freqd

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Overview

In this project, we will load an arbitrary signal file in csv format, analyze the wave and then re synthesize the wave and compare.

Simplify the synthesis by using only a fraction of the frequency components. It is obvious that the fidelity of reconstruction is directly related to the fraction of components retained.

Triangle

```
../../bin/triangle triangle.csv 4
../../bin/freqd triangle.csv 0.08
```

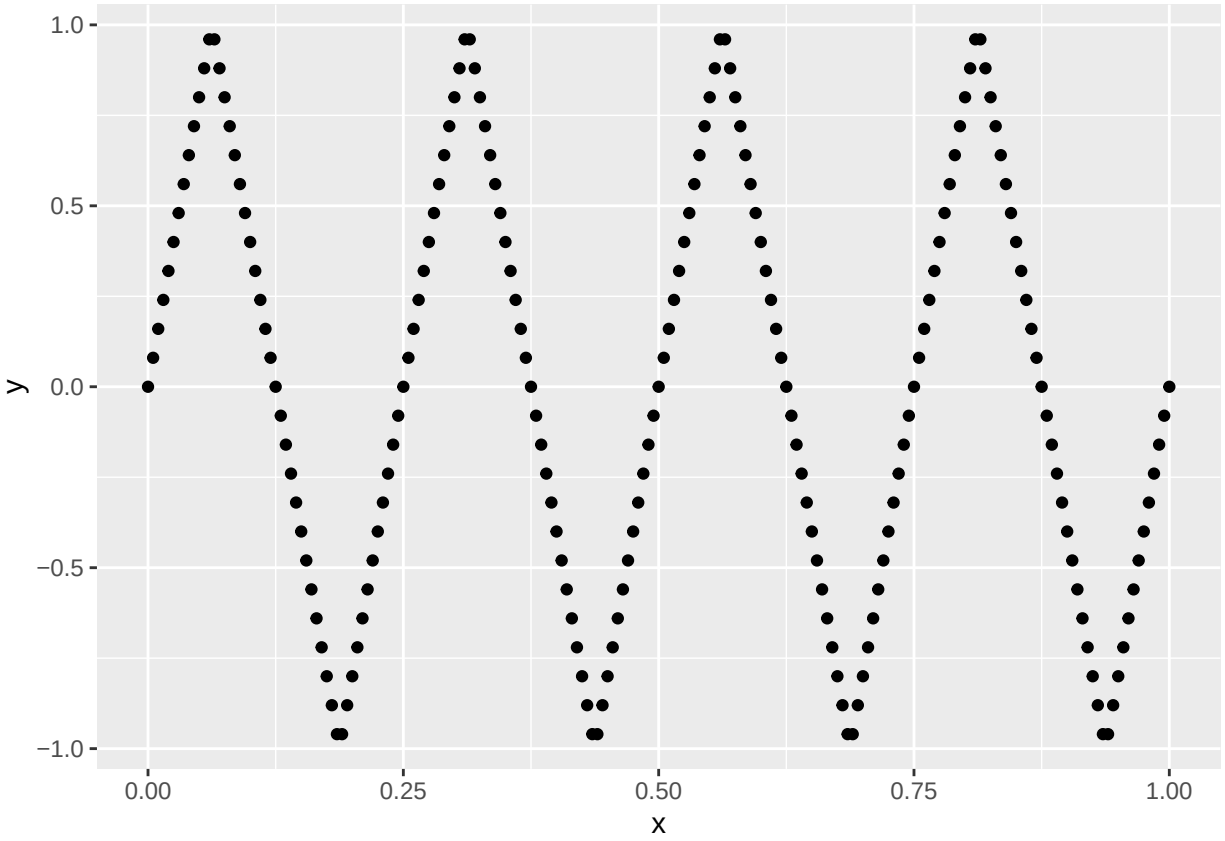
```
## triangle.csv
```

Original Signal

```
library(ggplot2)
