import data

In [1]:

```
getwd()
```

'/Users/Lotus/Desktop/stevens/job/mobile app store'

In [3]:

```
AppleStore <- read.csv('AppleStore.csv',na.strings = c(''))
# check the na data
AppleStore[!complete.cases(AppleStore),]
```

A data.frame: 0 × 17

X	id	track_name	size_bytes	currency	price	rating_count_tot
<int>	<int>	<chr>	<dbl>	<chr>	<dbl>	<int>

data preparation

In [6]:

```
head(AppleStore)
```

A data.frame: 6 × 17

	X	id	track_name	size_bytes	currency	price	rating_co
	<int>	<int>	<chr>	<dbl>	<chr>	<dbl>	
1	1	281656475	PAC-MAN Premium	100788224	USD	3.99	
2	2	281796108	Evernote - stay organized	158578688	USD	0.00	
3	3	281940292	WeatherBug - Local Weather, Radar, Maps, Alerts	100524032	USD	0.00	
4	4	282614216	eBay: Best App to Buy, Sell, Save! Online Shopping	128512000	USD	0.00	
5	5	282935706	Bible	92774400	USD	0.00	
6	6	283619399	Shanghai Mahjong	10485713	USD	0.99	

In [7]:

```
str(AppleStore)
```

```
'data.frame':	7197 obs. of  17 variables:
 $ X               : int  1 2 3 4 5 6 7 8 9 10 ...
 $ id              : int  281656475 281796108 281940
292 282614216 282935706 283619399 283646709 28403517
7 284666222 284736660 ...
 $ track_name      : chr  "PAC-MAN Premium" "Evernot
e - stay organized" "WeatherBug - Local Weather, Rad
ar, Maps, Alerts" "eBay: Best App to Buy, Sell, Save
! Online Shopping" ...
 $ size_bytes      : num  1.01e+08 1.59e+08 1.01e+08
1.29e+08 9.28e+07 ...
 $ currency        : chr  "USD" "USD" "USD" "USD" ..
.
 $ price           : num  3.99 0 0 0 0 0.99 0 0 9.99
3.99 ...
 $ rating_count_tot: int  21292 161065 188583 262241
985920 8253 119487 1126879 1117 7885 ...
 $ rating_count_ver: int  26 26 2822 649 5320 5516 8
79 3594 4 40 ...
 $ user_rating     : num  4 4 3.5 4 4.5 4 4 4 4.5 4
...
 $ user_rating_ver : num  4.5 3.5 4.5 4.5 5 4 4.5 4.
5 5 4 ...
 $ ver             : chr  "6.3.5" "8.2.2" "5.0.0" "5
.10.0" ...
 $ cont_rating     : chr  "4+" "4+" "4+" "12+" ...
 $ prime_genre     : chr  "Games" "Productivity" "We
ather" "Shopping" ...
 $ sup_devices.num : int  38 37 37 37 37 47 37 37 37
38 ...
 $ ipadSc_urls.num : int  5 5 5 5 5 5 0 4 5 0 ...
 $ lang.num        : int  10 23 3 9 45 1 19 1 1 10 .
..
 $ vpp_lic         : int  1 1 1 1 1 1 1 1 1 1 ...
```

In [8]:

```
#chr convert to factor
AppleStore$currency <- factor(AppleStore$currency)
AppleStore$prime_genre <- factor(AppleStore$prime_genre)
AppleStore$cont_rating <- factor(AppleStore$cont_rating)
AppleStore$vpp_lic <- factor(AppleStore$vpp_lic)
summary(AppleStore)
```

```
       X                id              track_name
size_bytes
 Min.   :    1   Min.   :2.817e+08   Length:7197
Min.   :5.898e+05
 1st Qu.: 2090   1st Qu.:6.001e+08   Class :characte
r   1st Qu.:4.692e+07
 Median : 4380   Median :9.781e+08   Mode  :characte
r   Median :9.715e+07
 Mean   : 4759   Mean   :8.631e+08
Mean   :1.991e+08
 3rd Qu.: 7223   3rd Qu.:1.082e+09
3rd Qu.:1.819e+08
 Max.   :11097   Max.   :1.188e+09
Max.   :4.026e+09

 currency        price          rating_count_tot  rati
ng_count_ver
 USD:7197   Min.   :  0.000   Min.   :      0   Min.
:     0.0
            1st Qu.:  0.000   1st Qu.:     28   1st
Qu.:     1.0
            Median :  0.000   Median :    300   Medi
an :    23.0
            Mean   :  1.726   Mean   :  12893   Mean
:   460.4
            3rd Qu.:  1.990   3rd Qu.:   2793   3rd
Qu.:   140.0
            Max.   :299.990   Max.   :2974676   Max.
:177050.0

  user_rating    user_rating_ver     ver
cont_rating
 Min.   :0.000   Min.   :0.000   Length:7197
12+:1155
 1st Qu.:3.500   1st Qu.:2.500   Class :character
17+: 622
 Median :4.000   Median :4.000   Mode  :character
4+ :4433
 Mean   :3.527   Mean   :3.254
9+ : 987
 3rd Qu.:4.500   3rd Qu.:4.500
 Max.   :5.000   Max.   :5.000

           prime_genre   sup_devices.num ipadSc_urls
.num    lang.num
```

```
 Games            :3862   Min.   : 9.00   Min.   :0.0
00   Min.   : 0.000  
 Entertainment    : 535   1st Qu.:37.00   1st Qu.:3.0
00   1st Qu.: 1.000  
 Education        : 453   Median :37.00   Median :5.0
00   Median : 1.000  
 Photo & Video    : 349   Mean   :37.36   Mean   :3.7
07   Mean   : 5.435  
 Utilities        : 248   3rd Qu.:38.00   3rd Qu.:5.0
00   3rd Qu.: 8.000  
 Health & Fitness: 180   Max.   :47.00   Max.   :5.0
00   Max.   :75.000  
 (Other)          :1570                                  
 vpp_lic 
 0:  50  
 1:7147  
```

In [9]:

```
#check price outliers
Poutliers <- AppleStore[AppleStore$price > 50,]
Poutliers
```

