

Pubmed Search Results of NONMEM

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Introduction and Methods

The number of publications containing NONMEM was retrieved from the Pubmed search at 2017-04-27 14:30 KST through Medline (PubMed) trend website and the fetched data was processed by R 3.4.0 (R Core Team 2017) and ggplot2 (Wickham and Chang 2016).

Results

Results from a PubMed search for the term, NONMEM and WinNonLin were plotted against the year the publication appeared.

```
library(knitr)
library(ggplot2)
library(dplyr)
library(tibble)
library(tidyr)

Pubmed <- list()

# Read Medline Trend data
Pubmed$winonlin <- readLines("http://dan.corlan.net/cgi-bin/medline-trend?Q=winonlin")
Pubmed$nonmem <- readLines("http://dan.corlan.net/cgi-bin/medline-trend?Q=nonmem")

# Data Prep
PubmedPrep <- function(x) data.frame(raw = Pubmed[[x]]) %>%
  filter(!grepl("Medline|Number|PRE", raw)) %>%
  mutate(raw = trimws(raw)) %>%
  separate(col = "raw", into = c("number", "year", "freq"), sep = "[^[:alnum:]]|^\\.\\.+") %>%
  mutate_all(as.numeric) %>%
  mutate(term = x)

Dataset <- bind_rows(lapply(names(Pubmed), PubmedPrep)) %>%
  arrange(year) %>%
  filter(year >= 1980) # First appearance is in 1980.

RawData <- Dataset %>%
  select(-freq) %>%
  arrange(year) %>%
  spread("term", value = "number")
```

Bar Plots

```
ggdata <- Dataset %>%
  filter(term == "nonmem")
```

Welcome to Medline (PubMed) trend

This page displays the number of entries (articles) in PubMed (Medline) published every year, that conform to search strategy (such as a phrase) you enter below:

It may take about 30 seconds to retrieve and build a trend.

The first column will be the number of papers in each year, the second column--the year, and the third column the number of papers per 100,000 in the medline database in that year.

Also, please note that statistics for the last year may be inaccurate as PubMed may still be indexing titles during the first part of the current year. For many purposes, it is safest to only consider numbers found until two years ago (for example, in 2014, only consider numbers until 2012).

Figure 1: Medline trend

```
gg1 <- ggplot(data=ggdata, aes(x=year, y=number)) +  
  geom_bar(stat="identity") +  
  guides(fill=FALSE) +  
  xlab("Year") + ylab("Number of Articles") +  
  ggtitle("Number of Articles Using NONMEM")+  
  scale_y_continuous(limits = c(0, 200))  
gg1
```

```
ggdata <- Dataset %>%  
  filter(term == "winnonlin"># %>%  
  #filter(number != 0)  
  
gg2 <- ggplot(data=ggdata, aes(x=year, y=number)) +  
  geom_bar(stat="identity") +  
  guides(fill=FALSE) +  
  xlab("Year") + ylab("Number of Articles") +  
  ggtitle("Number of Articles Using WinNonLin")+  
  scale_y_continuous(limits = c(0, 200))  
gg2
```

```
ggplot(Dataset, aes(x=year, y=number, fill=term)) +  
  geom_bar(stat="identity", position=position_dodge()) +  
  ggtitle("Number of Articles Using NONMEM or WinNonLin") +  
  xlab("Year") + ylab("Number of Articles") +  
  scale_y_continuous(limits = c(0, 200))
```