library(dplyr)
```

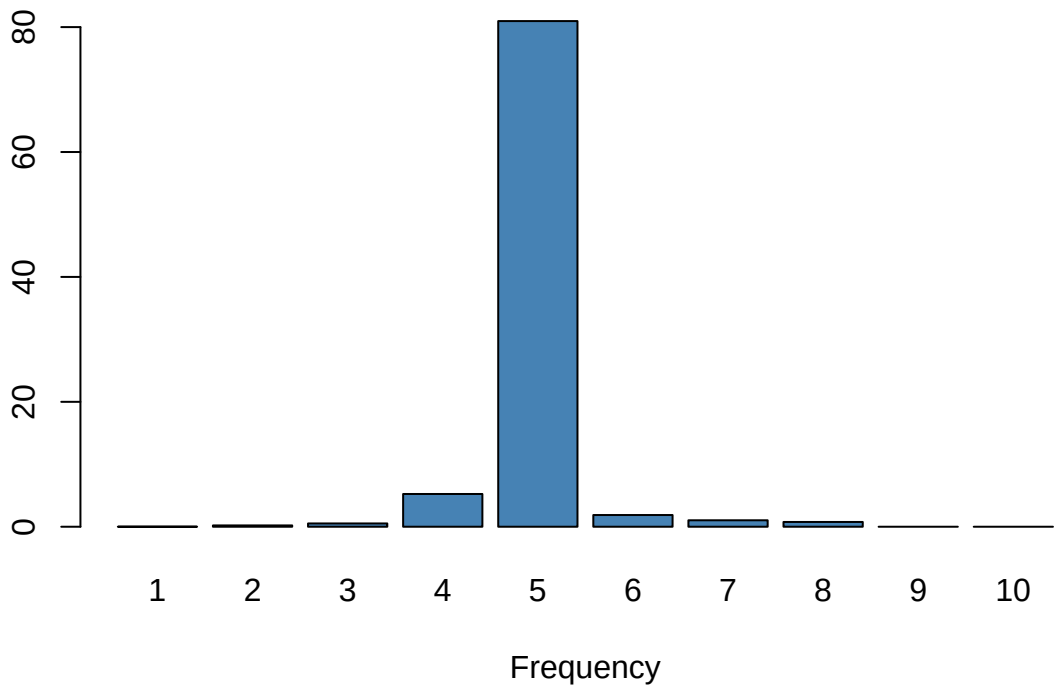
```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
signal<-read.csv("triangle.csv",header=FALSE,sep=",")
names(signal)<-c("x","y")
ggplot(signal,aes(x=x,y=y))+geom_point()
```


1.0
0.5
0.0
−0.5
−1.0
y
0.00
0.25
0.50
0.75
1.00
x

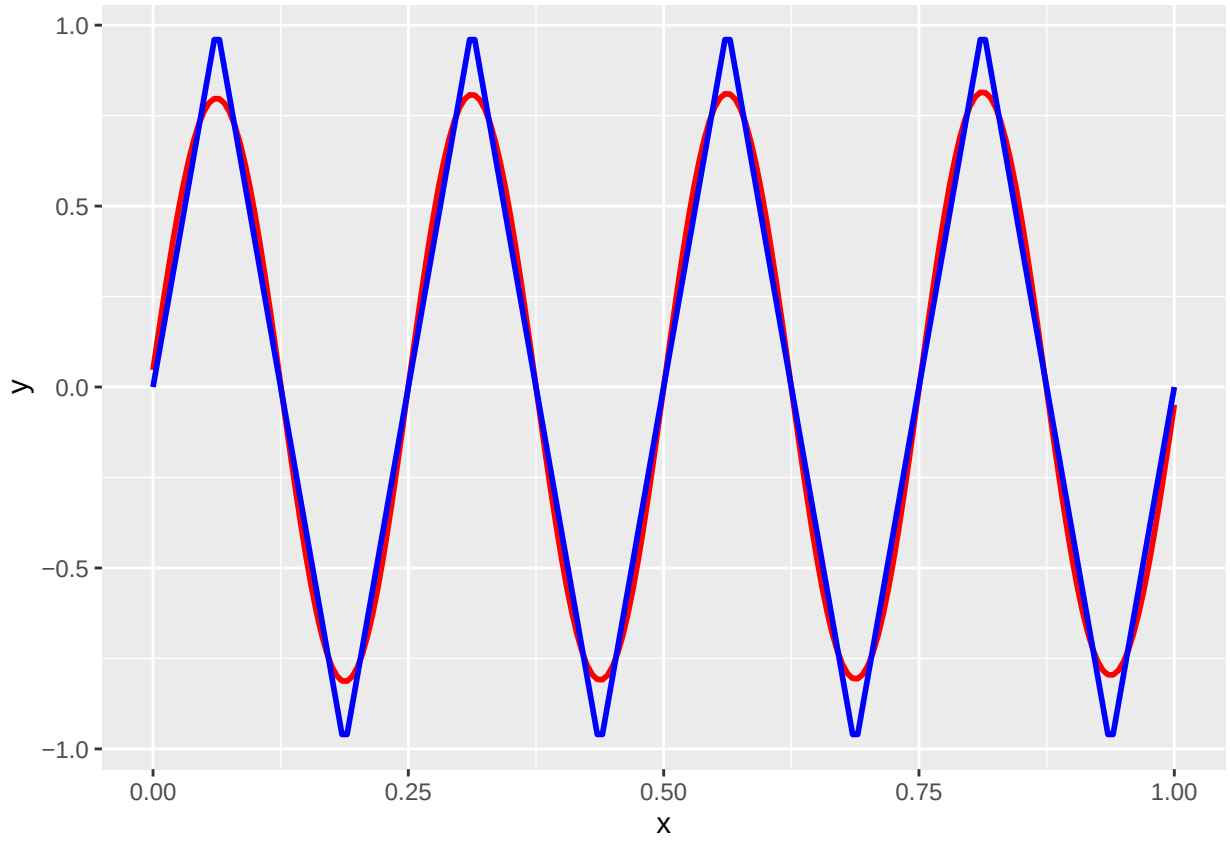
Spectrum

```
signalfft<-read.csv("triangle.csv.csv",header=FALSE,sep=",")
names(signalfft)<-c("freq","rex","imx","mod","arg")
dominant<-signalfft %>% slice_head(n=10)
barplot(dominant$mod,col="steelblue",names.arg=dominant$freq,xlab="Frequency")
```