A data.frame: 7 × 17

	X	id	track_name	size_bytes	currency	price	ratin
	<int>	<int>	<chr>	<dbl>	<fct>	<dbl>	
116	129	308368164	Proloquo2Go - Symbol-based AAC	723764224	USD	249.99	
163	184	320279293	NAVIGON Europe	144412672	USD	74.99	
1137	1324	491998279	Articulation Station Pro	425919488	USD	59.99	
1480	1714	551215116	LAMP Words For Life	583263232	USD	299.99	
2182	2541	700440156	Articulation Test Center Pro	174737408	USD	59.99	
2569	3043	849732663	KNFB Reader	106429440	USD	99.99	
3239	3899	946930094	FineScanner Pro - PDF Document Scanner App + OCR	63974400	USD	59.99	

data visualization

In [28]:

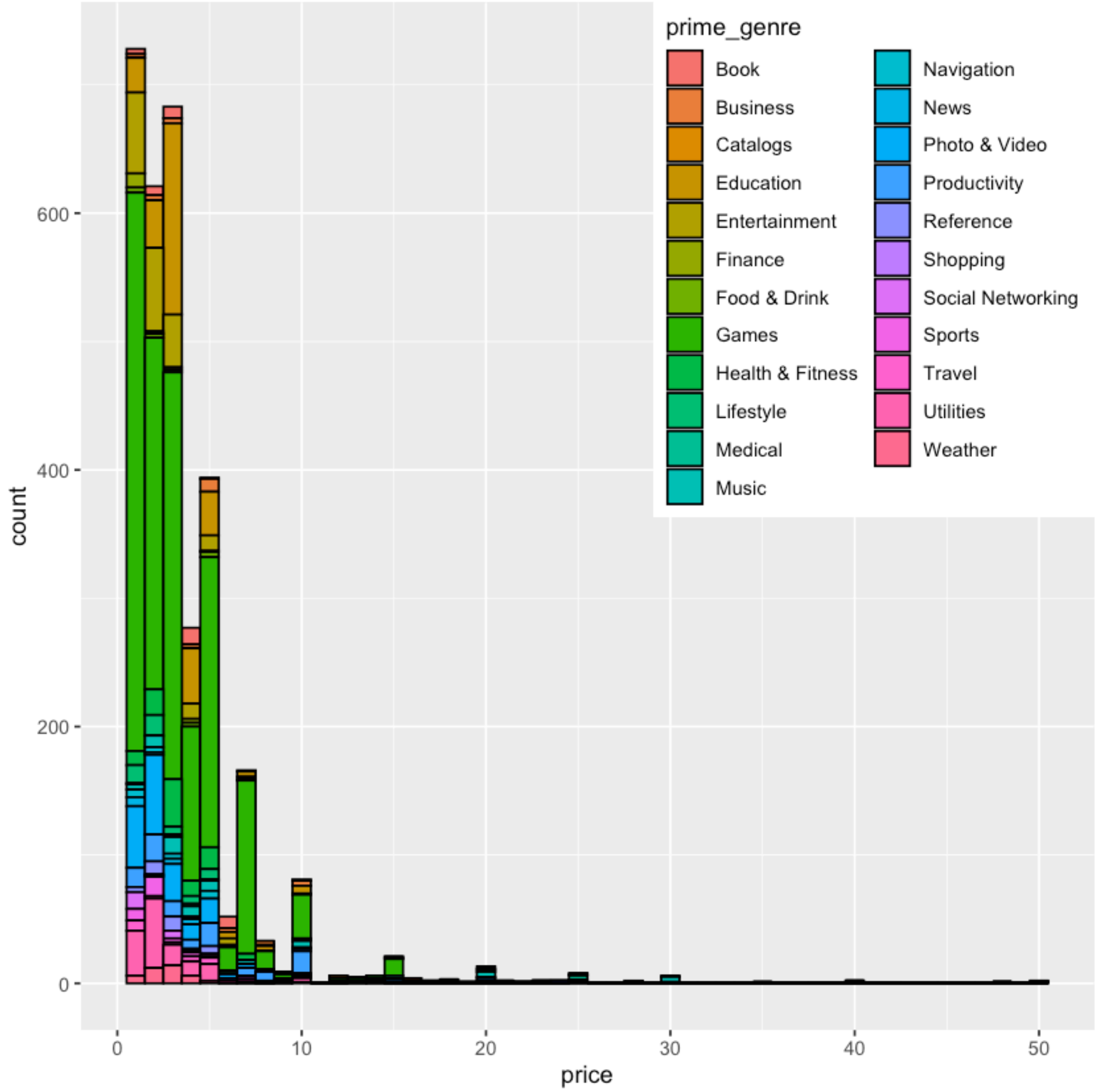
```
library(ggplot2)
library(grid)
```

price distribution of paid apps

In [15]:

