Assignment 2: Dataflow analysis using Intel Pin

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Benchmarks

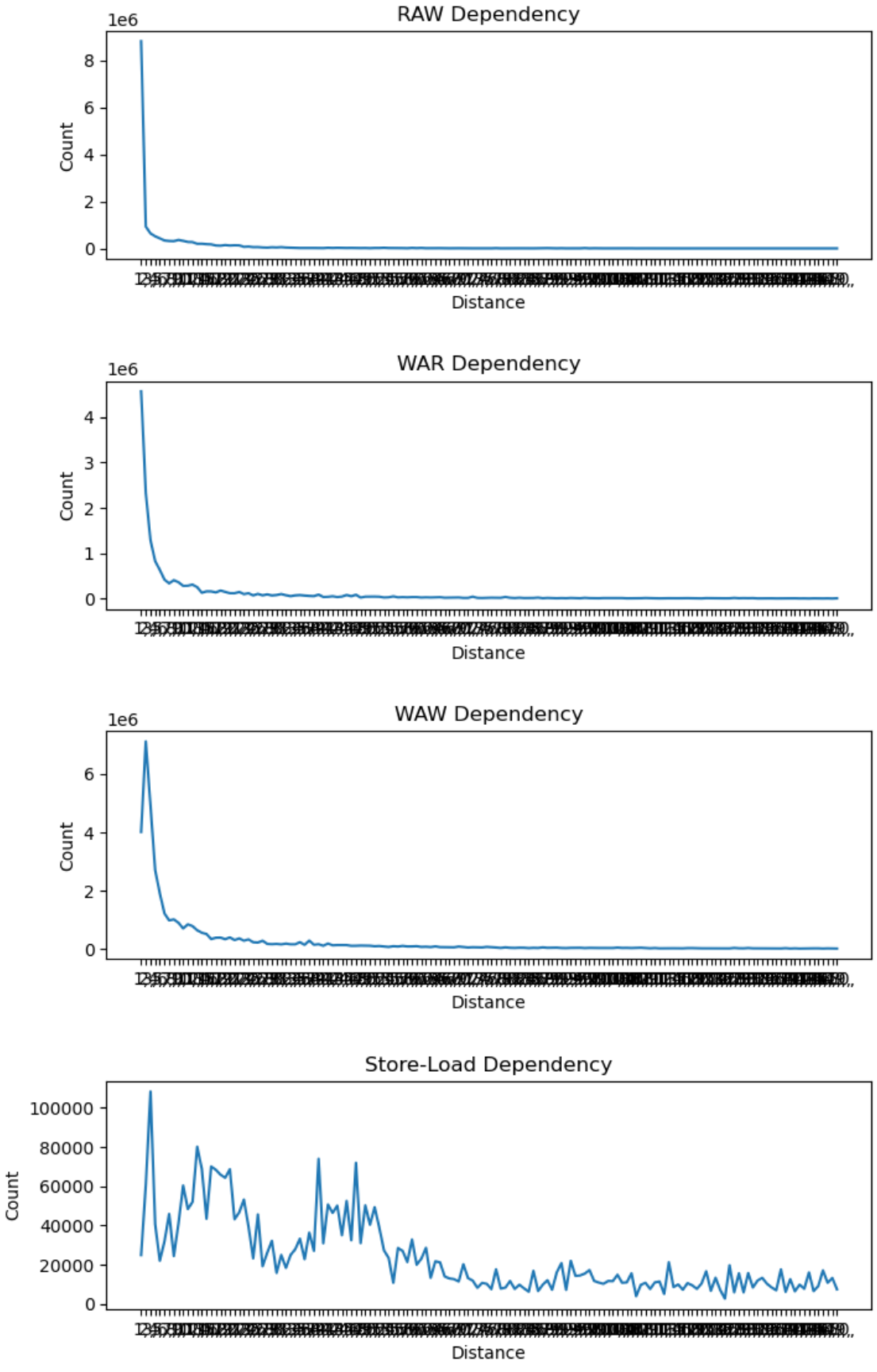
gcc

Observations:

1.The RAW and WAR dependencies have their peaks at lower RAW and WAR distance. Dependencies decrease as the RAW and WAR distance increases i.e the no. of short distance RAW and WAR dependencies is significantly higher than no. of long distance RAW and WAR dependencies. This indicates that instructions are often dependent on each other in close proximity.

