

Section A

```
In [2]: import time
start_time = time.process_time()

with open('kosarak.dat') as f:
    lines = f.read().split( '\n')

articles = []
users = []

for line in lines:
    stripped_line = line.rstrip()
    if stripped_line != "":
        line_components = stripped_line.split(' ')
        user_articles = set()

        for article in line_components:
            if article != "":
                article_num = int(article)
                if article_num not in articles:
                    articles.append(article_num)
                user_articles.add(article_num)
        users.append(sorted(user_articles))

article_strings = ["@attribute news%d {0,1}" % (num - 1) for num in articles]
user_strings = [{"%s}" % ", ".join ("%d 1" % (num - 1) for num in user) for user in users]
all_lines = ["@relation kosarak"] + article_strings + ["@data"] + user_strings
with open("kosarak.arff", "w") as f:
    for line in all_lines:
        f.write(line + "\n")

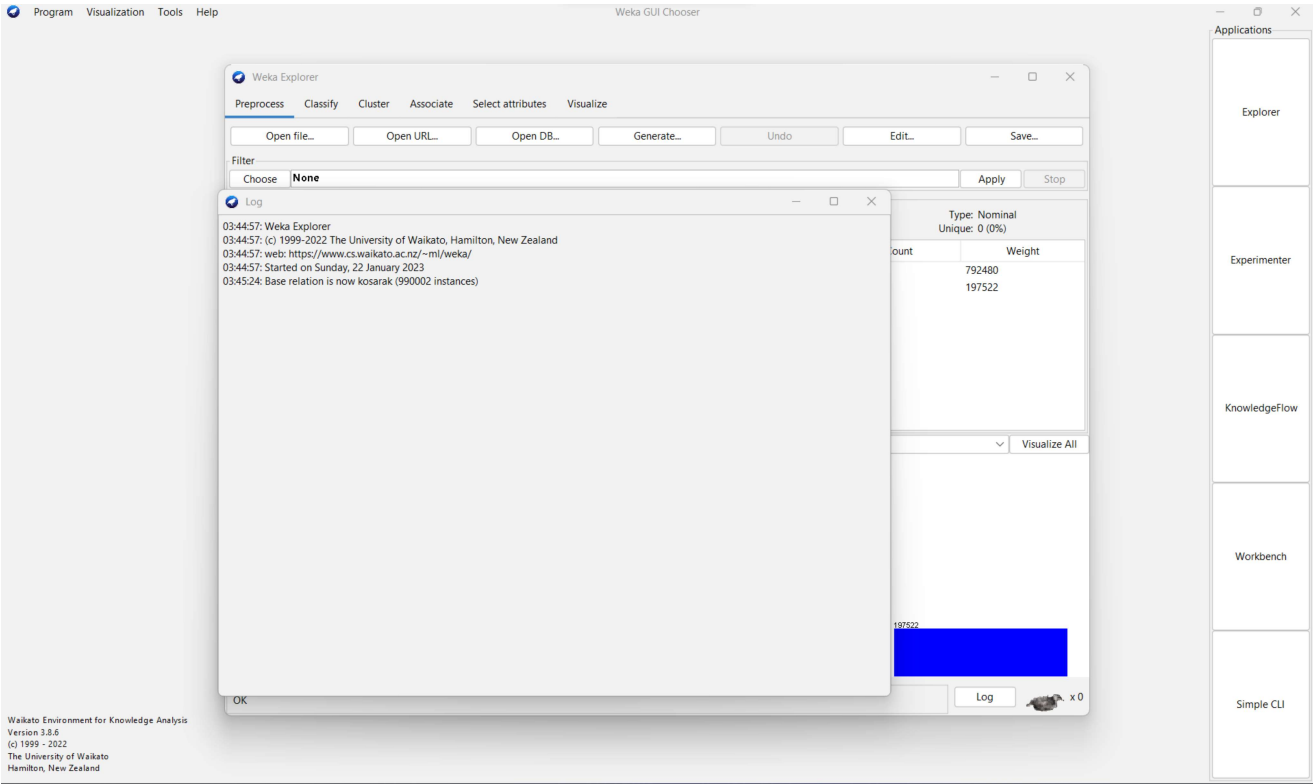
print(f"Time elapsed: {time.process_time() - start_time} seconds")
```

