A Comprehensive Study of Characterizing Program Execution Time

Young-Kyoon Suh
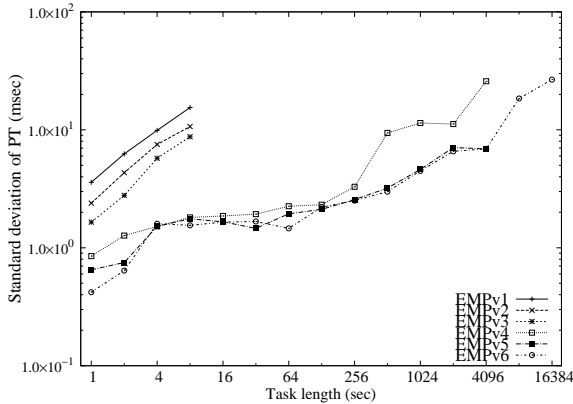
January 25, 2017

1   Experiment Notes
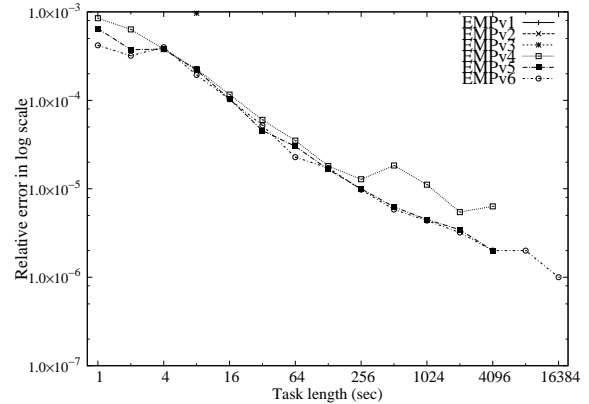
Task Length	Description	Time Length
INC1~INC64	Runs of 1000 samples (on `sodb12`).	2013-10-14 ~ 2013-10-15
INC128~INC2048	Runs of 300 samples (on `sodb12`).	2013-12-12 ~ 2013-12-21
INC4096	A run of 300 samples (on `sodb12`).	2014-06-23 ~ 2014-07-10
INC4096	A run of 40 samples (on `sodb12`).	2015-05-07 ~ 2015-05-09
INC8192	Runs of 40/40 samples (on `sodb12`).	2015-04-23 ~ 2015-04-27 / 2017-01-16 ~ 2017-01-20
INC16384	Runs of 40/40 samples (on `sodb12`).	2015-04-23 ~ 2015-04-23 / 2017-01-05 ~ 2017-01-13

Table 1: Notes on the regular INC data used for the histograms

2   Measurement Quality

(a) Standard Deviations of PT   (b) Relative Errors of PT

Figure 1: Measurement Quality Comparison among the EMP versions: updated with INC4096's another run

3 Histograms on the EMPv4 Data

We applied EMPv4 to the data described in Table 1, to get the following histograms.