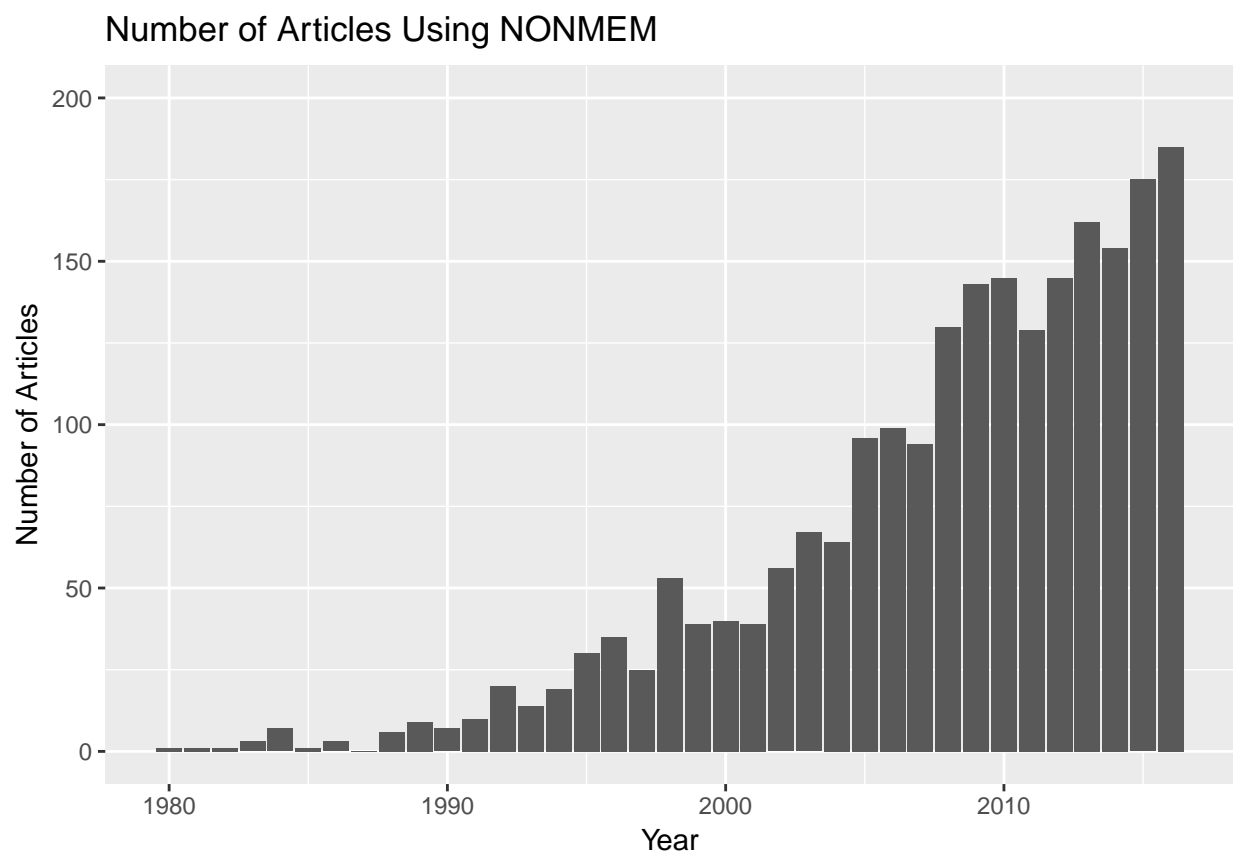


Figure 2: Publications utilizing NONMEM or WinNonLin

