Brynne Wilkinson Introduction to Statistics

Homework 2

1 Reporting a Binomial Test

Researchers tracked how often speakers used the prepositional dative in spontaneous phone conversations, as opposed to the double object construction, finding 501 occurrences of the prepositional dative and a total of 2,360 constructions. Using a test statistic of 0.5, the 95% confidence intervals were found to be 0.1959431 and 0.2293504. The p value obtained is less than $\alpha = 0.05$, thus, the results we obtained are significant and so we reject the null hypothesis.

R script:

```
>x <- 501
>n <- 501 + 1859
>binom.test(x, n, p = 0.5)
```

Results:

```
        Exact binomial test

data:  x and n
number of successes = 501, number of trials = 2360, p-value < 2.2e-16
alternative hypothesis: true probability of success is not equal to 0.5
95 percent confidence interval:
 0.1959431 0.2293504
sample estimates:
probability of success
             0.2122881
```

2 McNemar's Test

R Script:

```
>setwd('/Users/brynn/Downloads')
>c <- read.table(file = 'PTB.tsv', header = TRUE)
>Stanford.correct <- c$gold.tag == c$Stanford.tag
>NLP4J.correct <- c$gold.tag == c$NLP4J.tag
>x1 <- sum(Stanford.correct & !NLP4J.correct)
>x1
>x2 <- sum(NLP4J.correct & !Stanford.correct)
>x2
>binom.test(min(x1, x2), x1+x2, p= 0.5)
```

Results:

```
X1 <- [1] 943
X2 <- [1] 1016
```

```
        Exact binomial test

data:  min(x1, x2) and x1 + x2
number of successes = 943, number of trials = 1959, p-value =
0.1038
alternative hypothesis: true probability of success is not equal to 0.5
95 percent confidence interval:
 0.459029 0.503763
sample estimates:
probability of success
              0.481368
```

Based on the binomial tests and compared to an $\alpha = 0.05$, neither tagger performed significantly better than the other, so we cannot reject the null hypothesis.