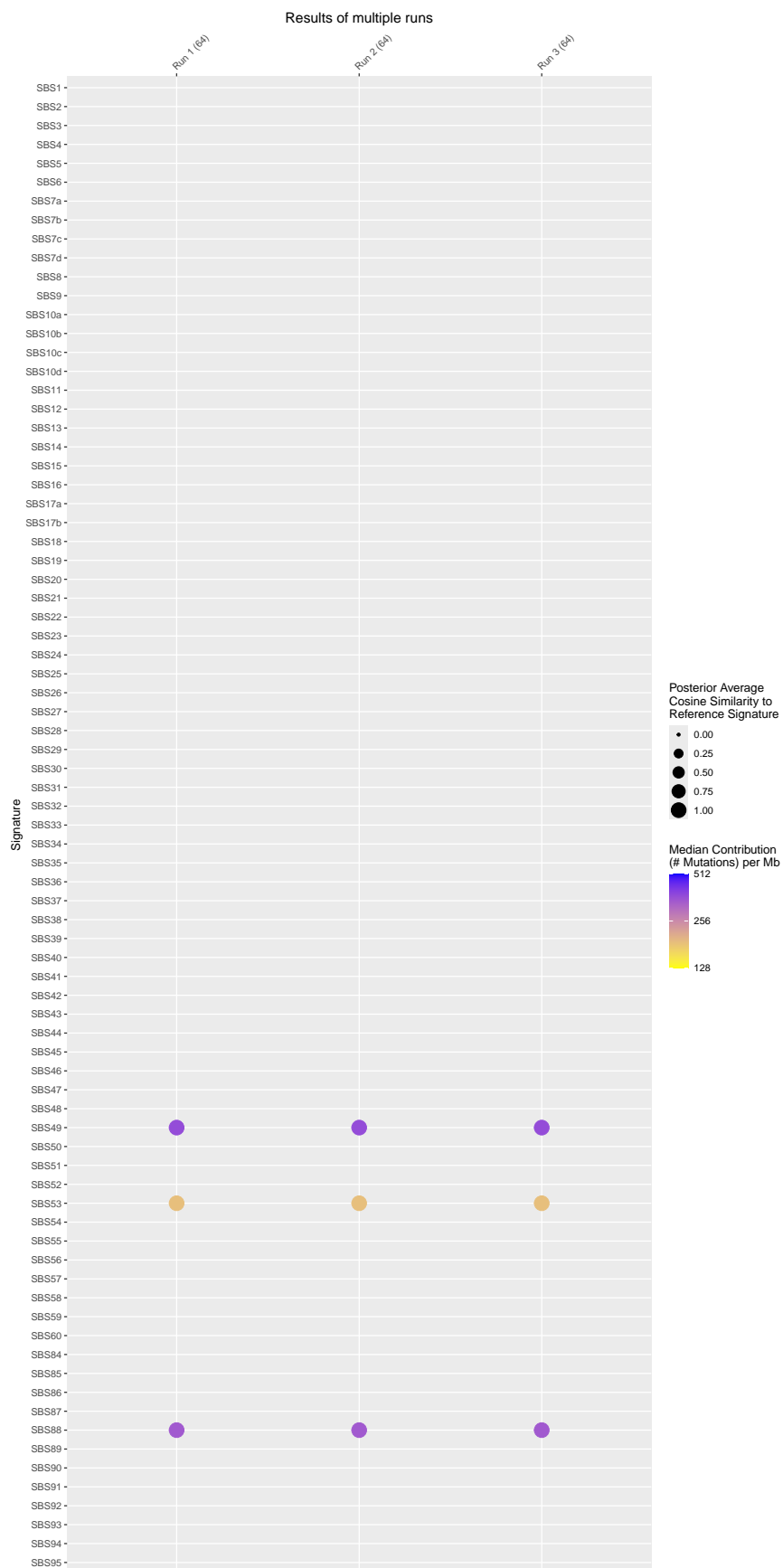


Results of multiple runs, returning summary data frame

```
out <- plot_results(  
  list("Run 1" = res, "Run 2" = res, "Run 3" = res),  
  title = "Results of multiple runs",  
  return_df = TRUE  
)  
out$df
```