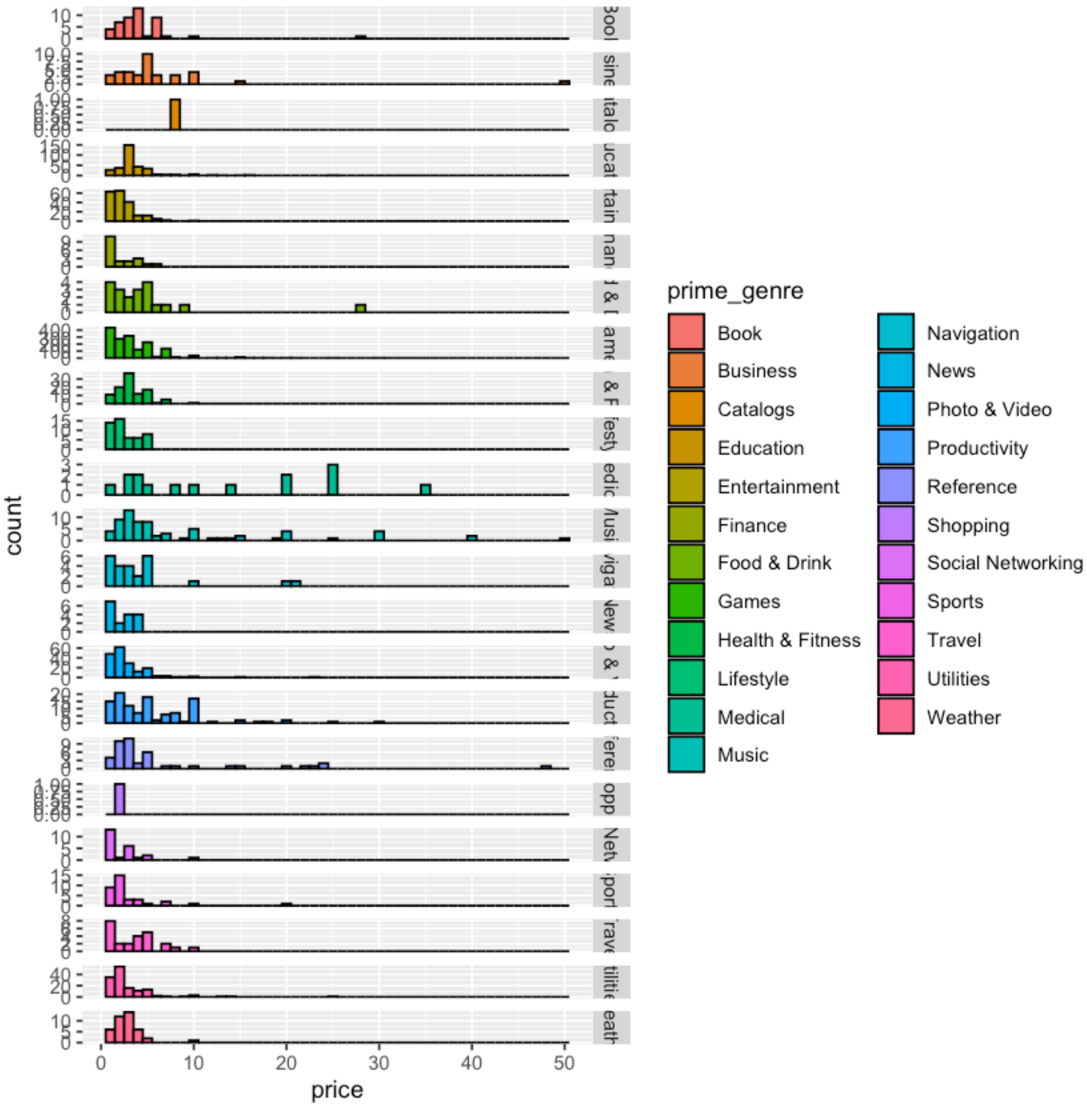
```
#visualize price distribution of paid apps
paidapp <- AppleStore[!AppleStore$price==0,]
paidapp <- paidapp[!paidapp$price>50,] #without outliers

p <- ggplot(data = paidapp,aes(x=price,fill=prime_genre))
p+geom_histogram(binwidth = 1,colour='black')+
  theme(legend.position=c(1,1),legend.justification=c(1,1))
```



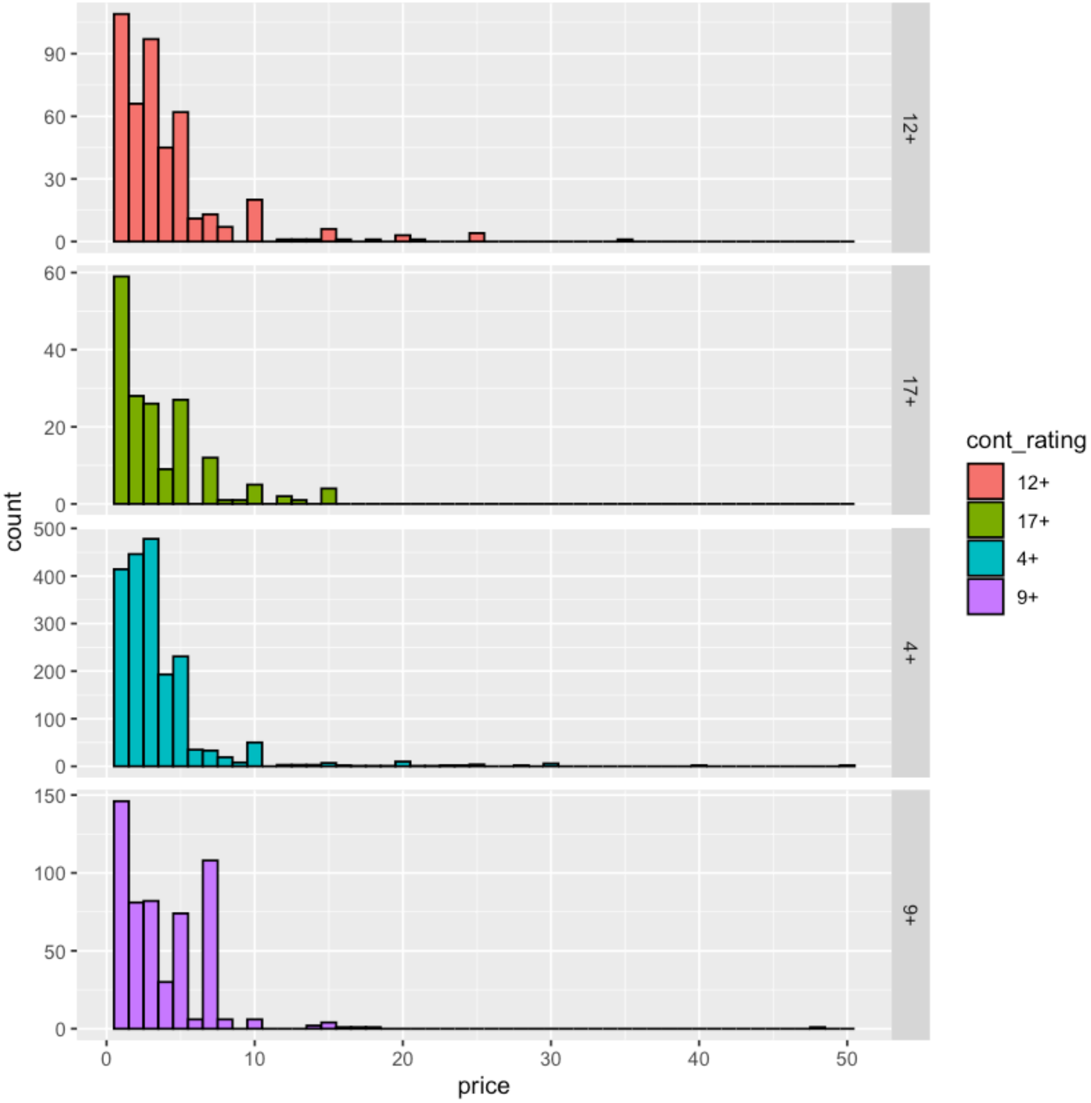
In [16]:

```
#price distribution get affected by category
v <- ggplot(data=paidapp,aes(x=price))
v+geom_histogram(binwidth = 1,aes(fill=prime_genre),colour='black') +
  facet_grid(prime_genre~.,scale='free')
```



