

# GSoC: Periodic Time Changepoint Detection Medium Test

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## Medium Test

### Goal:

write a function to take the (Bayesian) implementation from the easy task and identify the best location for a global changepoint in the Bayesian periodic changepoint process. Hint: use the original implementation and check each possible location for a changepoint. Return the maximum difference in the fit before and after the change.

### Function Body

```
# using periodCPT approach
evaluate_segment <- function(data_segment, period_length) {

  # assuming period length of 12 based on my input data, it is default value, can
# be modify by users
  series = PeriodCPT(data_segment, distribution = "bern", niter = 1e3, periodlength=period_length)
  fit = fit(series)

  return(fit)
}

find_best_changepoint <- function(binary_data, period_length=12) {
  best_location <- NULL
  max_diff <- -Inf

  # Iterate over all possible changepoint locations
  for (cp_location in period_length:(length(binary_data)-period_length-1)) {
    data_before <- binary_data[1:cp_location]
    data_after <- binary_data[(cp_location+1):length(binary_data)]

    # Compute the fit for data before and after the changepoint
    fit_before <- evaluate_segment(data_before, period_length)
    fit_after <- evaluate_segment(data_after, period_length)

    diff_fit <- abs(fit_after[1] - fit_before[1])

    # Update
    if (diff_fit > max_diff) {
```

```

    max_diff <- diff_fit
    best_location <- cp_location
  }
}

print(paste("Best location in the Data:", as.character(best_location)))
print(paste("Max difference is:", as.character(max_diff)))
}

```

Run the function using generated binaray data from easy task

```
set.seed(217) # For reproducibility
binary_data = ts( rbinom(90, size = 1, prob = rep(c(0.2, 0.8), each=6)), freq = 12)
find_best_changepoint(binary_data)
```

[illegible]

[illegible]

```
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## [1] "Best location in the Data: 75"  
## [1] "Max difference is: 66.7048819274891"
```