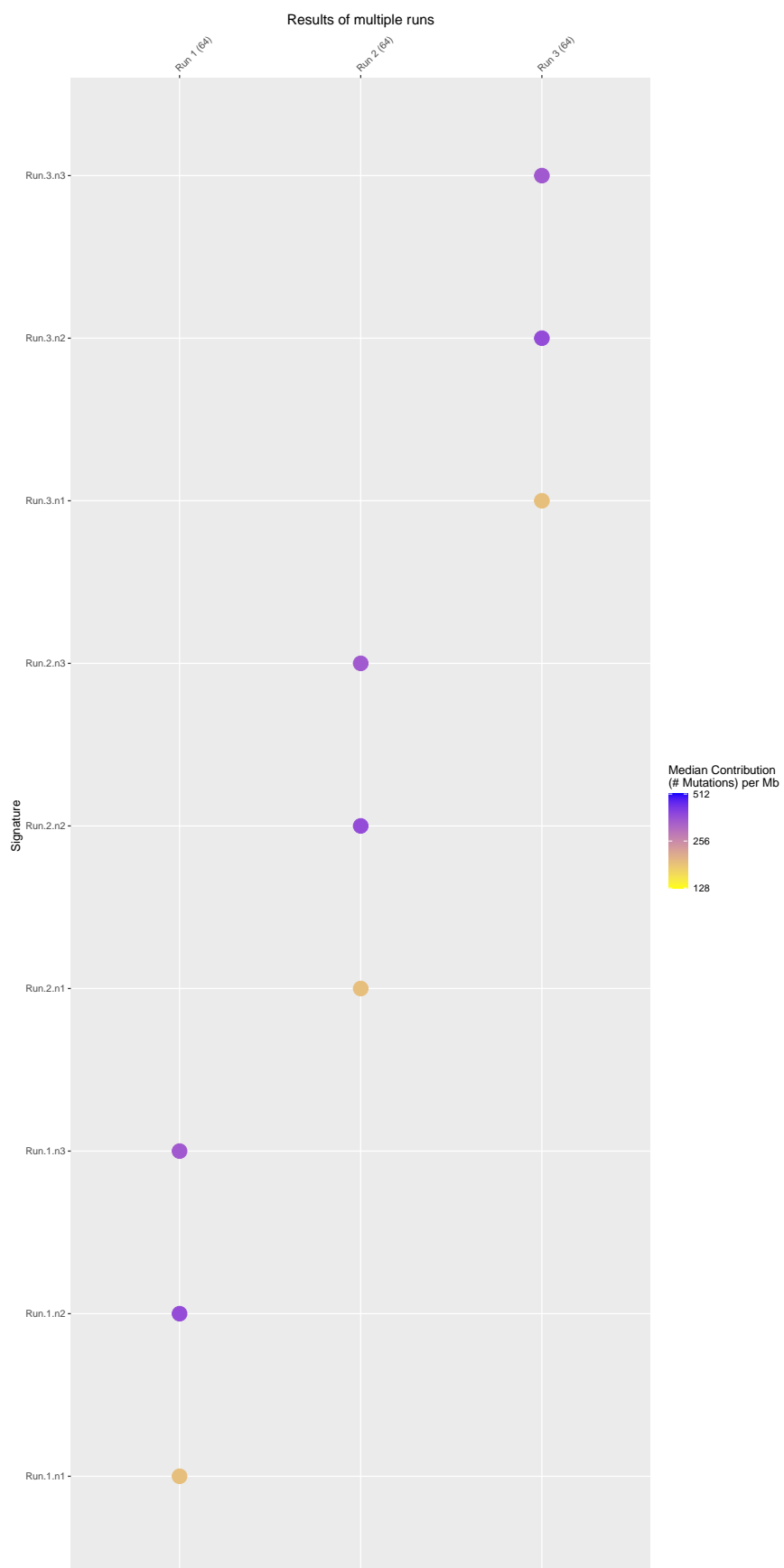
##	Name	Signature	G	Med_Contribution	Cosine_Similarity
## 1	Run 1 (64)	SBS49	64	369.6137	0.9993471
## 2	Run 1 (64)	SBS53	64	187.2693	0.9922150
## 3	Run 1 (64)	SBS88	64	343.7005	0.9990686
## 4	Run 2 (64)	SBS49	64	369.6137	0.9993471
## 5	Run 2 (64)	SBS53	64	187.2693	0.9922150
## 6	Run 2 (64)	SBS88	64	343.7005	0.9990686
## 7	Run 3 (64)	SBS49	64	369.6137	0.9993471
## 8	Run 3 (64)	SBS53	64	187.2693	0.9922150
## 9	Run 3 (64)	SBS88	64	343.7005	0.9990686

```
out$plot
```