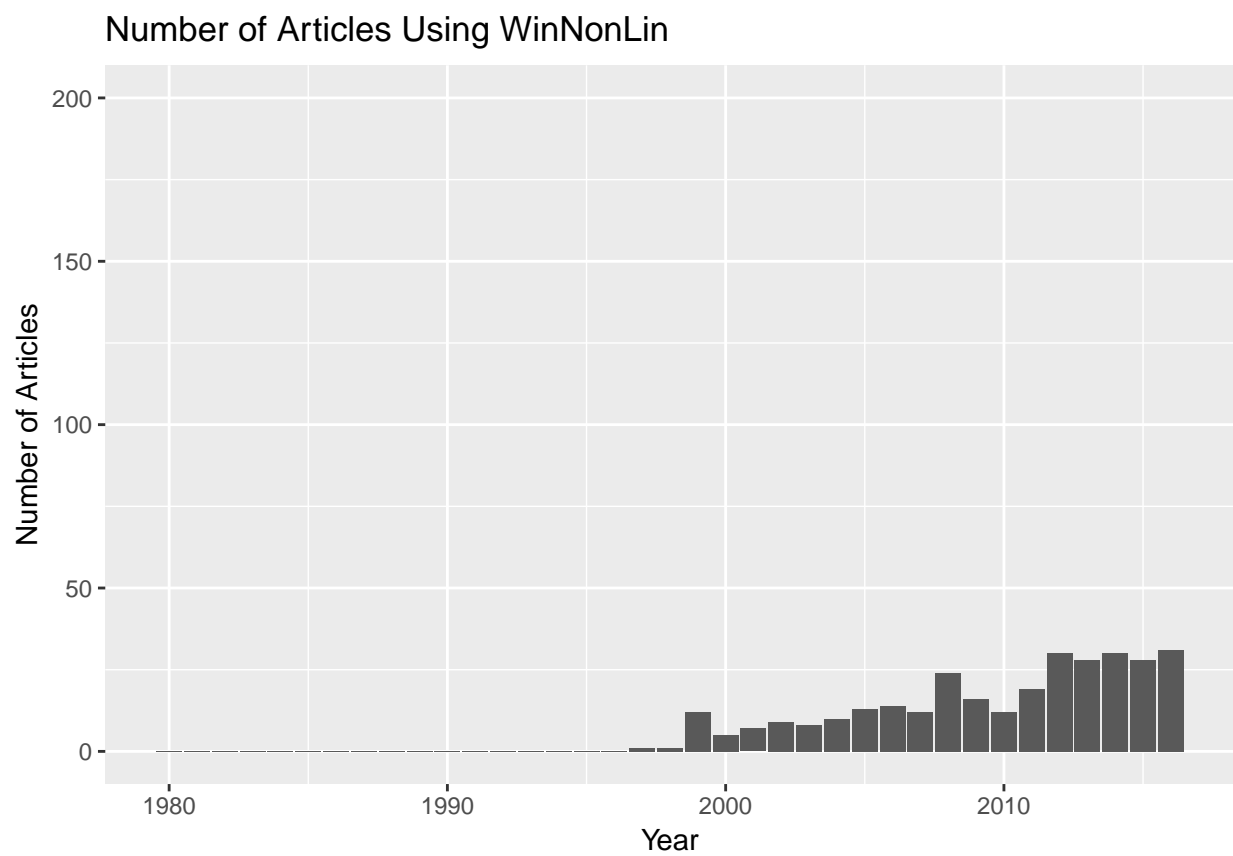
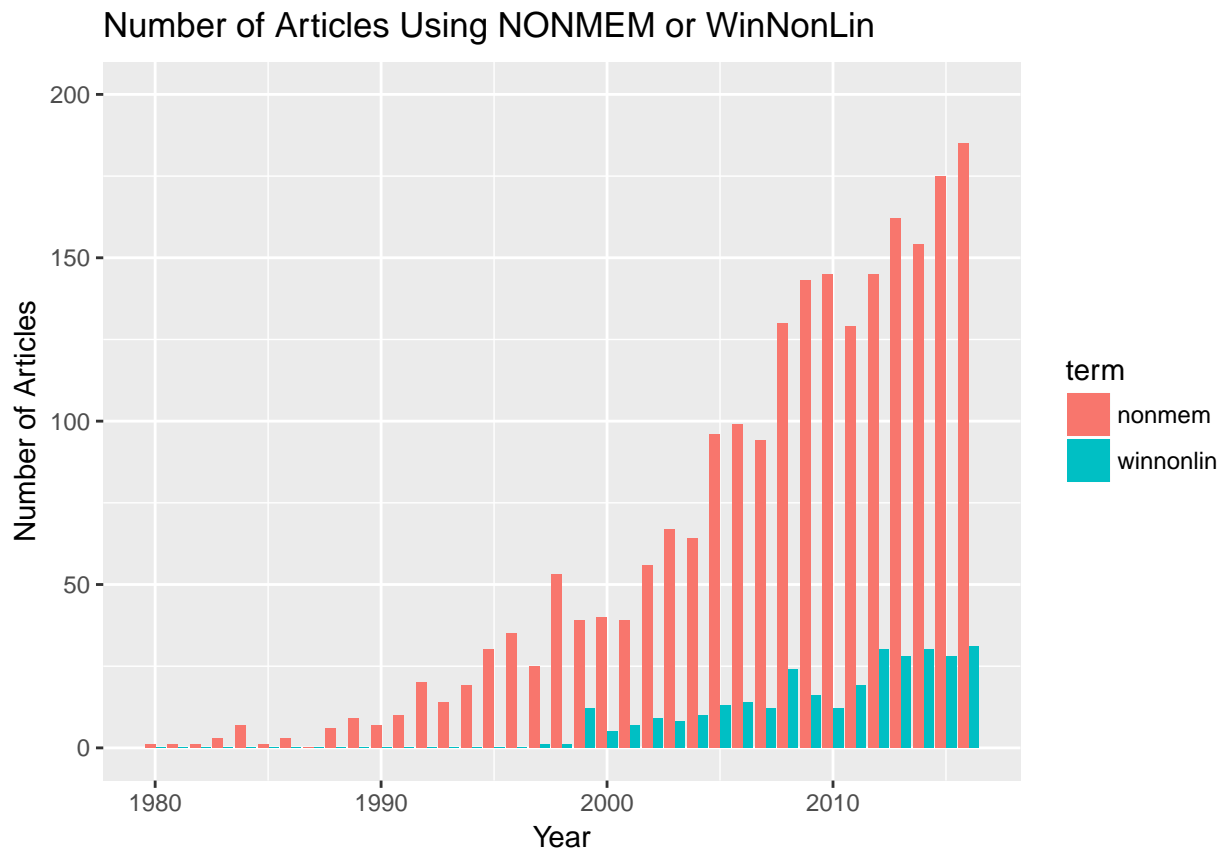