Reconstructed

```
signalre<-read.csv("triangle.csv_re.csv",header=FALSE,sep=",")
names(signalre) <- c("x","y")
signalre <- signalre %>% mutate(yorig=signal$y)
ggplot(signalre,aes(x=x,y=y))+
      geom_line(colour="red",linewidth=1)+
      geom_line(aes(y=yorig),color="blue",linewidth=1)+
      theme(legend.position = "bottom")
```

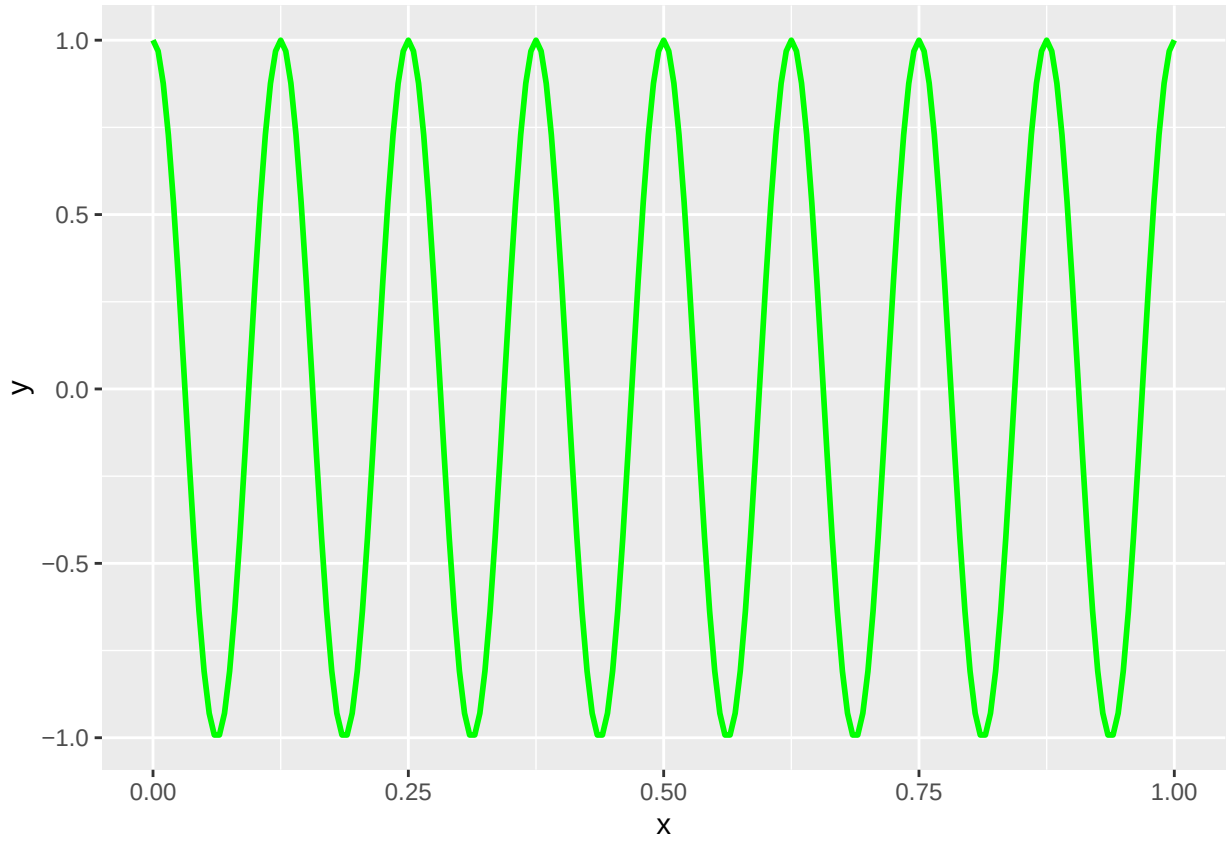


Sinusoid

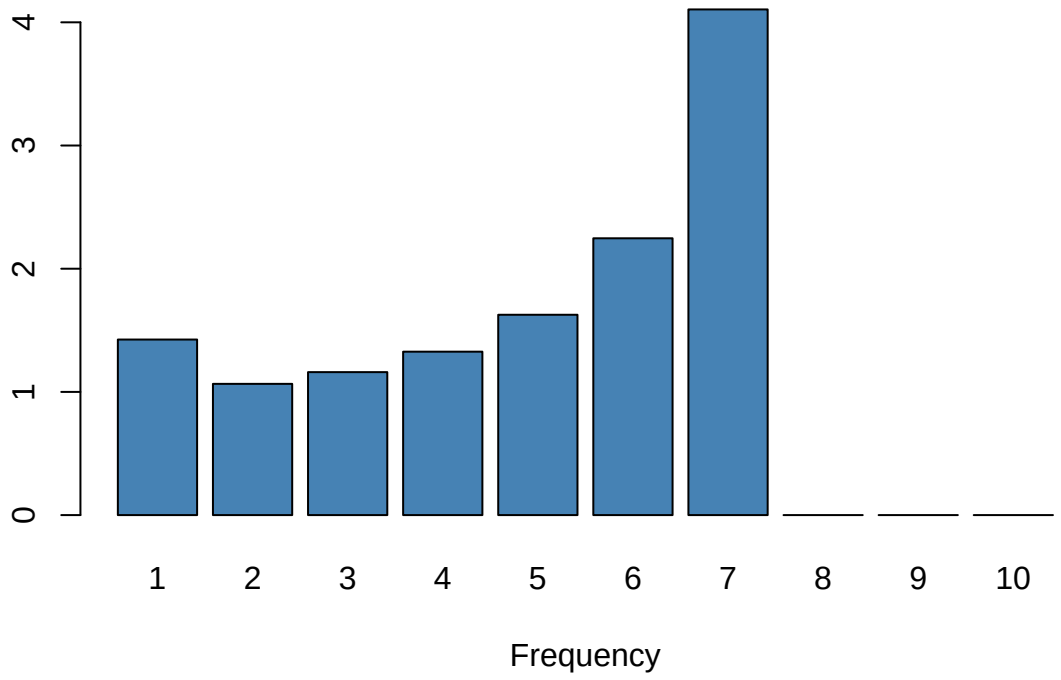
```
../../bin/sinusoid sinusoid.csv 8
../../bin/freqd sinusoid.csv 0.07
```

```
## sinusoid.csv
```