3.1 ET

(a) ET frequency on INC1

(b) ET frequency on INC2
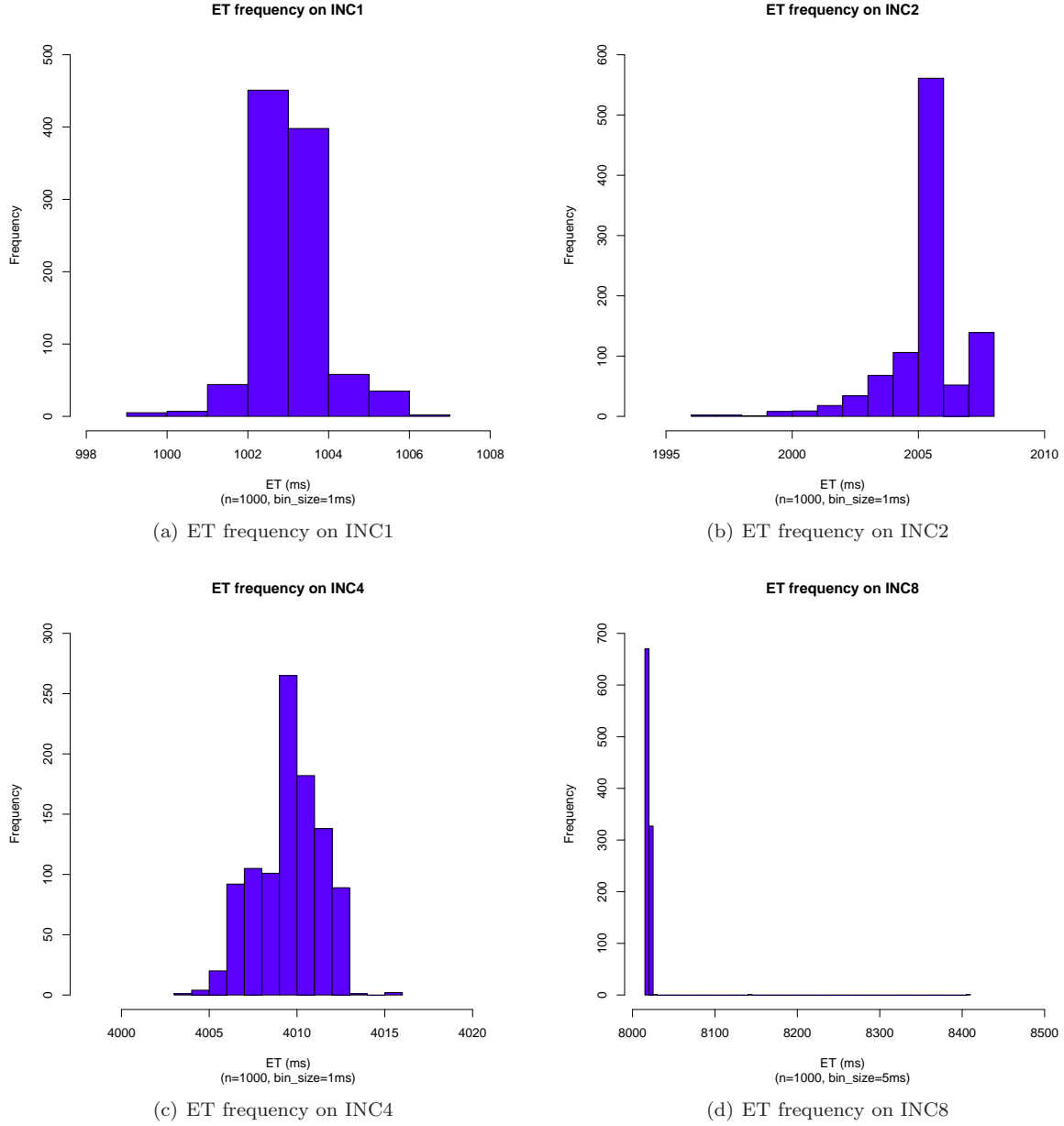
(c) ET frequency on INC4
