

decrypt

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```

# read coded message
input <- readLines("CodedMessage_Short.txt", n=1000)
# input <- readLines("CodedMessage_Med.txt", n=1000)
# read frequency table
p <- read.table("LetterPairFreqFrom7Novels.txt")
input <- tolower(input)
s <- strsplit(input, split = " ")
s <- do.call(paste0, as.data.frame(s))

# p[,1]
#
# for (word in s){
#   for(char in 1:str_length(word)){
#     print(char)
#   }
# }

#At a given substitution point, evaluate the energy
energy <- function(strings, pairWeight, shift){
  freqs = 0
  alphabet <- letters#[1:26]
  wls <- str_length(strings) #word lengths

  for (word in strings){
    for(char in 1:(str_length(word)-1)){
      # if (char < str_length(word)){ #Can't index past the last letter
      letter1 = (match(substr(word,char,char),alphabet) + shift) %% 26
      letter2 = (match(substr(word,char+1,char+1), alphabet) + shift) %% 26

      if(!is.na(letter1) & !is.na(letter2)){
        if(letter1 != 0 & letter2 != 0){
          freqs = freqs + (pairWeight[letter1,letter2])
          # print(freqs)
        }
      }
    }

    # for (line in p){ #Every line of frequencies
    #   for (letter in 1:26){ #Every letter frequency
    #     #
    #   }
    # }

```

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    }
    # browser()
  }
  return(freqs)
}

#At a given substitution point, evaluate the energy
convert <- function(strings, shift){
  new_msg = ""
  for (word in strings){
    new_word = ""
    for(char in 1:(str_length(word))){
      # chars = paste(char,())
      letter_num = (match(substr(word, char, char),letters) + shift)
      if(!is.na(letter_num)){
        if(letter != 0){
          if (letter_num > 26){letter_num = letter_num %% 26}
          letter = letters[letter_num]
          new_word = paste(new_word, letter, sep = "")
        }
      }
    }
    new_msg = paste(new_msg, new_word, sep = " ")
  }
  return(new_msg)
}

max = 0
best_shift = 0
for (shift_x in 0:(length(letters)-1)){
  fx = energy(s,p,shift_x)
  print(shift_x)
  print(fx)
  # print(convert(s,shift_x))
  if(fx > max){
    max = fx
    best_shift = shift_x
  }
}

```

```
## [1] 0
## [1] 19968.4
## [1] 1
## [1] 18488.5
## [1] 2
## [1] 12131.9
## [1] 3
## [1] 10773.8
## [1] 4
## [1] 8379.3
## [1] 5
## [1] 14704.9
## [1] 6
## [1] 10883.6
## [1] 7
## [1] 16792.1
## [1] 8
## [1] 9810.6
## [1] 9
## [1] 8476.7
## [1] 10
## [1] 11702.2
## [1] 11
## [1] 14991.1
## [1] 12
## [1] 18224.8
## [1] 13
## [1] 12402.1
## [1] 14
## [1] 13318.9
## [1] 15
## [1] 19134
## [1] 16
## [1] 9955.5
## [1] 17
## [1] 5903.9
## [1] 18
## [1] 7768.2
## [1] 19
## [1] 20146.9
```

```
## [1] 20
## [1] 18888.2
## [1] 21
## [1] 6935.7
## [1] 22
## [1] 10661.9
## [1] 23
## [1] 12873.6
## [1] 24
## [1] 18084.9
## [1] 25
## [1] 11794.9
```