Results of multiple runs against no reference

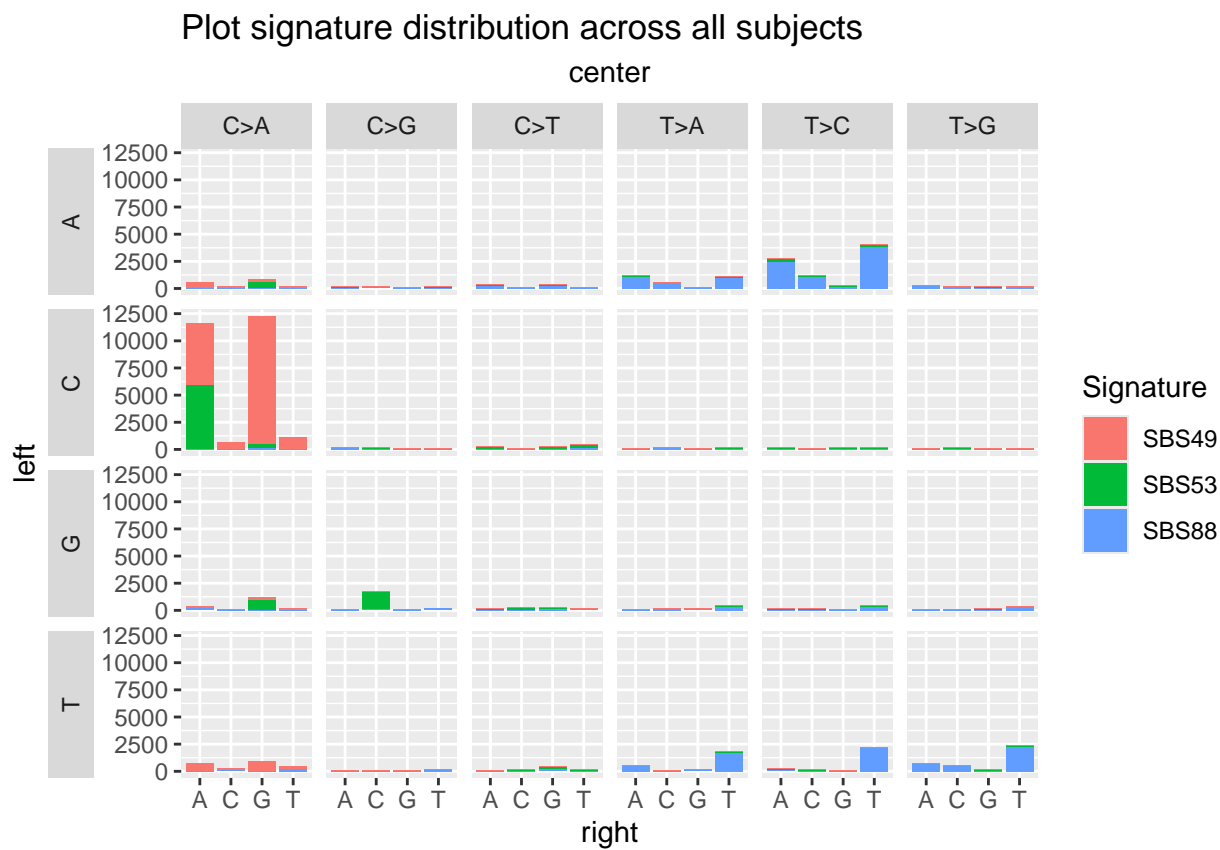
```
class(res) = 'bayesNMF'
plot_results(
  list("Run 1" = res, "Run 2" = res, "Run 3" = res),
  reference = NULL,
  title = "Results of multiple runs"
)
```