2. The same is true for WAW dependencies, but it has been found that this peak occurs later rather than at distance = 1. Which means that, generally speaking, after a write command, we do not write to the same register again.

3. Similar to RAW, WAR, WAW as distance increases the dependencies decrease. Unlike other dependencies there are a lot of peaks in the Store-Load dependencies. These peaks occur at specific values of distance, we believe that this is due to the recurrent dynamic occurrence of store load pairs in loops.


Dependency Analysis of gcc
RAW Dependency
1e6
Count
Distance
WAR Dependency
1e6
Count
Distance
WAW Dependency
1e6
Count
Distance
Store-Load Dependency
Count
Distance

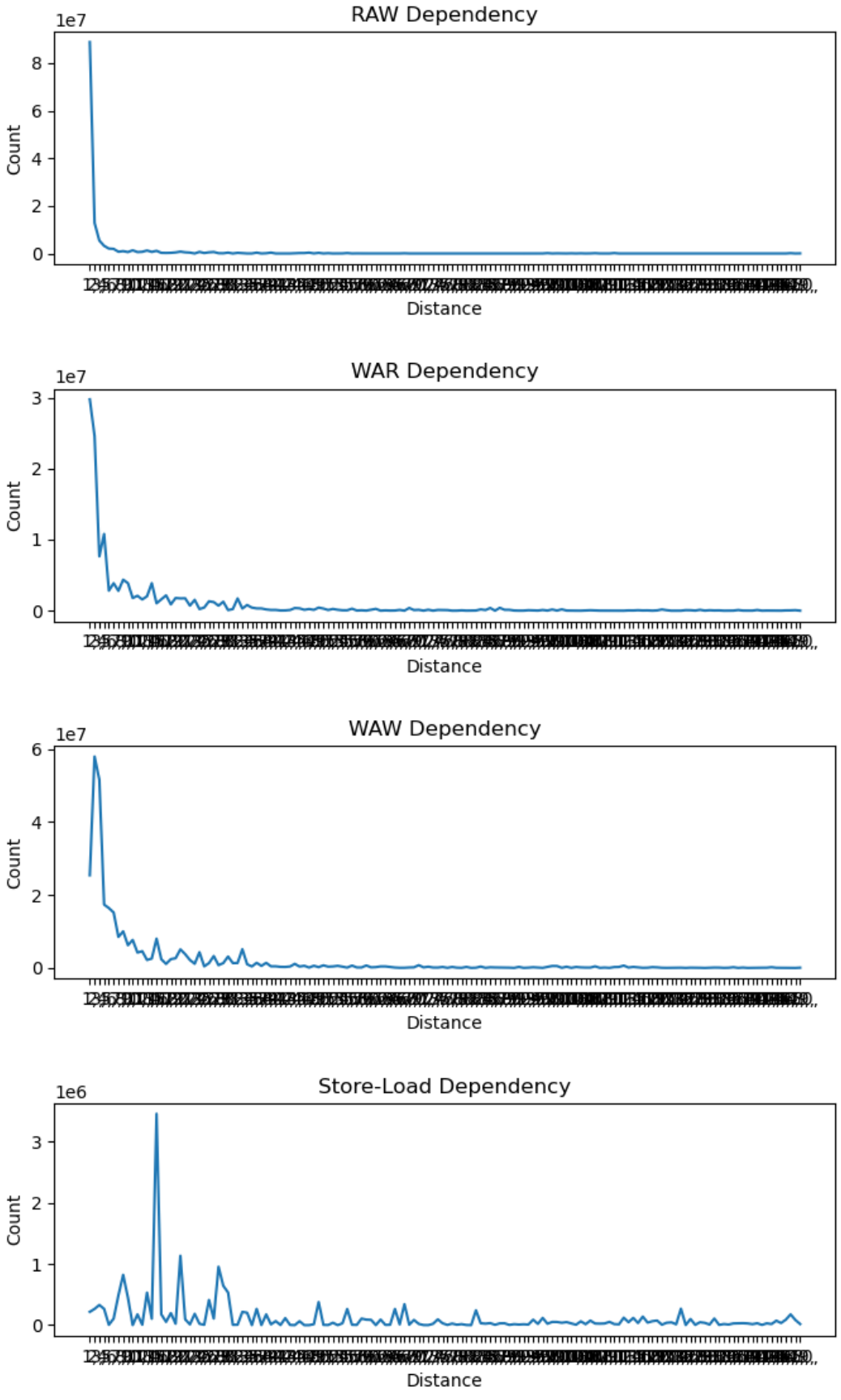
lbm

Observations:

1. Similar observations to gcc like as the distance increases number of dependencies decrease for RAW, WAR and WAW dependencies.

2. But compared to gcc the RAW, WAR and WAW dependencies are a little bit spread out, it indicates that the dependencies have more separation.

3. Similar to RAW, WAR, WAW as distance increases the dependencies decrease. Unlike other dependencies there are a lot of peaks in the Store-Load dependencies. These peaks occur at specific values of distance, we believe that this is due to the recurrent dynamic occurrence of store load pairs in loops.


Dependency Analysis of mcf
RAW Dependency
1e7
Count
Distance
WAR Dependency
1e7
Count
Distance
WAW Dependency
1e7
Count
Distance
Store-Load Dependency
1e6
Count
Distance

mcf

Observations:

1. Similar observations to gcc like as the distance increases number of dependencies decrease for RAW, WAR and WAW dependencies.

2. But compared to gcc the RAW, WAR and WAW dependencies are a little bit spread out, it indicates that the dependencies have more separation.