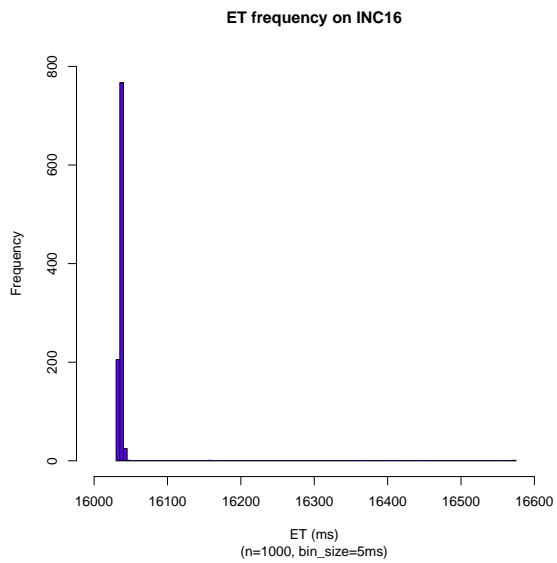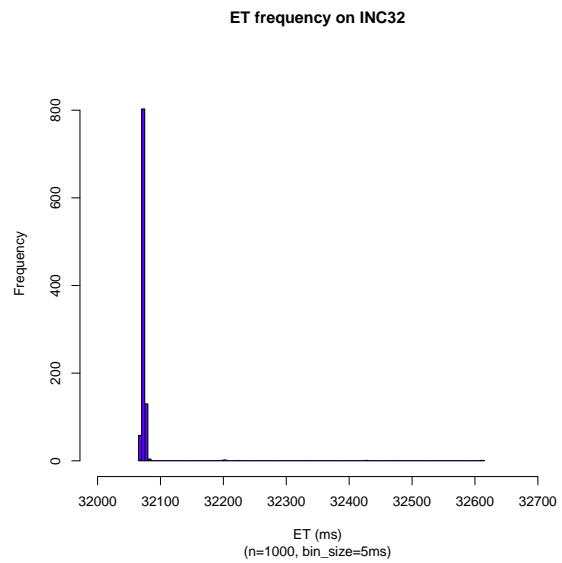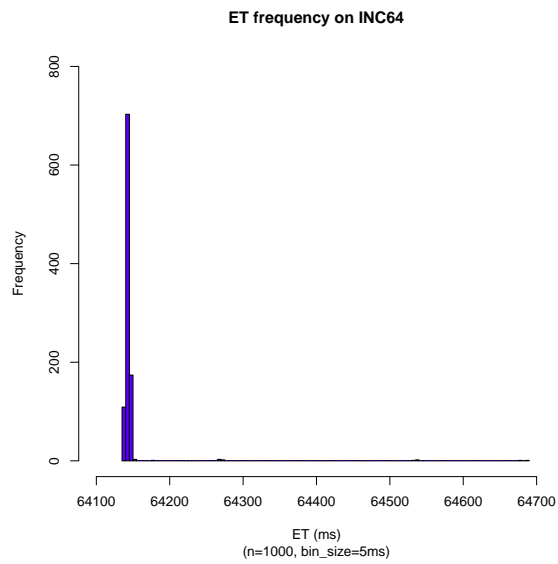
(d) ET frequency on INC8