## Plotting signature distribution on the mutation-type level

Plot signature distribution across all subjects.

```
plot_signature_dist(
  res,
  title = "Plot signature distribution across all subjects"
)
```

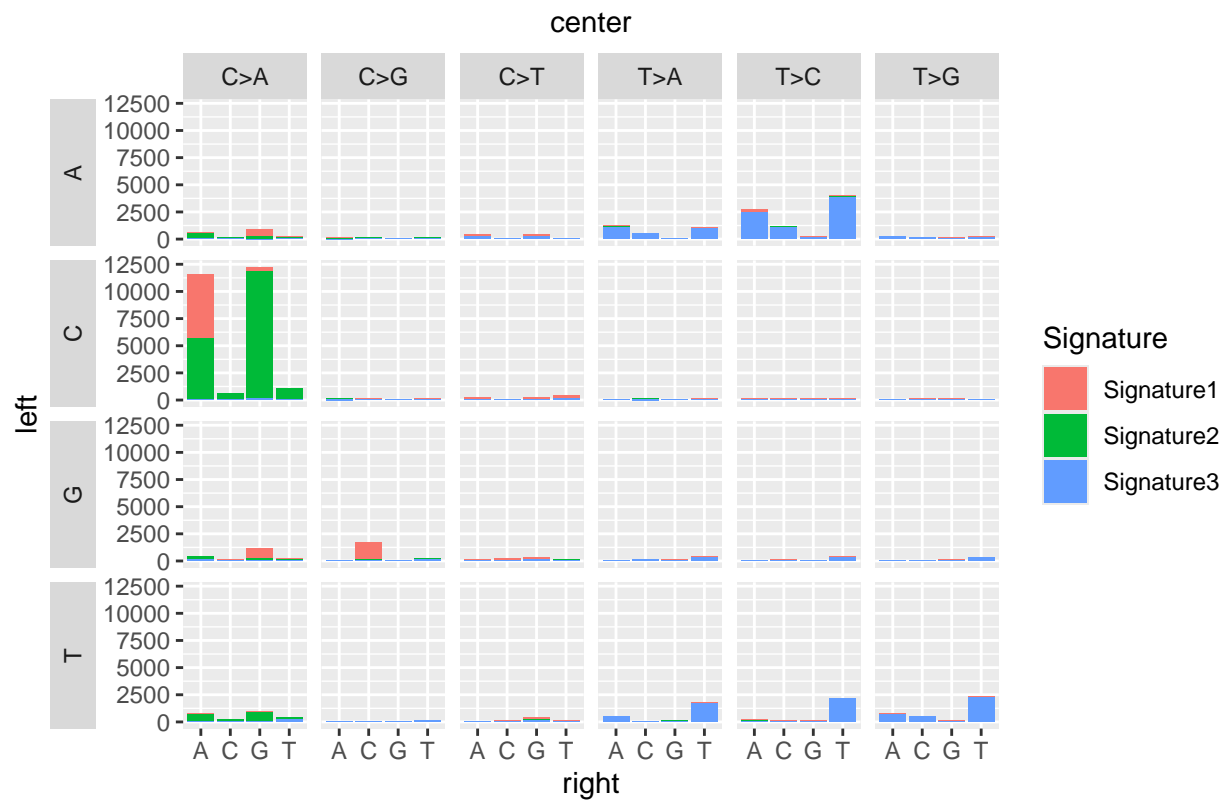


Plot signature distribution across all subjects without a reference.

```
plot_signature_dist(
  res,
  title = "Plot signature distribution across all subjects",
  reference = NULL
)
```