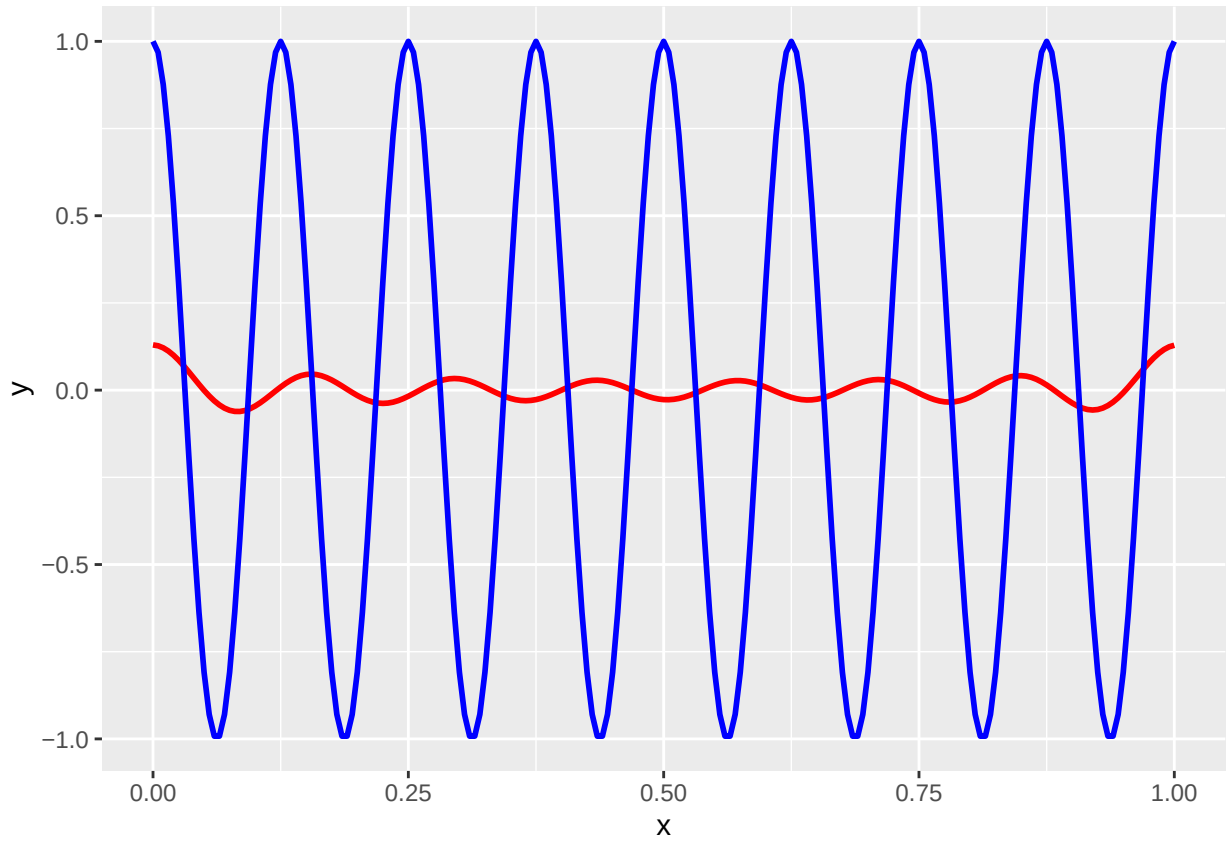
```
signal<-read.csv("sinusoid.csv",header=FALSE,sep=",")
names(signal)<-c("x","y")
ggplot(signal,aes(x=x,y=y))+geom_line(color="green",linewidth=1)
```




```
signalfft<-read.csv("sinusoid.csv.csv",header=FALSE,sep=",")
names(signalfft)<-c("freq","rex","imx","mod","arg")
dominant<-signalfft %>% slice_head(n=10)
barplot(dominant$mod,col="steelblue",names.arg=dominant$freq,xlab="Frequency")
```




```
signalre<-read.csv("sinusoid.csv_re.csv",header=FALSE,sep=",")
names(signalre) <- c("x","y")
signalre <- signalre %>% mutate(yorig=signal$y)
ggplot(signalre,aes(x=x,y=y))+
      geom_line(colour="red",linewidth=1)+
      geom_line(aes(y=yorig),color="blue",linewidth=1)+
      theme(legend.position = "bottom")
```


1.0
0.5
0.0
−0.5
−1.0
y
0.00
0.25
0.50
0.75
1.00
x