

随机模拟方法与应用导论作业六

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2019-10-04

6.5 (Comparing snowfall of Buffalo and Cleveland)

The datafile “`buffalo.cleveland.snowfall.txt`” contains the total snowfall in inches for the cities Buffalo and Cleveland for the seasons 1968 – 69 through 2008 – 09.

- Compute the differences between the Buffalo snowfall and the Cleveland snowfall for all seasons.
- Using the `t.test` function with the difference data, test the hypothesis that Buffalo and Cleveland get, on average, the same total snowfall in a season.
- Use the `t.test` function to construct a 95% confidence interval of the mean difference in seasonal snowfall.

- 首先读取文件`buffalo.cleveland.snowfall.txt`

```
snowfall = read.table('buffalo.cleveland.snowfall.txt', head = TRUE)
```

然后计算各个季度Buffalo和Cleveland的降雪量差值并展示

```
snowfall$diff = snowfall$Buffalo - snowfall$Cleveland  
snowfall[,c(1,4)]
```

```
##      SEASON  diff  
## 1  2008-2009  20.5  
## 2  2007-2008  26.6  
## 3  2006-2007  12.4  
## 4  2005-2006  27.6  
## 5  2004-2005  -8.8  
## 6  2003-2004   9.7  
## 7  2002-2003  15.6  
## 8  2001-2002  86.4  
## 9  2000-2001  80.6  
## 10 1999-2000   3.5  
## 11 1998-1999  38.1  
## 12 1997-1998  41.6  
## 13 1996-1997  41.7  
## 14 1995-1996  40.3
```

```
## 15 1994-1995 31.0
## 16 1993-1994 40.2
## 17 1992-1993 4.7
## 18 1991-1992 27.1
## 19 1990-1991 10.4
## 20 1989-1990 31.1
## 21 1988-1989 12.6
## 22 1987-1988 -14.9
## 23 1986-1987 11.7
## 24 1985-1986 56.4
## 25 1984-1985 43.5
## 26 1983-1984 53.1
## 27 1982-1983 14.4
## 28 1981-1982 11.9
## 29 1980-1981 0.4
## 30 1979-1980 29.7
## 31 1978-1979 59.0
## 32 1977-1978 64.2
## 33 1976-1977 136.0
## 34 1975-1976 28.1
## 35 1974-1975 28.6
## 36 1973-1974 30.2
## 37 1972-1973 10.3
## 38 1971-1972 64.3
## 39 1970-1971 45.6
## 40 1969-1970 67.1
## 41 1968-1969 41.4
```

bc. 检验假设—Buffalo和Cleveland季度平均降雪量相等，也就是检验两地的季度降雪量差值的均值为0。用函数`t.test`和上面计算得到的差值数据检验该假设，代码和结果如下

```
t.test(snowfall$diff,mu = 0,conf.level=0.95)

##
## One Sample t-test
##
## data:  snowfall$diff
## t = 7.5692, df = 40, p-value = 3.061e-09
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
## 24.56221 42.45731
```

```
## sample estimates:  
## mean of x  
## 33.50976
```

由结果可知，t检验统计量(t-test statistic)为7.5692，p值为 3.061×10^{-9} ，由于p值很小($p \ll 0.05$)，故拒绝假设；两地季度降雪量平均差值的95%置信区间应为(24.56221, 42.45731)。