Figure 2: ET Histograms of INC1 ... INC8
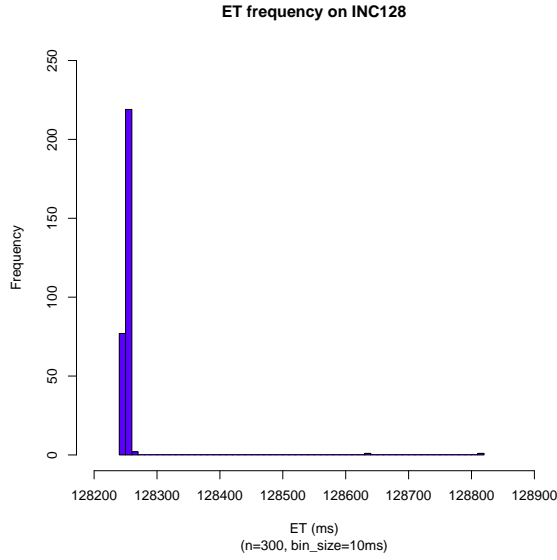
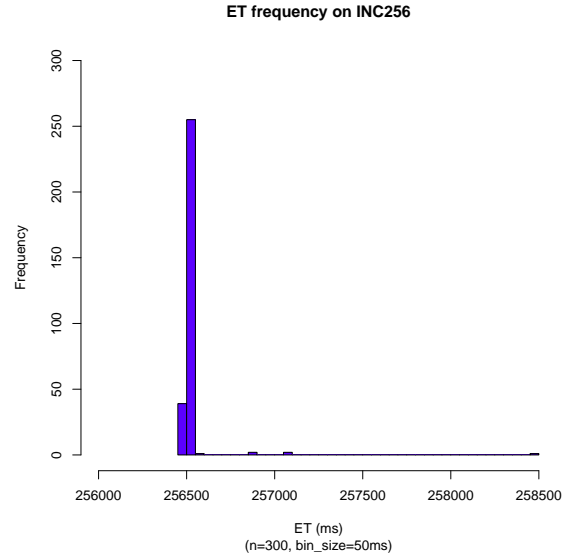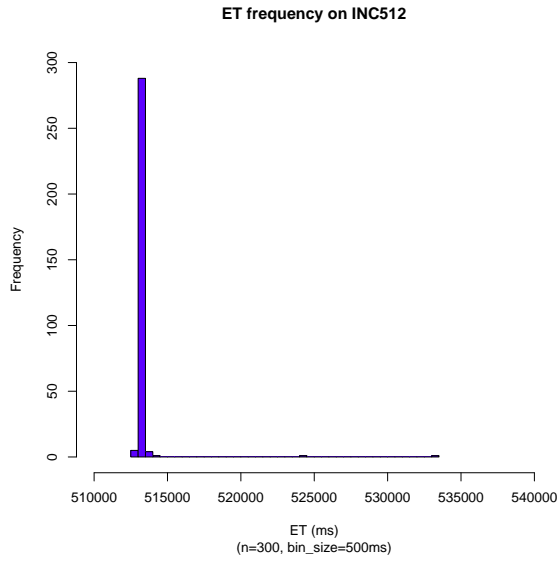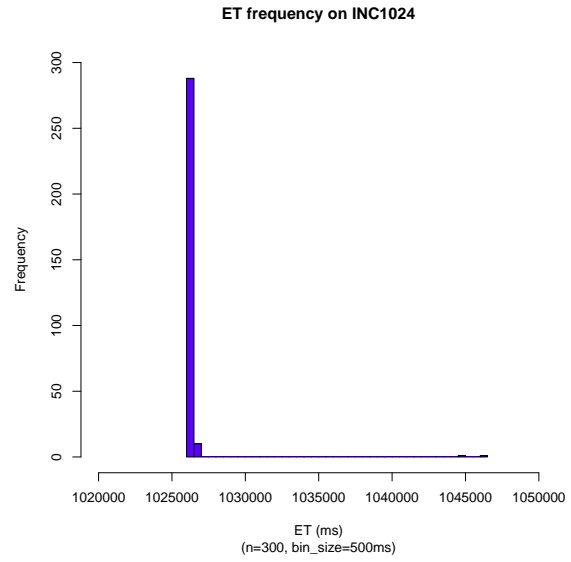(a) ET frequency on INC16