In [19]:

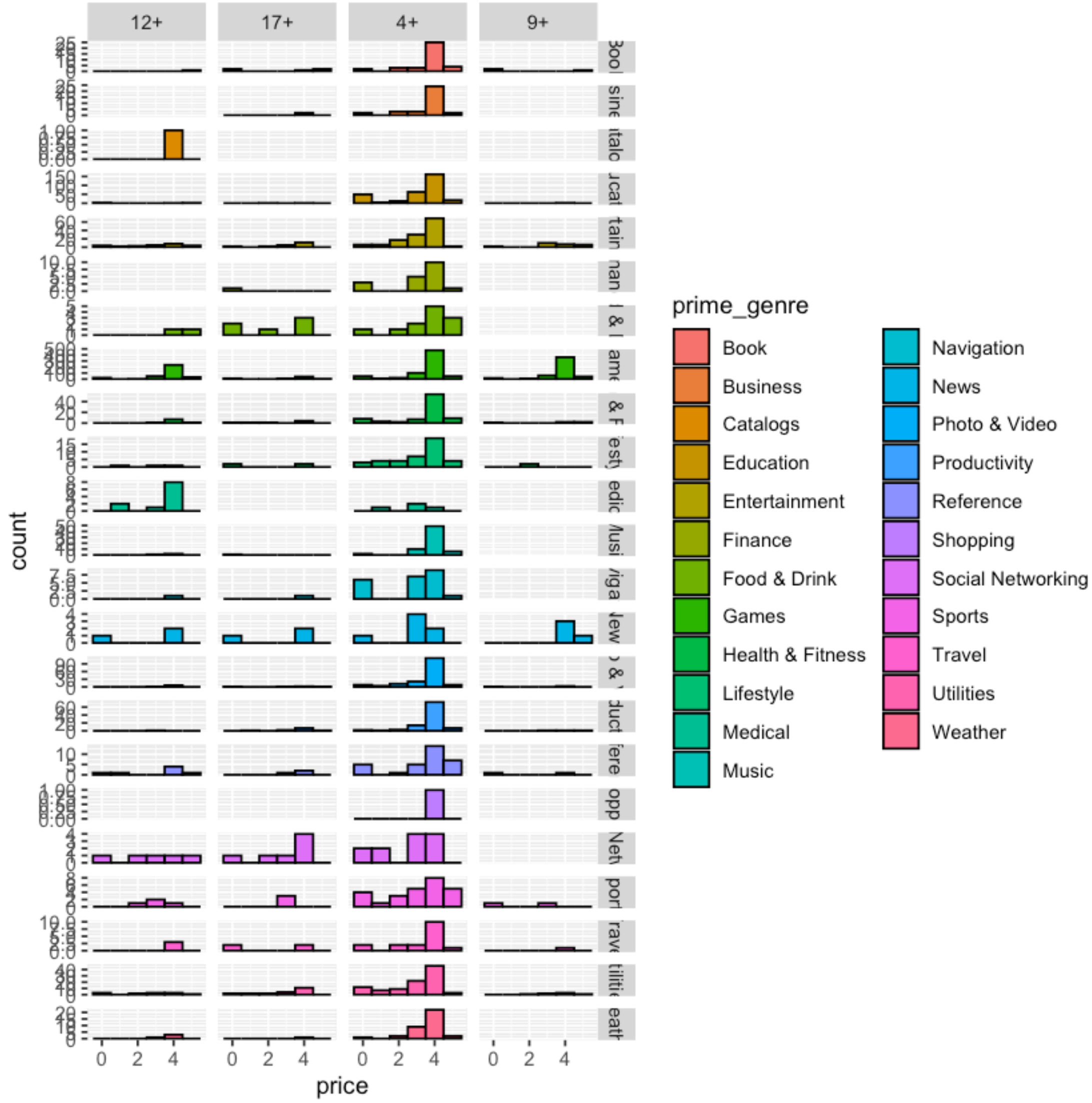
```
#price distribution get affected by content rating
v+geom_histogram(binwidth = 1,aes(fill=cont_rating),colour='black') +
  facet_grid(cont_rating~.,scale='free')
```



ratings

In [48]:

```
# ratings affected by content rating and genre
v+geom_histogram(binwidth = 1,aes(x=user_rating,fill=prime_genre
),colour='black') +
  facet_grid(prime_genre~cont_rating,scale='free')
```



In [21]:

