

# Dead and Core reproduction

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In this walk-through we'll perform the plot generation for the dead and core analysis. We assume you have read the other walk-throughs.

## Preliminaries

First, libraries, note that I have silenced the shadowing warnings from R:

```
library(ggplot2)    #plotting
library(dplyr)      #dataframe manipulation
library(tidyr)      #dataframe manipulation
library(broom)      #for the tidy function
library(scales)     #for scientific function
library(latex2exp)  #for TeX in Labels
library(ggpubr)     #for stat_cor
```

And now we'll load the data, and perform some simple munging to select relevant columns.

```
## Load files
finResultsFile <- "../data/fin_dead_core.csv"
autoResultsFile <- "../data/auto_dead_core.csv"

## The usual manipulations
finData <- read.csv(file=finResultsFile) %>%
  mutate(Algorithm = as.factor(Algorithm), Config = as.factor(Config)) %>%
  mutate(Algorithm = gsub("-->", "\U27f6", Algorithm))

autoData <- read.csv(file=autoResultsFile) %>%
  mutate(Algorithm = as.factor(Algorithm), Config = as.factor(Config)) %>%
  mutate(Algorithm = gsub("-->", "\U27f6", Algorithm))

## combine the data frames
finDF <- finData %>% mutate(data = "Fin")
autoDF <- autoData %>% mutate(data = "Auto")

data <- rbind(finDF, autoDF) %>%
  select(Mean, Algorithm, data, ChcCount, PlainCount, Config)
```

Now let's look at the dataset

```
str(data)

## 'data.frame':   8 obs. of  6 variables:
## $ Mean      : num  11.05 8.07 9.51 8.42 211.7 ...
## $ Algorithm : chr   "v v" "p v" "p p" "v p" ...
## $ data      : chr   "Fin" "Fin" "Fin" "Fin" ...
```

```
## $ ChcCount : int 3810 3810 3810 3810 4213 4213 4213 4213
## $ PlainCount: int 1441 1441 1441 1441 26808 26808 26808 26808
## $ Config : Factor w/ 2 levels "V1*V2*V3*V4*V5*V6*V7*V8*V9*V10",...: 1 1 1 1 2 2 2 2
data
```

```
##      Mean Algorithm data ChcCount PlainCount Config
## 1 11.050036      v v   Fin      3810      1441 V1*V2*V3*V4*V5*V6*V7*V8*V9*V10
## 2  8.070409      p v   Fin      3810      1441 V1*V2*V3*V4*V5*V6*V7*V8*V9*V10
## 3  9.506401      p p   Fin      3810      1441 V1*V2*V3*V4*V5*V6*V7*V8*V9*V10
## 4  8.415740      v p   Fin      3810      1441 V1*V2*V3*V4*V5*V6*V7*V8*V9*V10
## 5 211.700881      v v   Auto     4213     26808      V1*V2*V3*V4
## 6 363.160775      p v   Auto     4213     26808      V1*V2*V3*V4
## 7 378.688111      p p   Auto     4213     26808      V1*V2*V3*V4
## 8 288.664233      v p   Auto     4213     26808      V1*V2*V3*V4
```

We can already see enough to reproduce the table in the paper, but some formatting would be nicer:

```
deadCoreDF <- data %>%
  # perform the following actions for each dataset
  group_by(data) %>%
  # sort by mean
  arrange(Mean) %>%
  ## change the significant figures by dataset
  mutate(MeanLbl = case_when(data == "Auto" ~ signif(Mean, 5),
                             data == "Fin" ~ signif(Mean, 3)))
```

```
deadCoreDF
```

```
## # A tibble: 8 x 7
## # Groups:   data [2]
##      Mean Algorithm data ChcCount PlainCount Config MeanLbl
##      <dbl> <chr>      <chr>      <int>      <int> <fct>      <dbl>
## 1  8.07 p v         Fin      3810      1441 V1*V2*V3*V4*V5*V6*V7*V8*V9~ 8.07
## 2  8.42 v p         Fin      3810      1441 V1*V2*V3*V4*V5*V6*V7*V8*V9~ 8.42
## 3  9.51 p p         Fin      3810      1441 V1*V2*V3*V4*V5*V6*V7*V8*V9~ 9.51
## 4 11.1 v v         Fin      3810      1441 V1*V2*V3*V4*V5*V6*V7*V8*V9~ 11.1
## 5 212. v v         Auto     4213     26808 V1*V2*V3*V4                212.
## 6 289. v p         Auto     4213     26808 V1*V2*V3*V4                289.
## 7 363. p v         Auto     4213     26808 V1*V2*V3*V4                363.
## 8 379. p p         Auto     4213     26808 V1*V2*V3*V4                379.
```

and a simple bar plot to show the data:

```
ggplot(deadCoreDF, mapping = aes(x=Algorithm, y=Mean, color = Algorithm)) +
  theme_classic() +
  ## remove the legends for fill, size, color
  guides(fill = FALSE) +
  guides(size = FALSE) +
  guides(color = FALSE) +
  ## make the plot a bar plot
  geom_bar(stat="identity", fill="white", width=0.5,
           size=1.15) +
  ## add the text labels to show exact values
  geom_text(aes(label=MeanLbl, hjust=1.4), color="black") +
  ## construct the plot for both data sets
  facet_wrap(. ~ data, scales = "free_x") +
```

```
## other niceties
labs(title = "Dead Core Demonstration",
      y = "Time [s] to solve Dead and Core Analysis over all Versions") +
theme(legend.position = "none") +
coord_flip()
```

