Appendix S3 - Code for Figure 4

From zero to infinity: minimum to maximum diversity of the planet by spatio-parametric Rao's quadratic entropy

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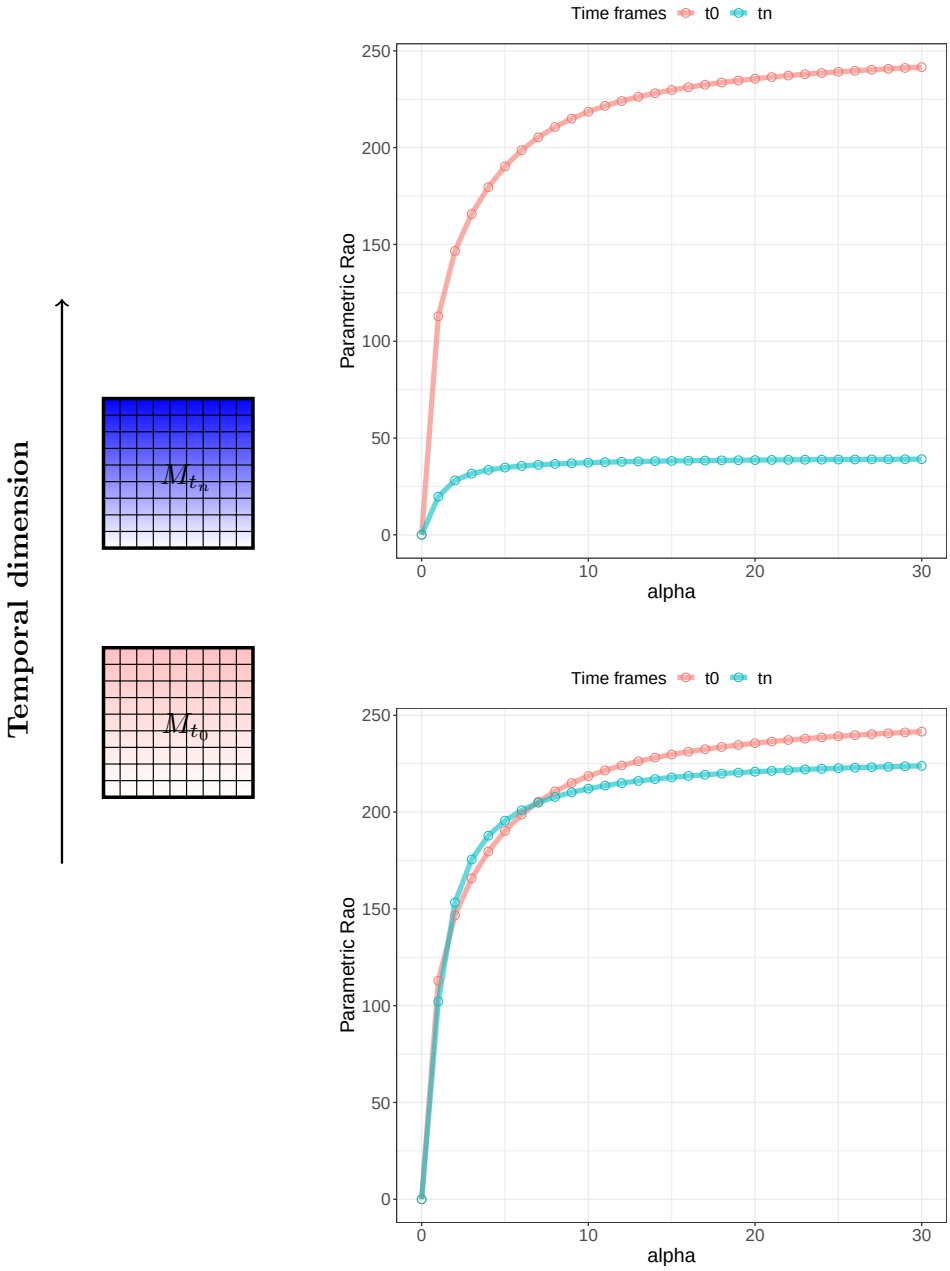
```
library(ggplot2)
library(rasterdiv)
x1 <- matrix(c(255, 128, 1, 255, 128, 1, 255, 128, 1),ncol=3)
x2 <- matrix(c(10, 10, 10, 10, 50, 50, 50, 50, 50),ncol=3)
p1 <- paRao(x1,window=3,np=1,na.tolerance=0.1,dist_m="
    euclidean",alpha=2)
p2 <- paRao(x2,window=3,np=1,na.tolerance=0.1,dist_m="
    euclidean",alpha=2)
alphas <- seq(0,30,1)
out1 <- paRao(x1,window=3,np=1,na.tolerance=0.1,dist_m="
    euclidean",alpha=alphas)
out2 <- paRao(x2,window=3,np=1,na.tolerance=0.1,dist_m="
    euclidean",alpha=alphas)
r1 <- sapply(out1, function(y) {y[2,2]})
r2 <- sapply(out2, function(y) {y[2,2]})
ggp <- rbind.data.frame(
cbind.data.frame(raop=r1,alphas,"Time frames"=rep("t0",length
    (alphas))),
cbind.data.frame(raop=r2,alphas,"Time frames"=rep("tn",length
    (alphas))))

pdf("landscapes.pdf")
ggplot(ggp, aes(x=alphas, y=raop,col=`Time frames`)) +
     geom_line(size=2,alpha=0.6) +
     geom_point(cex=3,pch=21) +
     theme_bw() +
     xlab("alpha") +
     ylab("Parametric Rao") +
     theme(axis.text.x = element_text(size=14), axis.text.y =
    element_text(size=14)) +
     theme(axis.title.x = element_text(size=16), axis.title.y
     = element_text(size=16))+
     theme(legend.position="top",legend.title=element_text(
    size=14),legend.text=element_text(size=14))
dev.off()



########################################

#### Second graph

library(raster)