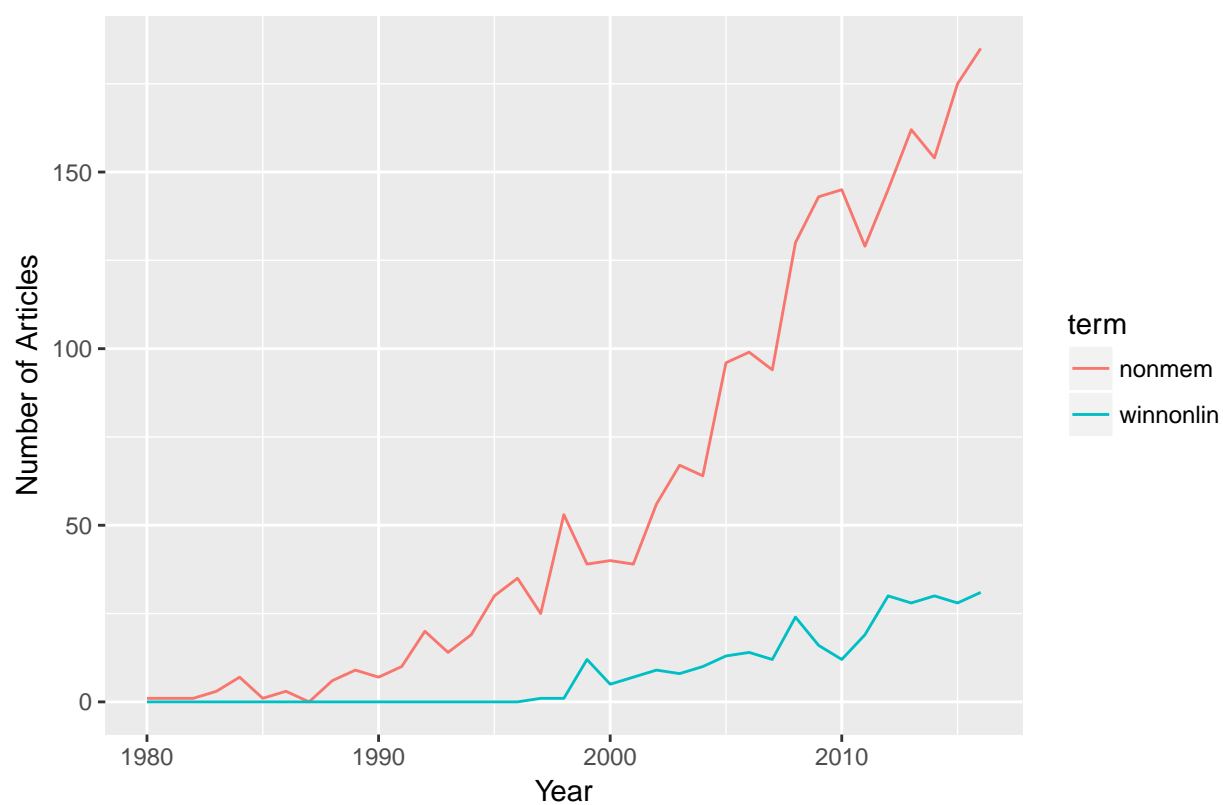
Figure 3: Publications utilizing NONMEM or WinNonLin