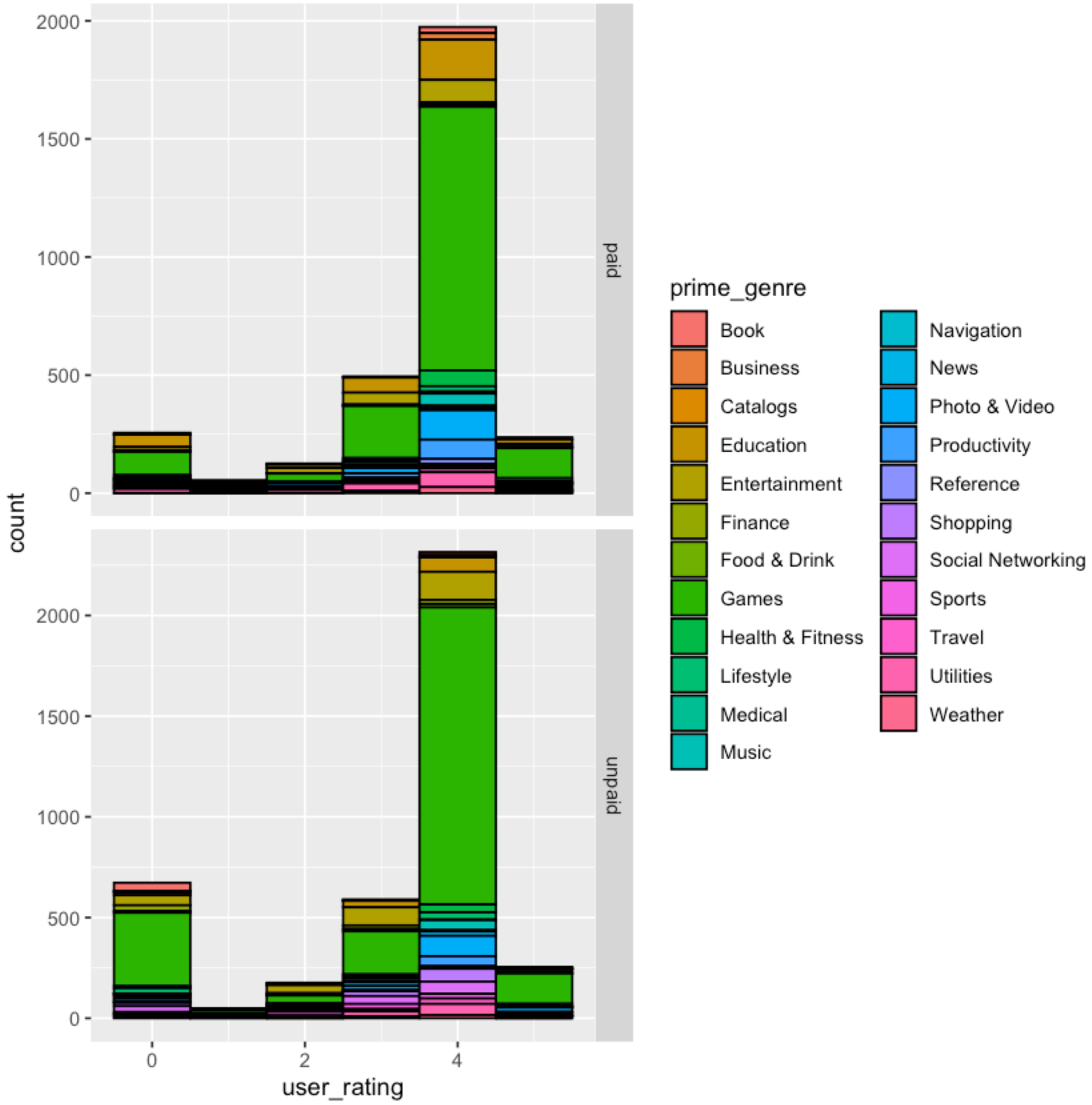
```
#adding paid or not column
AppleStore[AppleStore$price>0,'PaidOrNot'] <- 'paid'
AppleStore[AppleStore$price==0,'PaidOrNot'] <- 'unpaid'
AppleStore$PaidOrNot = factor(AppleStore$PaidOrNot)
head(AppleStore)
```

A data.frame: 6 × 18

	X	id	track_name	size_bytes	currency	price	rating_co
	<int>	<int>	<chr>	<dbl>	<fct>	<dbl>	
1	1	281656475	PAC-MAN Premium	100788224	USD	3.99	
2	2	281796108	Evernote - stay organized	158578688	USD	0.00	
3	3	281940292	WeatherBug - Local Weather, Radar, Maps, Alerts	100524032	USD	0.00	
4	4	282614216	eBay: Best App to Buy, Sell, Save! Online Shopping	128512000	USD	0.00	
5	5	282935706	Bible	92774400	USD	0.00	
6	6	283619399	Shanghai Mahjong	10485713	USD	0.99	

In [46]:

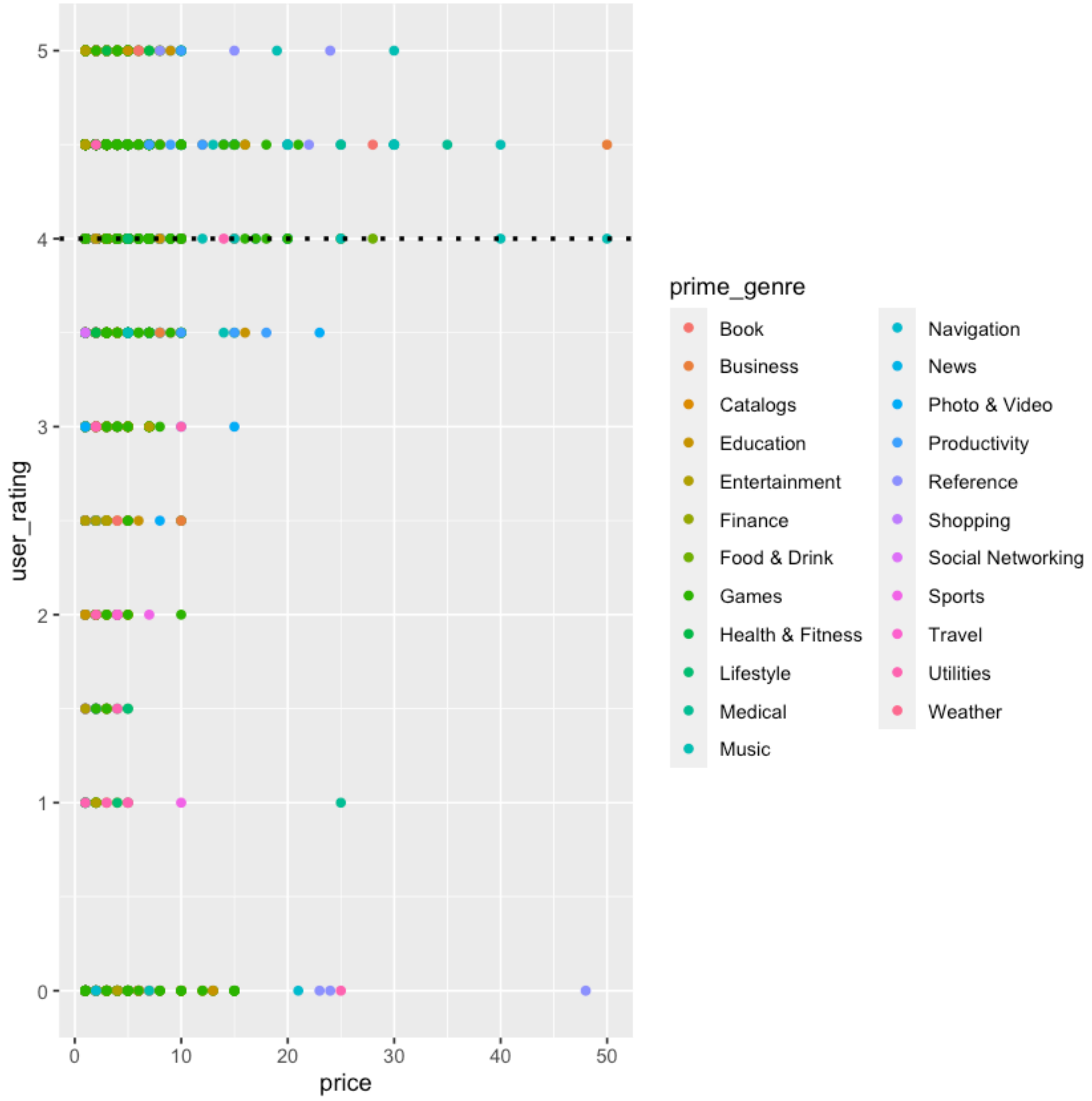
```
#ratings affected by paid and free
a <- ggplot(data=AppleStore)
a+geom_histogram(binwidth = 1,aes(x=user_rating,fill=prime_genre
),colour='black') +
  facet_grid(PaidOrNot~.,scale='free')
```