Time elapsed: 237.79842923700002 seconds

Section B

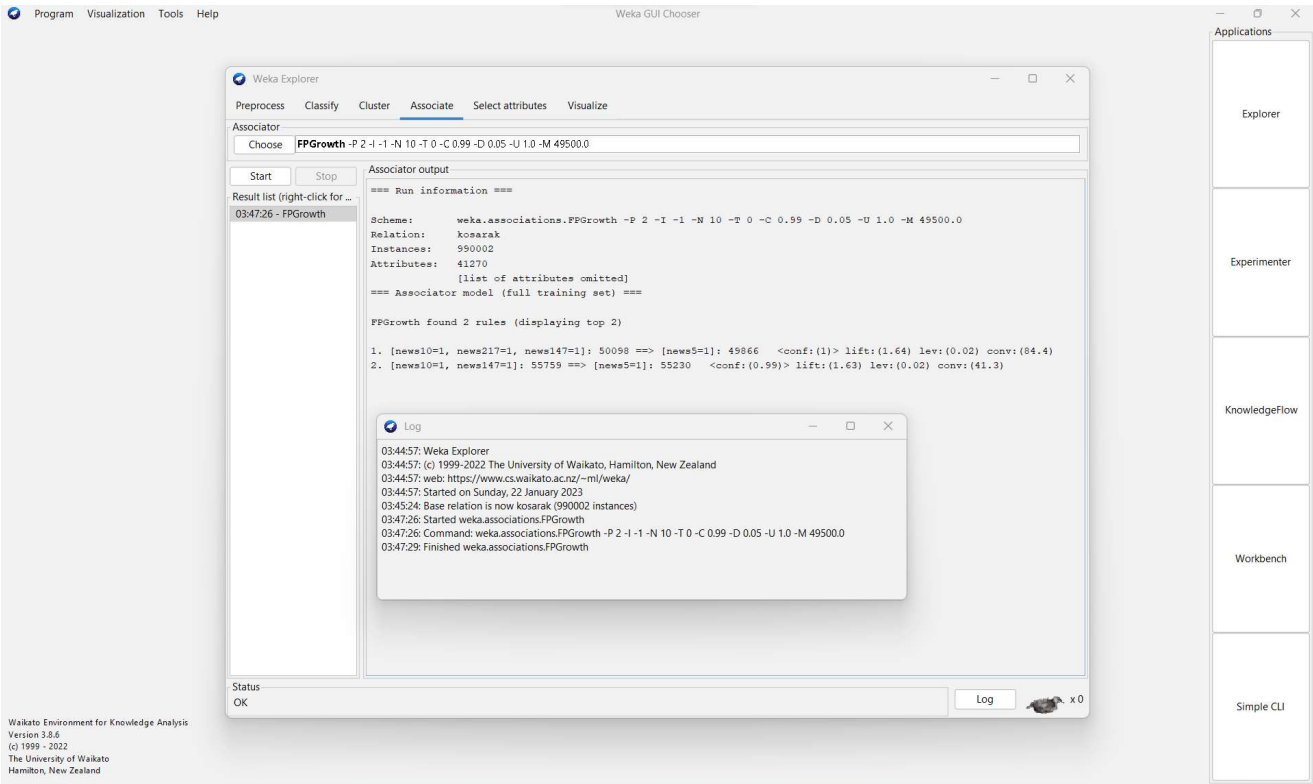
The time taken for converting kosark.dat to kosark.arff file is 237.79 seconds.

Section C



The time taken to load the file in Weka was 27 seconds.

Section D



Type Markdown and LaTeX: α^2

Section E

The screenshot shows the Weka Explorer interface with the FPBGrowth algorithm selected. The main window displays the following output:

```

=== Run information ===

Scheme:      weka.associations.FPBGrowth -P 2 -I -1 -N 10 -T 0 -C 0.99 -D 0.05 -U 1.0 -M 49500.0
Relation:    kosarak
Instances:   990002
Attributes:  41270
              (list of attributes omitted)

=== Associator model (full training set) ===

FPBGrowth found 2 rules (displaying top 2)

1. [news10=1, news217=1, news147=1]: 50098 ==> [news5=1]: 49866 <conf:(1)> lift:(1.64) lev:(0.02) conv:(84.4)
2. [news10=1, news147=1]: 55759 ==> [news5=1]: 55230 <conf:(0.99)> lift:(1.63) lev:(0.02) conv:(41.3)
  
```

A log window is open, showing the execution details of the FPBGrowth algorithm, including the command used and the time taken for each step.

```

Log

03:44:57: Weka Explorer
03:44:57: (c) 1999-2022 The University of Waikato, Hamilton, New Zealand
03:44:57: web: https://www.cs.waikato.ac.nz/~ml/weka/
03:44:57: Started on Sunday, 22 January 2023
03:45:24: Base relation is now kosarak (990002 instances)
03:47:26: Started weka.associations.FPBGrowth
03:47:26: Command: weka.associations.FPBGrowth -P 2 -I -1 -N 10 -T 0 -C 0.99 -D 0.05 -U 1.0 -M 49500.0
03:47:29: Finished weka.associations.FPBGrowth
03:56:47: Started weka.associations.FPBGrowth
03:56:47: Command: weka.associations.FPBGrowth -P 2 -I -1 -N 10 -T 0 -C 0.99 -D 0.05 -U 1.0 -M 49500.0
03:56:50: Finished weka.associations.FPBGrowth
03:56:52: Started weka.associations.FPBGrowth
03:56:52: Command: weka.associations.FPBGrowth -P 2 -I -1 -N 10 -T 0 -C 0.99 -D 0.05 -U 1.0 -M 49500.0
03:56:55: Finished weka.associations.FPBGrowth
03:56:58: Started weka.associations.FPBGrowth
03:56:58: Command: weka.associations.FPBGrowth -P 2 -I -1 -N 10 -T 0 -C 0.99 -D 0.05 -U 1.0 -M 49500.0
03:57:01: Finished weka.associations.FPBGrowth
03:57:02: Started weka.associations.FPBGrowth
03:57:02: Command: weka.associations.FPBGrowth -P 2 -I -1 -N 10 -T 0 -C 0.99 -D 0.05 -U 1.0 -M 49500.0
03:57:05: Finished weka.associations.FPBGrowth
03:57:07: Started weka.associations.FPBGrowth
03:57:07: Command: weka.associations.FPBGrowth -P 2 -I -1 -N 10 -T 0 -C 0.99 -D 0.05 -U 1.0 -M 49500.0
03:57:10: Finished weka.associations.FPBGrowth
  
```

For the first time it took 3 seconds.

For the second time it took 7 seconds.

The third time it took 6 seconds.

The fourth time it took 4 seconds.

The fifth time took 5 seconds.

The Average time taken is 5 seconds which is way less than the time taken to convert the dataset and then load into Weka.