(b) ET frequency on INC32

(c) ET frequency on INC64

Figure 3: ET Histograms of INC16 ... INC64

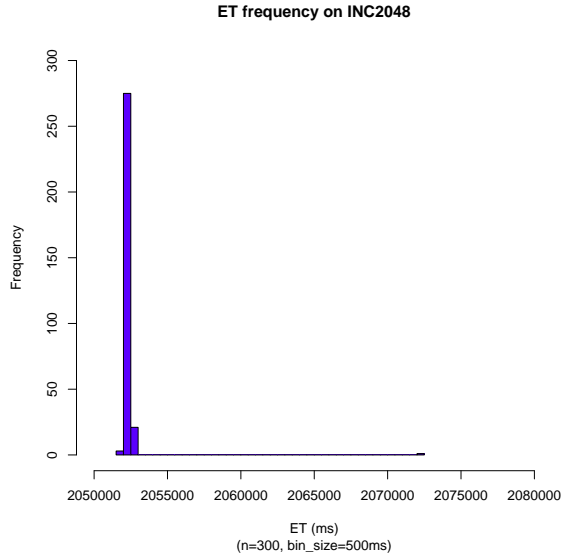(a) ET frequency on INC128
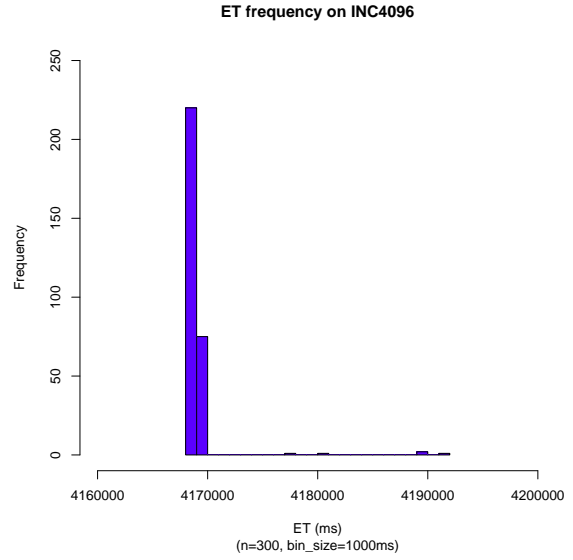