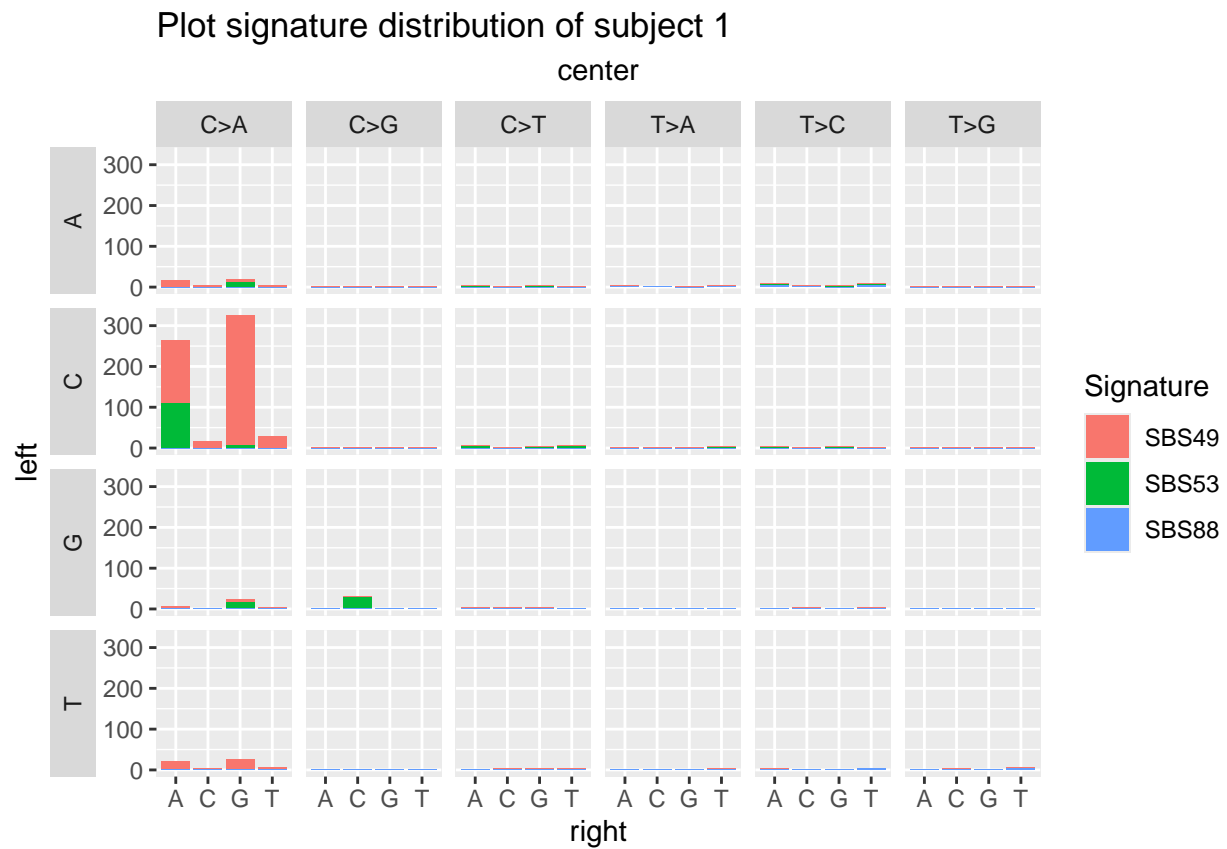


Plot signature distribution across all subjects



Plot signature distribution of a particular subject

```
plot_signature_dist(
  res,
  subject = 1,
  title = "Plot signature distribution of subject 1"
)
```



Plot signature distribution of a subset of subjects

```
plot_signature_dist(
  res, subject = c(1,4,10),
  title = "Plot signature distribution of subjects 1, 4, and 10"
)
```

