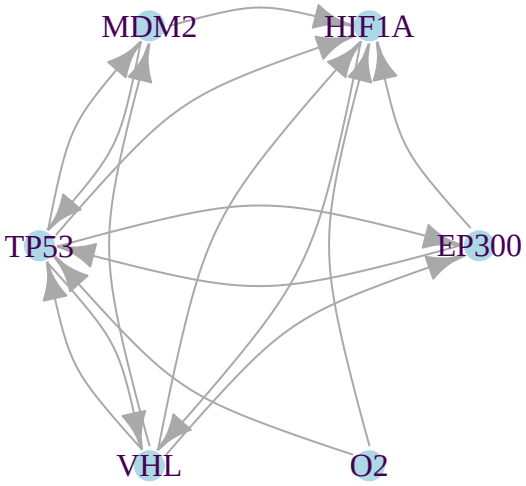
BoolNet

Boolean network from HIFaxis

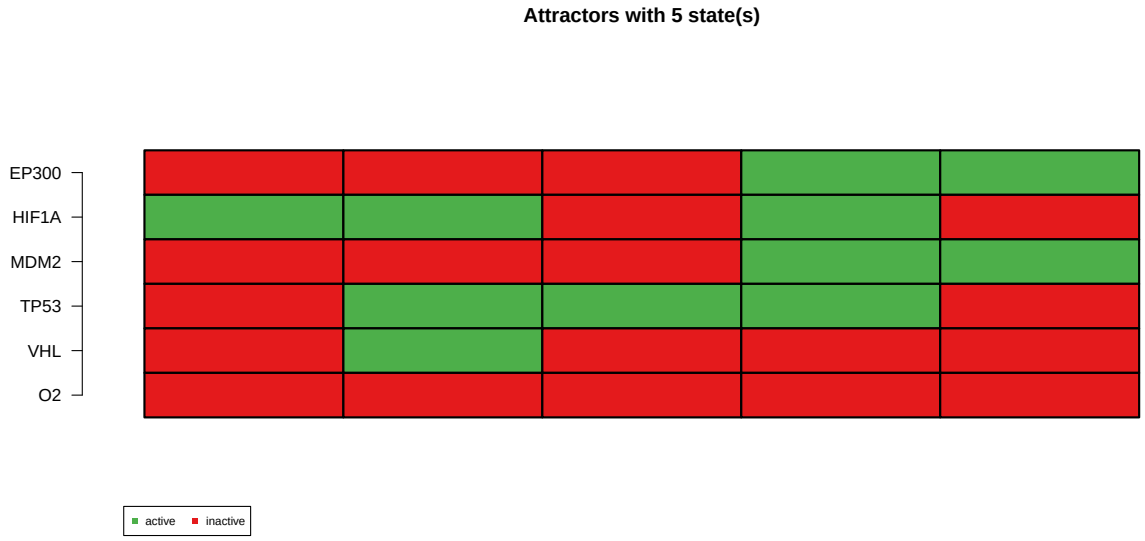
```
net <- loadNetwork("../data/reduced_HIFaxis.bn")
net
```

```
## Boolean network with 6 genes
##
## Involved genes:
## EP300 HIF1A MDM2 TP53 VHL O2
##
## Transition functions:
## EP300 = (!VHL & TP53) | (VHL & !TP53)
## HIF1A = !VHL & ((!O2 & EP300 & !TP53) | (!O2 & !MDM2))
## MDM2 = TP53 & !VHL
## TP53 = !MDM2 | (!O2 & EP300 & VHL)
## VHL = HIF1A & !TP53
## O2 = 0
##
## Knocked-out and over-expressed genes:
## O2 = 0
```

```
HIFaxis.p <- plotNetworkWiring(net, plotIt=F)
plot(HIFaxis.p, vertex.label.color="#440154ff",  vertex.color="lightblue", vertex.frame.color="white", l
     main="HIF axis Network\n Theoretical")
```