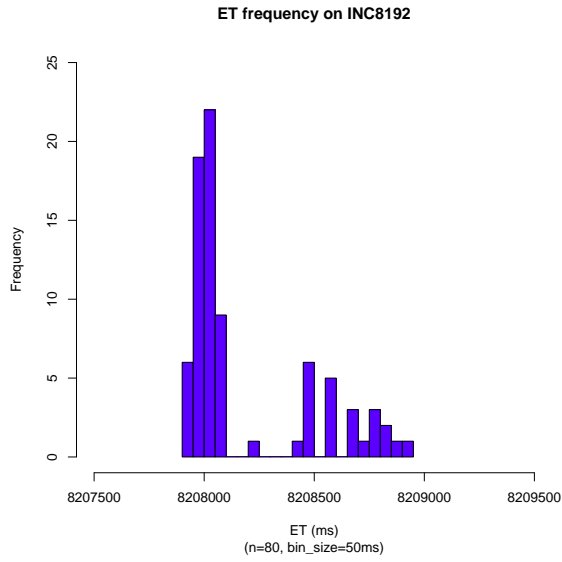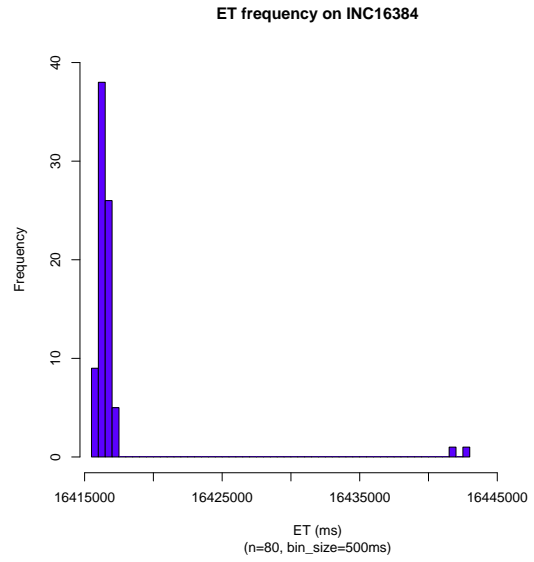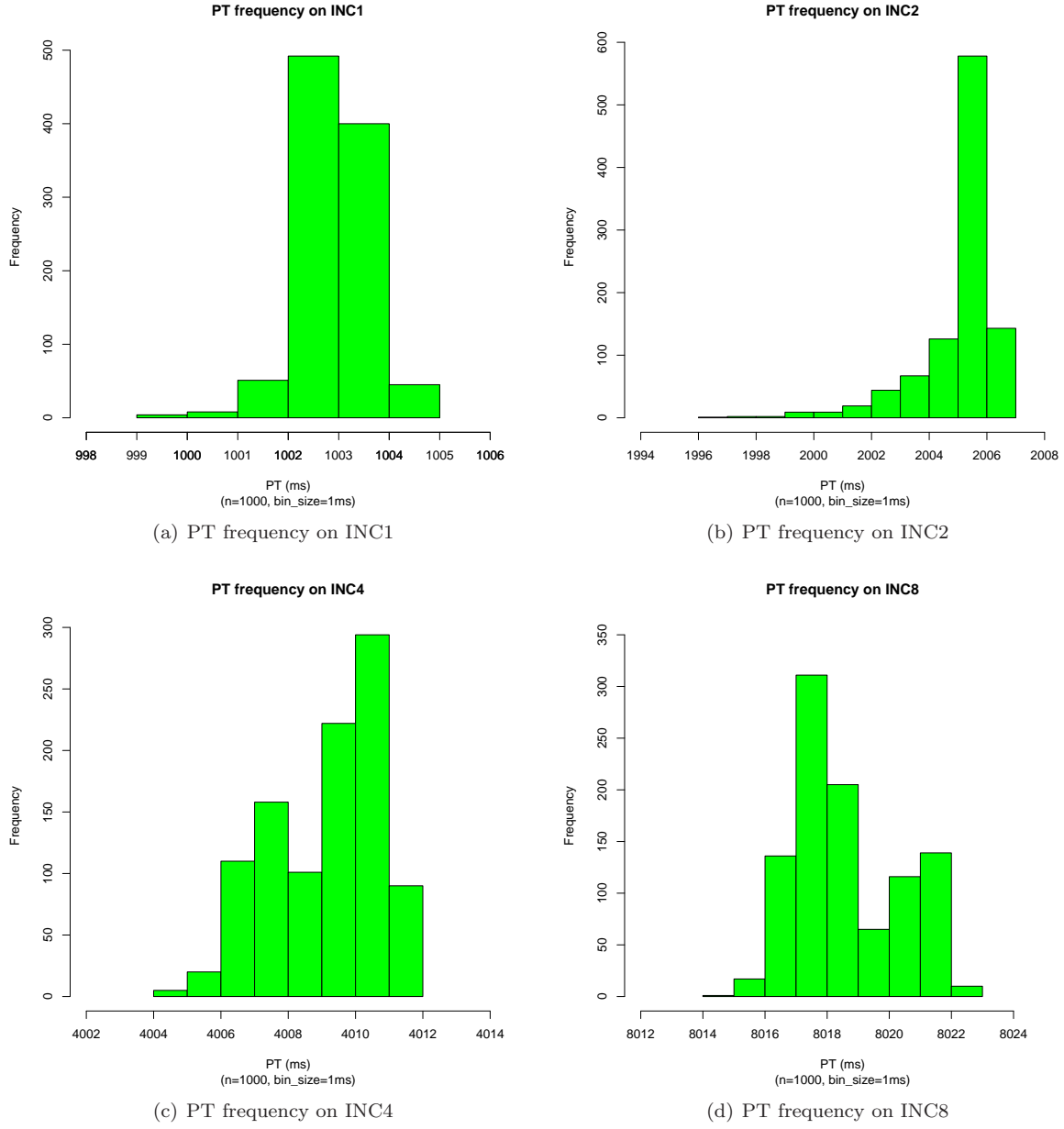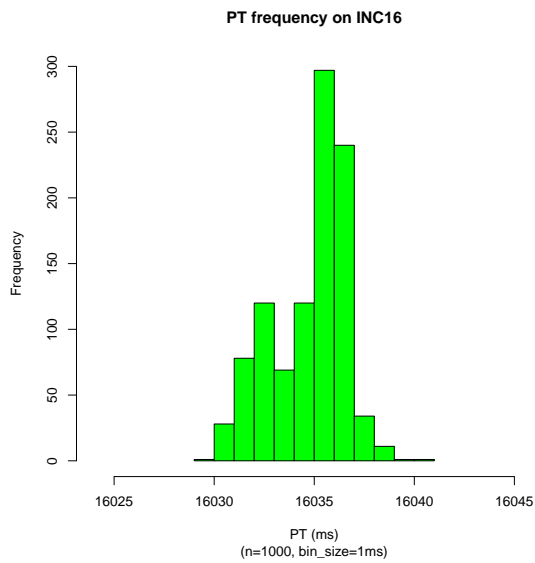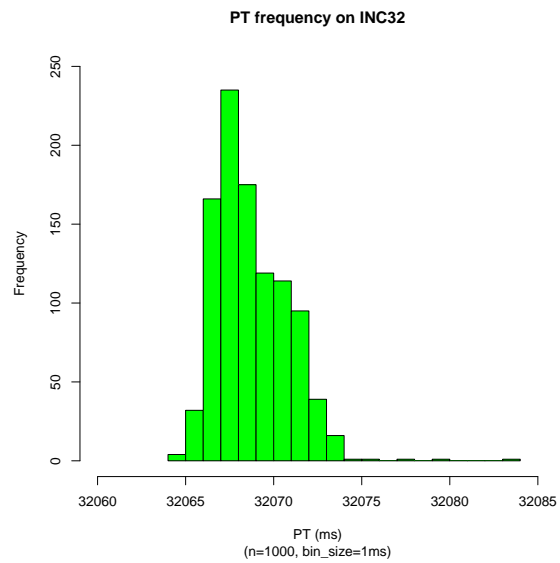
(b) ET frequency on INC256