price and ratings

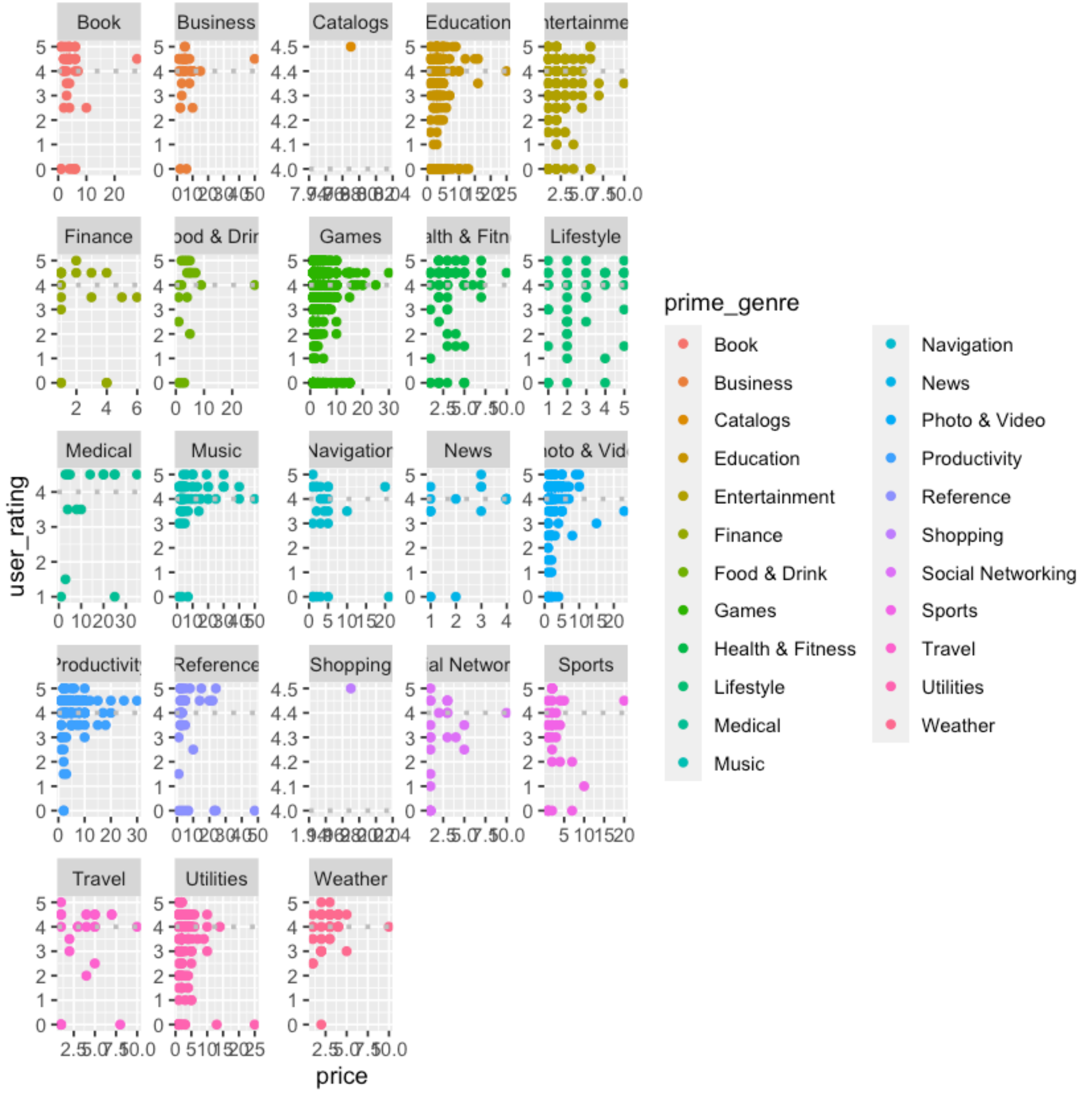
In [25]:

```
#price and ratings let 4.0 as the line of satisfied rating
pr <- ggplot(data=paidapp,aes(x=price,y=user_rating,colour=prime
_genre))
pr+geom_point()+geom_hline(yintercept = 4.0,colour='black',size
= 1,linetype=3)
```



In [43]:

