

ICA demo solutions

Source

```
library(ggplot2)
library(gridExtra)
library(fastICA)
```

1. Why is the assumption of Non-Gaussian necessary in ICA?

Answer

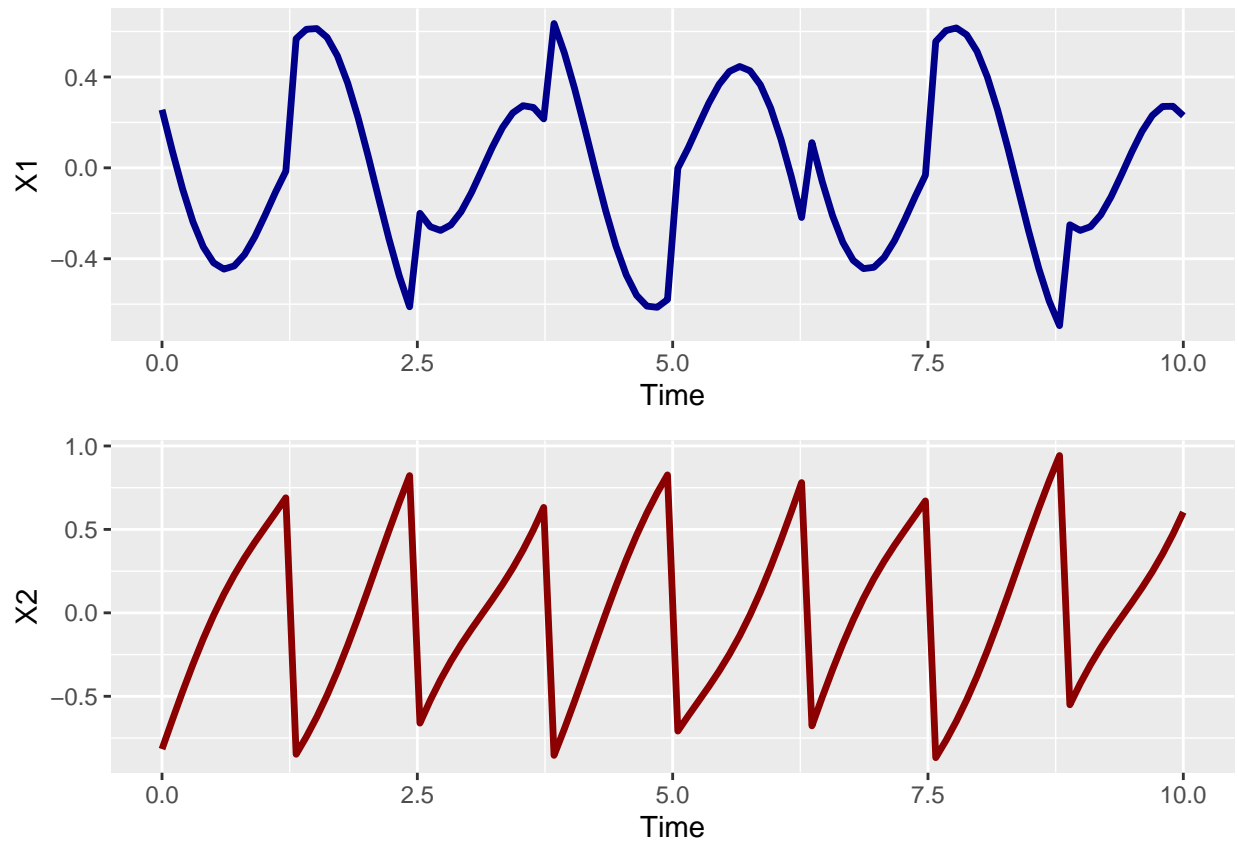
If we choose a Gaussian distribution for ICA, which is a rotational symmetry distribution, we may not find a unique solution for the decomposition of ICA.

2. Use FastICA to recover the two following mixture signals.

Question 2

```
X <- read.csv("ICA_Q2.csv")
```

```
plot_mix1 = ggplot(X,aes(x=Time,y=X1)) + geom_line(size=1.2, colour="darkblue")
plot_mix2 = ggplot(X,aes(x=Time,y=X2)) + geom_line(size=1.2, colour="darkred")
grid.arrange(plot_mix1, plot_mix2, ncol=1, nrow=2)
```



Answer

```
# fastICA
X_ICA = X[, 2:3]
time <- X[, 1]
ICA_result = fastICA(X_ICA, n.comp = 2)
S.extracted = data.frame(Time=time,
                          S1.extracted=ICA_result$S[, 1],
                          S2.extracted=ICA_result$S[, 2])
plot_ica1 = ggplot(S.extracted, aes(x=Time, y=S1.extracted)) +
  geom_line(size=1.2, colour="darkblue")
plot_ica2 = ggplot(S.extracted, aes(x=Time, y=S2.extracted)) +
  geom_line(size=1.2, colour="darkred")
grid.arrange(plot_ica1, plot_ica2, ncol=1, nrow=2)
```