(c) ET frequency on INC512

(d) ET frequency on INC1024

Figure 4: ET Histograms of INC128 ... INC1024

ET frequency on INC2048

(a) ET frequency on INC2048

ET frequency on INC4096

(b) ET frequency on INC4096

ET frequency on INC8192

(c) ET frequency on INC8192

ET frequency on INC16384

(d) ET frequency on INC16384

Figure 5: ET Histograms of INC2048 ... INC16384
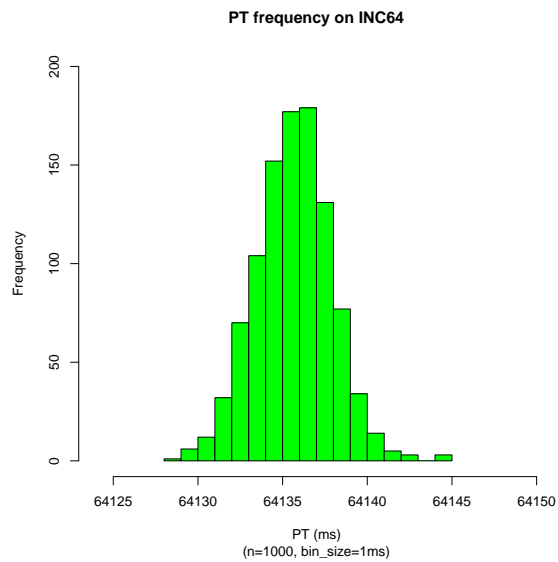
3.2 PT