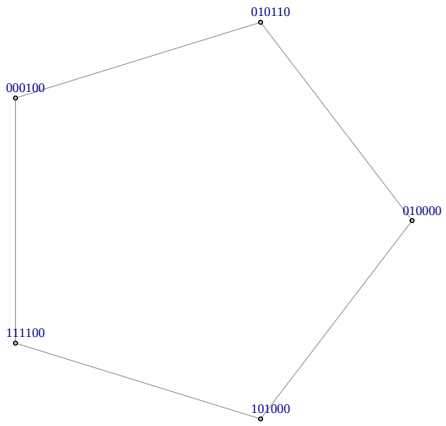



```
attr.syn <- getAttractors(net, type = "synchronous")

# calculate number of different attractor lengths,
# and plot attractors side by side in "table" mode
par(mfrow=c(1, length(table(sapply(attr.syn$attractors,
                           function(attr.syn)
                           {
                             length(attr.syn$involvedStates)
                           })))))

plotAttractors(attr.syn)
```

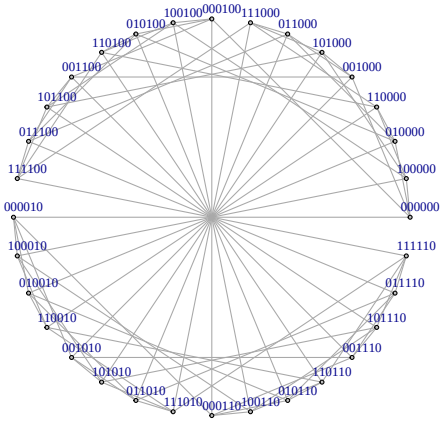



```
## $`5`
##       Attr1.1 Attr1.2 Attr1.3 Attr1.4 Attr1.5
## EP300       0       0       0       1       1
## HIF1A       1       1       0       1       0
## MDM2        0       0       0       1       1
## TP53        0       1       1       1       0
## VHL         0       1       0       0       0
## O2          0       0       0       0       0
```

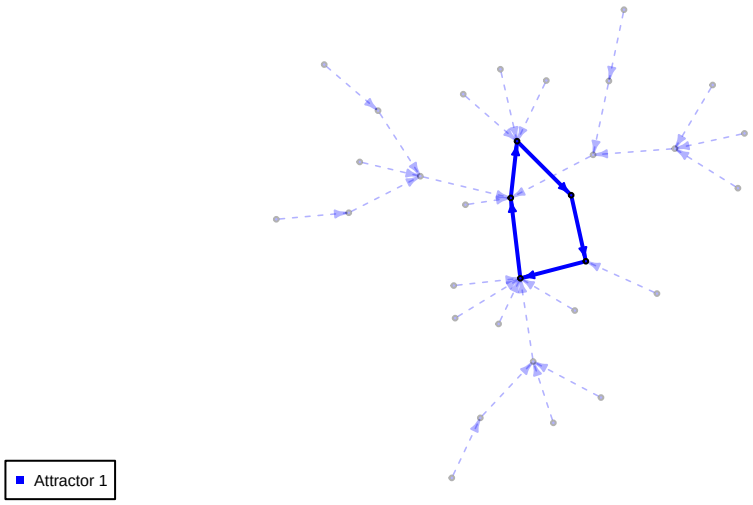
```
# plot attractors in "graph" mode
par(mfrow=c(1, length(attr.syn$attractors)))
plotAttractors(attr.syn, mode="graph")
```



```
# identify asynchronous attractors
attr.asyn <- getAttractors(net, type="asynchronous")

# plot attractors in "graph" mode
par(mfrow=c(1, length(attr.asyn$attractors)))
plotAttractors(attr.asyn, mode="graph")
```




```
plotStateGraph(attr.syn)
```




```
sim <- markovSimulation(net,
                        numIterations=1024,
                        returnTable=FALSE)
sim
```

```
## States reached at the end of the simulation:
##   EP300 HIF1A MDM2 TP53 VHL O2 Probability
## 1     0     1    0    0   0  0     0.34375
## 2     1     0    1    0   0  0     0.34375
## 3     0     0    0    1   0  0     0.12500
## 4     1     1    1    1   0  0     0.06250
## 5     0     1    0    1   1  0     0.12500
```