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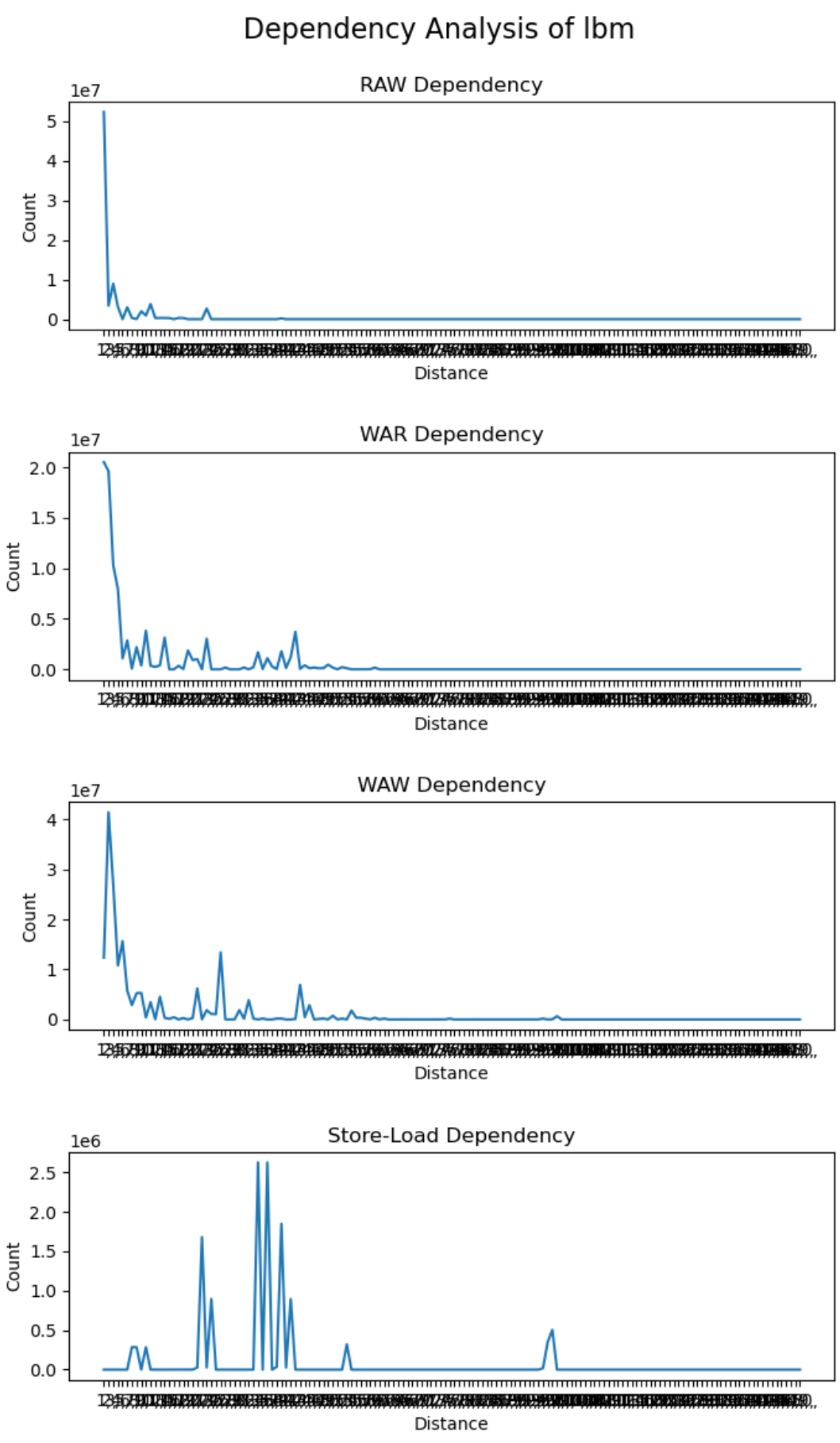
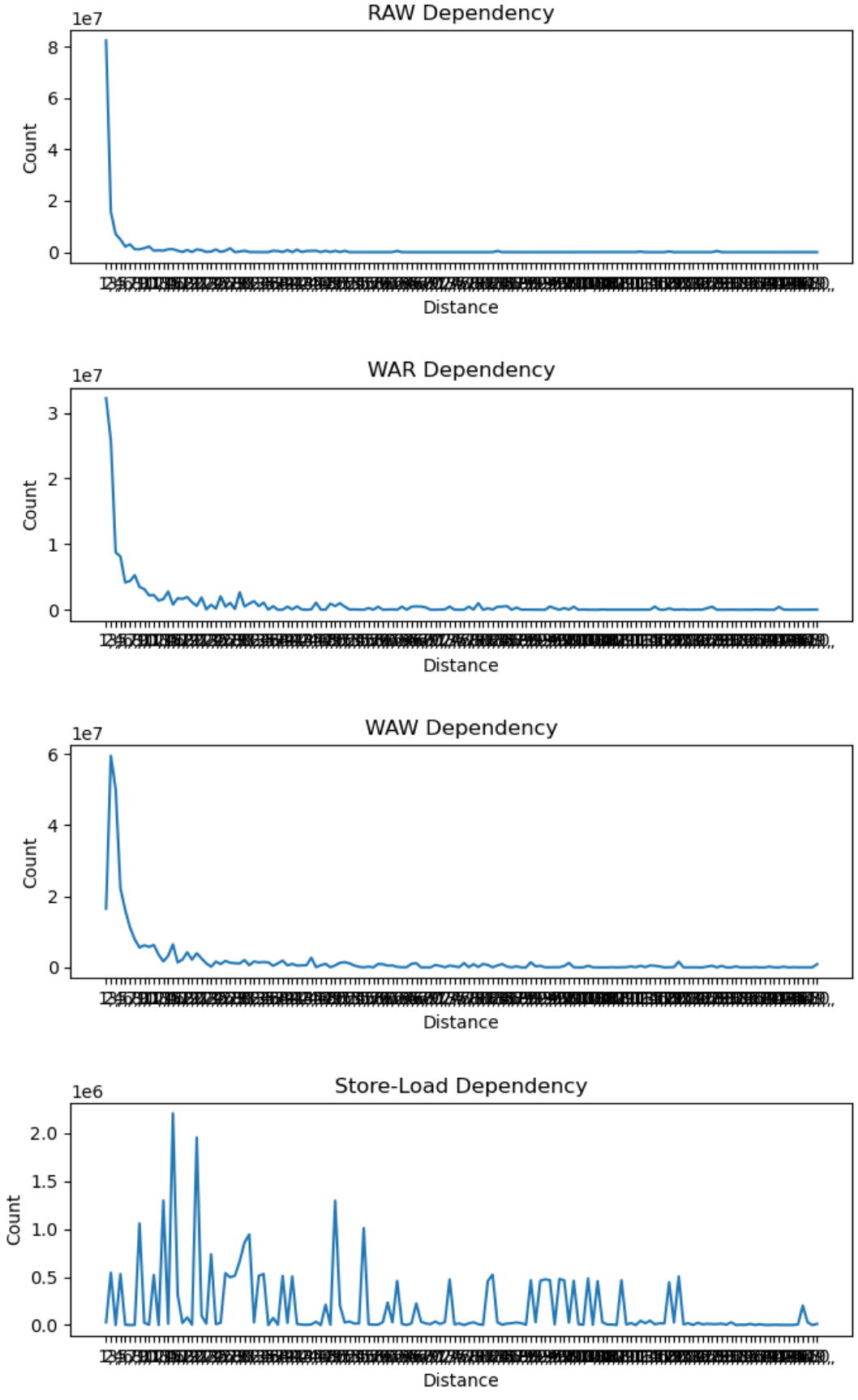