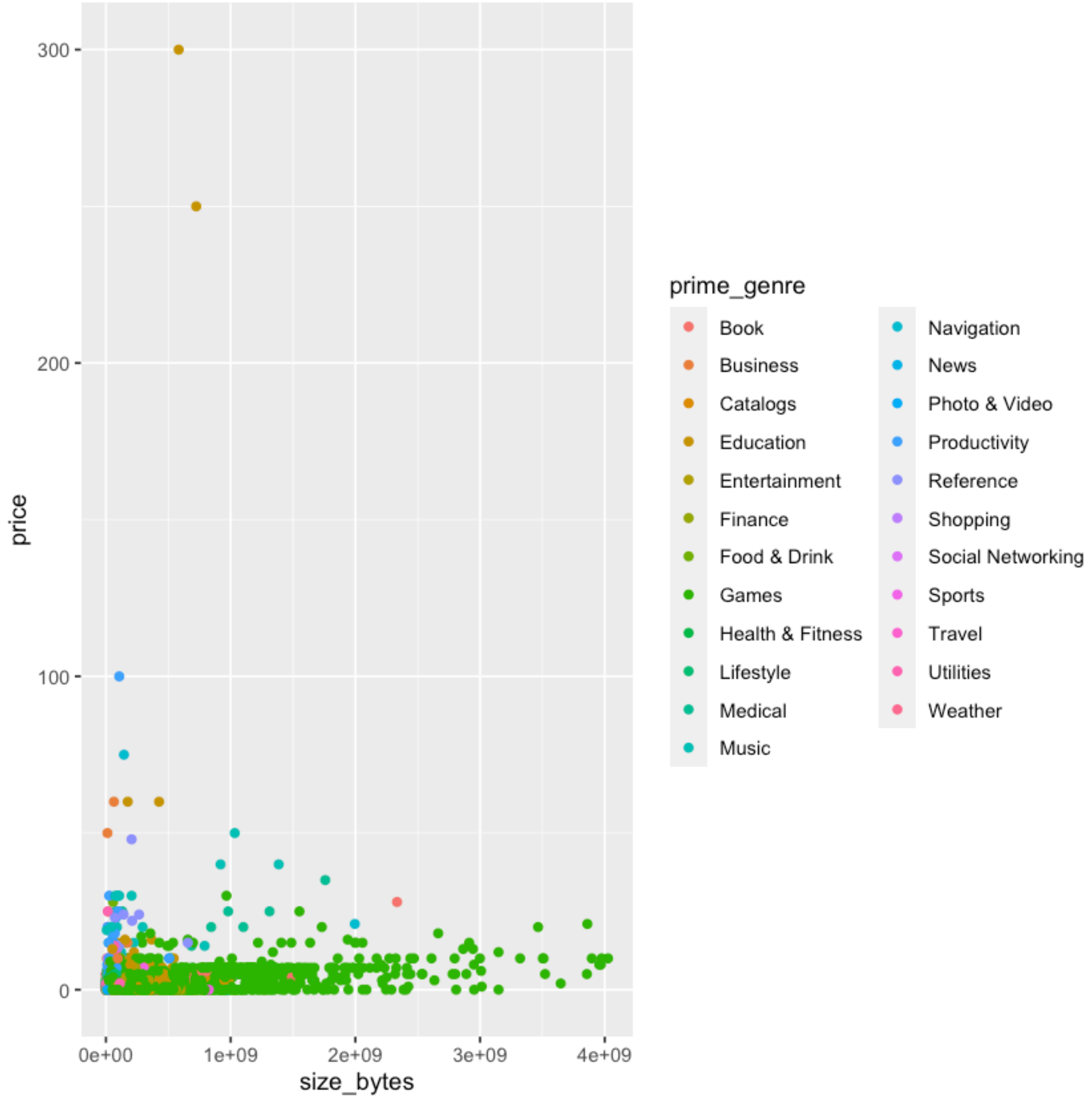
```
pr+geom_point()+facet_wrap(.~prime_genre,scale='free')+ # facet genre
  geom_hline(yintercept = 4.0,colour='Grey',size = 1,linetype=3)
```



app size and price

In [30]:

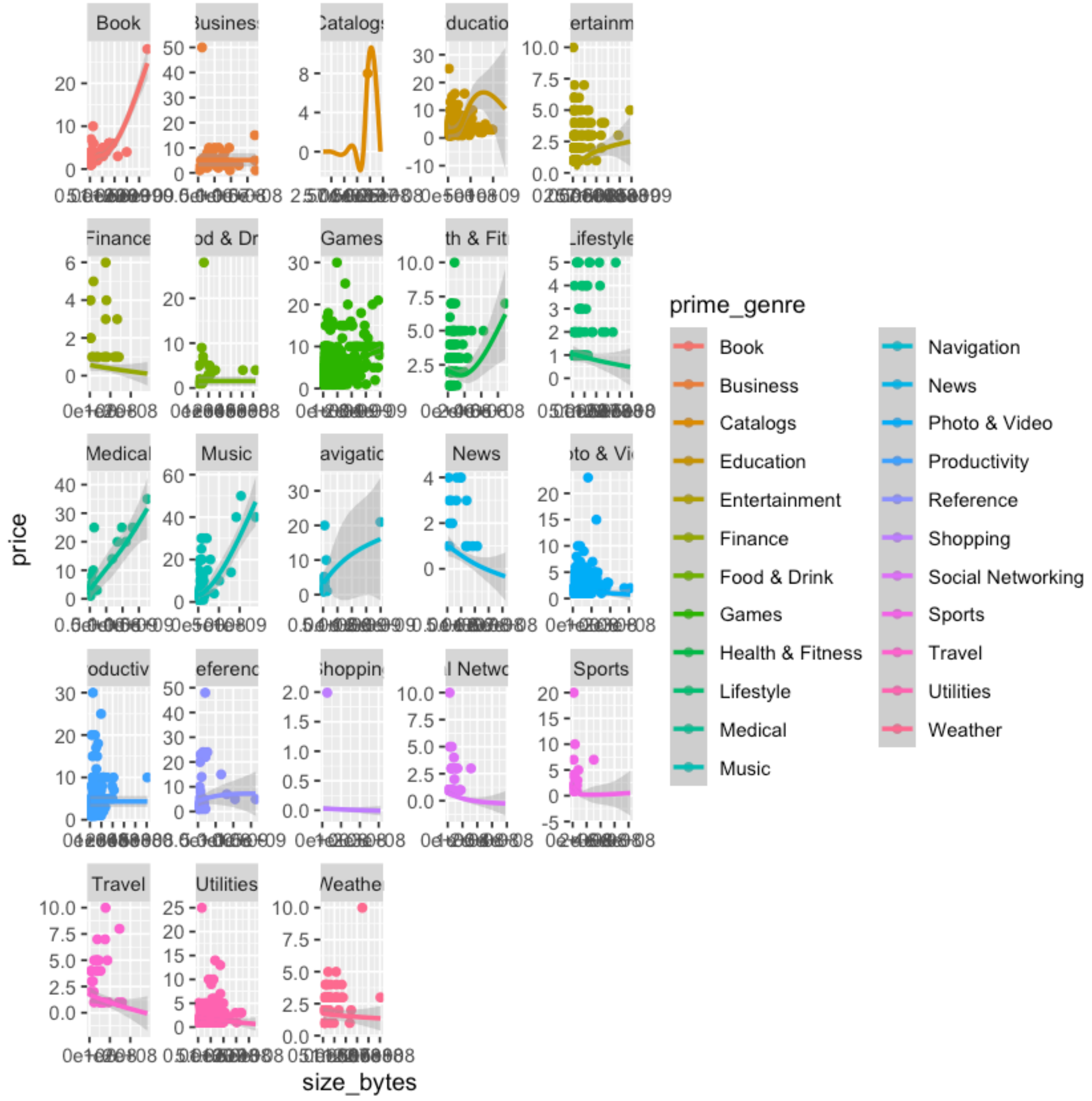
```
#size and price
sp <- ggplot(data=AppleStore,aes(x=size_bytes,y=price,colour=pri
me_genre))
sp + geom_point()
```



```
In [44]:
```

```
#group by genre
sp + geom_point(data=paidapp)+geom_smooth()+facet_wrap(.~prime_g
enre,scale='free')
```