library(rasterdiv)
library(ggplot2)

x1 <- matrix(c(255, 128, 1, 255, 128, 1, 255, 128, 1),ncol=3)
x2 <- matrix(c(10, 10, 10, 10, 50, 50, 50, 50, 50),ncol=3)
```

```
x3 <- matrix(c(rep(20,3),rep(250,6)),ncol=3)
alphas <- seq(0,30,1)
out1 <- paRao(x1,window=3,np=1,na.tolerance=0.1,dist_m="
   euclidean",alpha=alphas)
out2 <- paRao(x2,window=3,np=1,na.tolerance=0.1,dist_m="
   euclidean",alpha=alphas)
out3 <- paRao(x3,window=3,np=1,na.tolerance=0.1,dist_m="
   euclidean",alpha=alphas)
r1 <- sapply(out1, function(y) {y[2,2]})
r2 <- sapply(out2, function(y) {y[2,2]})
r3 <- sapply(out3, function(y) {y[2,2]})
ggp <- rbind.data.frame(
cbind.data.frame(raop=r1,alphas,"Time frames"=rep("t0",length
   (alphas))),
cbind.data.frame(raop=r3,alphas,"Time frames"=rep("tn",length
   (alphas))))

pdf("landscapes2.pdf")
ggplot(ggp, aes(x=alphas, y=raop,col=`Time frames`)) +
    geom_line(size=2,alpha=0.6) +
    geom_point(cex=3,pch=21) +
    theme_bw() +
    xlab("alpha") +
    ylab("Parametric Rao") +
    theme(axis.text.x = element_text(size=14), axis.text.y =
   element_text(size=14)) +
    theme(axis.title.x = element_text(size=16), axis.title.y
    = element_text(size=16))+
    theme(legend.position="top",legend.title=element_text(
   size=14),legend.text=element_text(size=14))
    ggsave("~/paRao_comparison1.png",dpi=600,scale=0.5,width
   =10,height=10)
dev.off()
```


Temporal dimension
M_{t_n}
M_{t_0}
Time frames t0 tn
Parametric Rao
alpha
0
50
100
150
200
250
0
10
20
30
Time frames t0 tn
Parametric Rao
alpha
0
50
100
150
200
250
0
10
20
30

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