Dependency Analysis of lbm
RAW Dependency
1e7
Count
Distance
WAR Dependency
1e7
Count
Distance
WAW Dependency
1e7
Count
Distance
Store-Load Dependency
1e6
Count
Distance

namd

Observations:

1. Similar observations to gcc like as the distance increases number of dependencies decrease for RAW, WAR and WAW dependencies.

2. Similar to RAW, WAR, WAW as distance increases the dependencies decrease. Unlike other dependencies there are a lot of peaks in the Store-Load dependencies. These peaks occur at specific values of distance, we believe that this is due to the recurrent dynamic occurrence of store load pairs in loops.

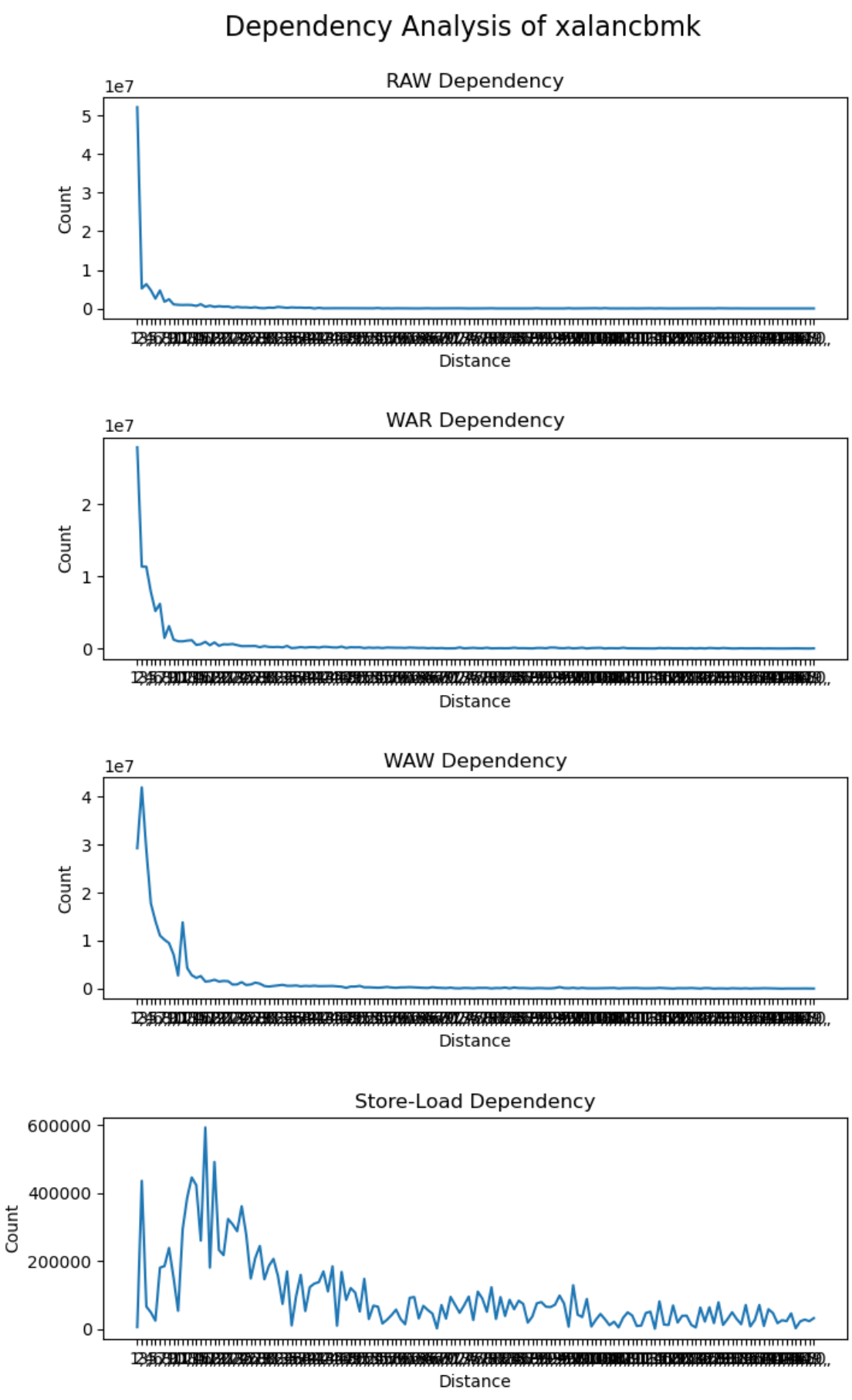

Dependency Analysis of namd
RAW Dependency
1e7
8
6
4
2
0
Count
Distance
WAR Dependency
1e7
3
2
1
0
Count
Distance
WAW Dependency
1e7
6
4
2
0
Count
Distance
Store-Load Dependency
1e6
2.0
1.5
1.0
0.5
0.0
Count
Distance

xalancbmk

Observations:

1. Similar observations to gcc like as the distance increases number of dependencies decrease for RAW, WAR and WAW dependencies.

2. Similar to RAW, WAR, WAW as distance increases the dependencies decrease. Unlike other dependencies there are a lot of peaks in the Store-Load dependencies. These peaks occur at specific values of distance, we believe that this is due to the recurrent dynamic occurrence of store load pairs in loops.


Dependency Analysis of xalancbmk
RAW Dependency
1e7
5
4
3
2
1
0
Count
Distance
WAR Dependency
1e7
2
1
0
Count
Distance
WAW Dependency
1e7
4
3
2
1
0
Count
Distance
Store-Load Dependency
600000
400000
200000
0
Count
Distance