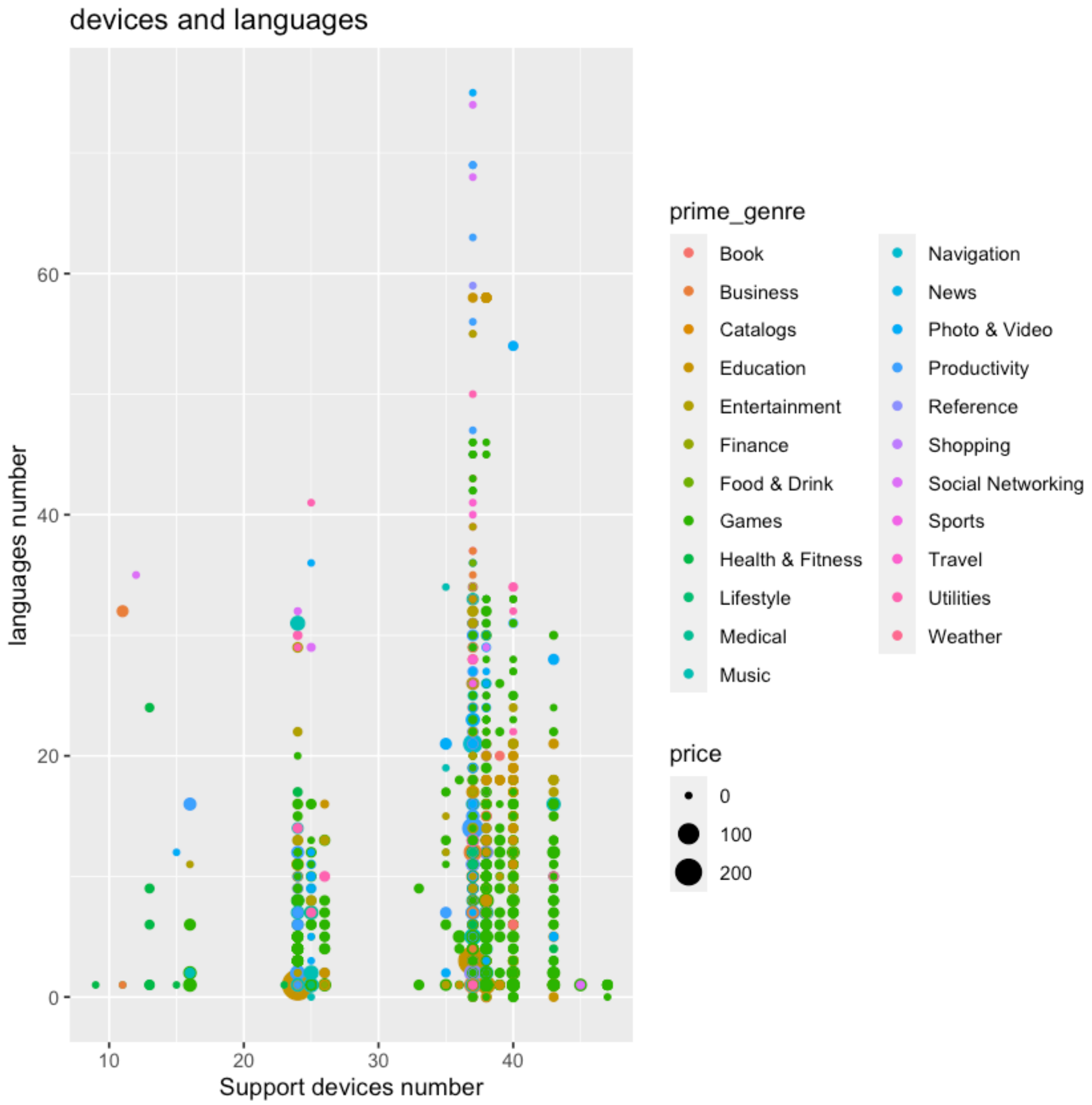
```
`geom_smooth()` using method = 'gam' and formula 'y
~ s(x, bs = "cs")'
```



devices numbers and languages numbers

In [18]:

```
#devices and languages
q<-ggplot(data = AppleStore, aes(x=sup_devices.num,y=lang.num,colour=prime_genre,size=price))
q+geom_point()+xlab('Support devices number')+ylab('languages number')+
  ggtitle('devices and languages')
```


devices and languages
languages number
Support devices number
prime_genre
Book
Business
Catalogs
Education
Entertainment
Finance
Food & Drink
Games
Health & Fitness
Lifestyle
Medical
Music
Navigation
News
Photo & Video
Productivity
Reference
Shopping
Social Networking
Sports
Travel
Utilities
Weather
price