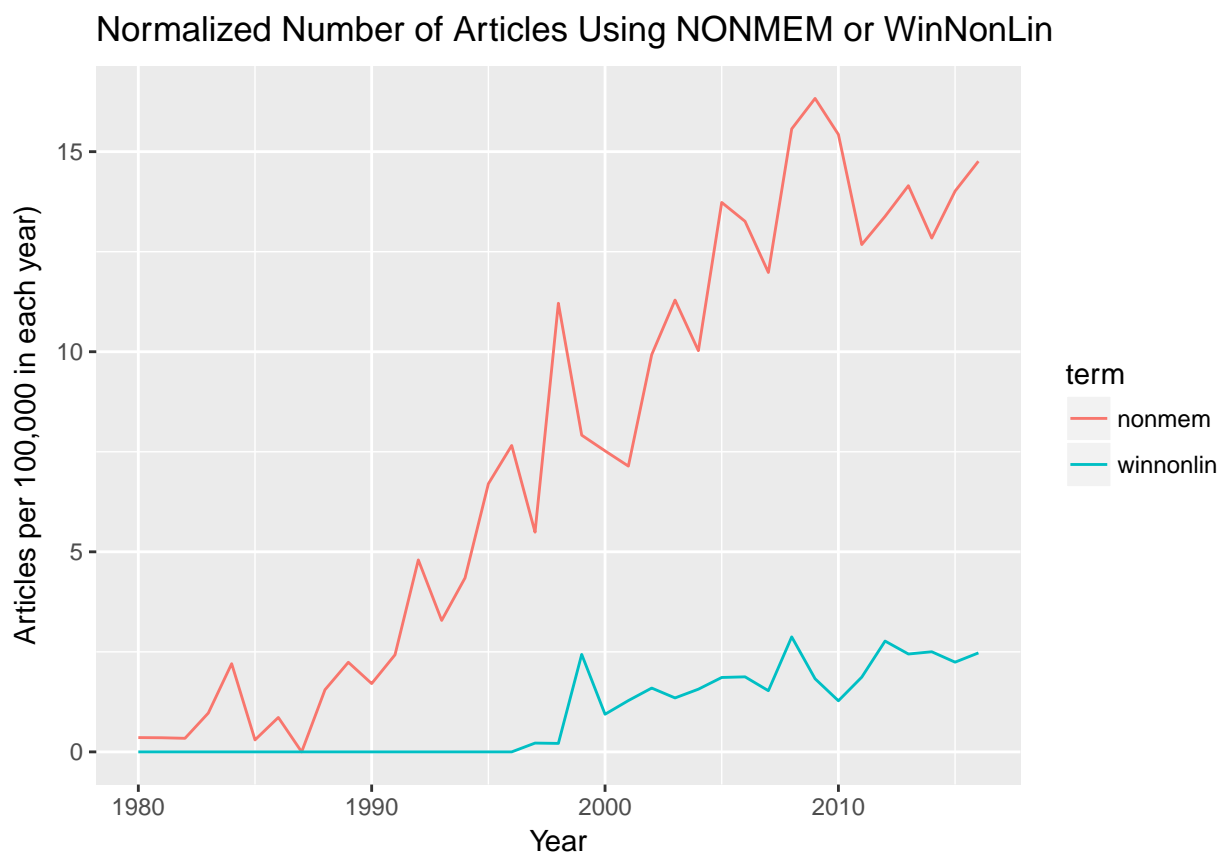
Line Plots

```
ggplot(Dataset, aes(x=year, y=number, colour=term, group=term)) +  
  geom_line() +  
  xlab("Year") + ylab("Articles") +  
  ggtitle("Number of Articles Using NONMEM or WinNonLin") +  
  xlab("Year") + ylab("Number of Articles")
```

Number of Articles Using NONMEM or WinNonLin



```
ggplot(Dataset, aes(x=year, y=freq, colour=term, group=term)) +  
  geom_line() +  
  xlab("Year") + ylab("Articles per 100,000 in each year") +  
  ggtitle("Normalized Number of Articles Using NONMEM or WinNonLin")
```



Raw data

Results from a PubMed search for the term, NONMEM were listed.

```
knitr::kable(RawData, caption = "Raw data of the number of publications utilizing NONMEM.")
```

Table 1: Raw data of the number of publications utilizing NONMEM.

year	nonmem	winnonlin
1980	1	0
1981	1	0
1982	1	0
1983	3	0
1984	7	0
1985	1	0
1986	3	0
1987	0	0
1988	6	0
1989	9	0
1990	7	0
1991	10	0
1992	20	0
1993	14	0
1994	19	0
1995	30	0

year	nonmem	winnonlin
1996	35	0
1997	25	1
1998	53	1
1999	39	12
2000	40	5
2001	39	7
2002	56	9
2003	67	8
2004	64	10
2005	96	13
2006	99	14
2007	94	12
2008	130	24
2009	143	16
2010	145	12
2011	129	19
2012	145	30
2013	162	28
2014	154	30
2015	175	28
2016	185	31

Conclusion

The total number of articles using NONMEM is 2207 and the total number of articles using WinNonLin is 310.

The number of publications utilizing NONMEM or WinNonLin tends to increase. The percentage of the number of papers per 100,000 in the medline database in each year also increases but articles using NONMEM seem to increase faster.

References

- R Core Team. 2017. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Wickham, Hadley, and Winston Chang. 2016. *Ggplot2: Create Elegant Data Visualisations Using the Grammar of Graphics*. <https://CRAN.R-project.org/package=ggplot2>.