(a) PT frequency on INC1

(b) PT frequency on INC2

(c) PT frequency on INC4

(d) PT frequency on INC8

Figure 6: PT Histograms of INC1 ... INC8
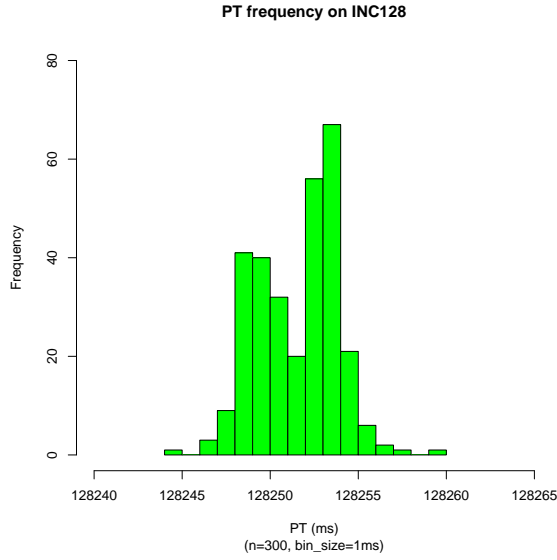
(a) PT frequency on INC16
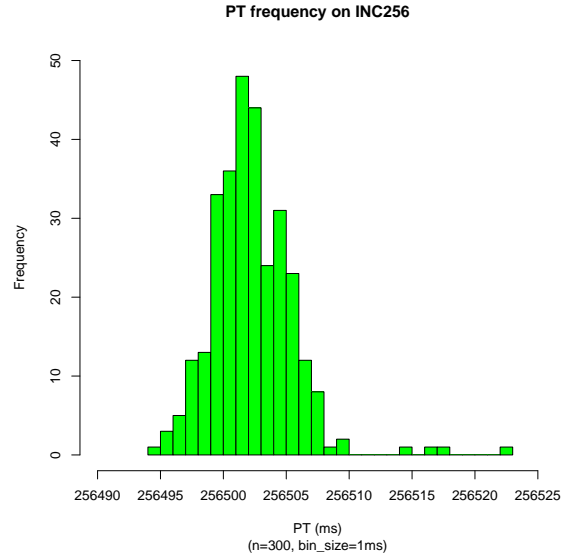

(b) PT frequency on INC32
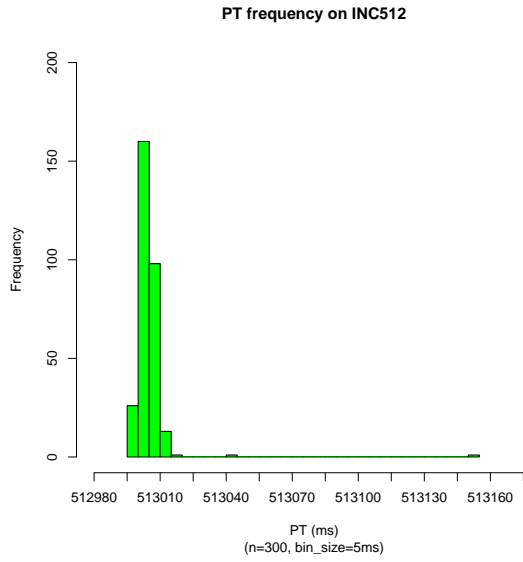

(c) PT frequency on INC64
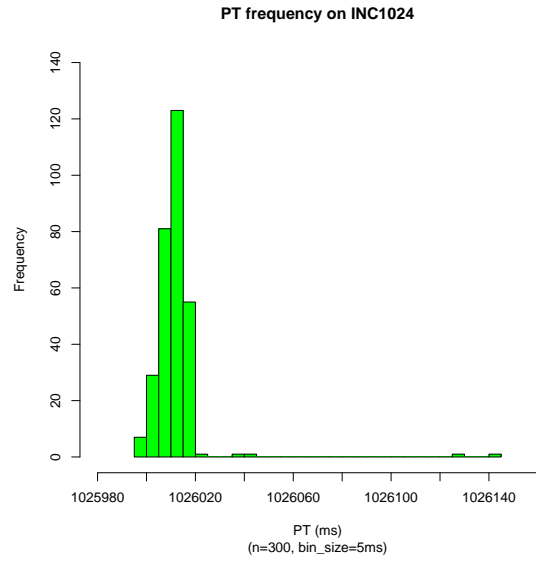
Figure 7: PT Histograms of INC16 ... INC64

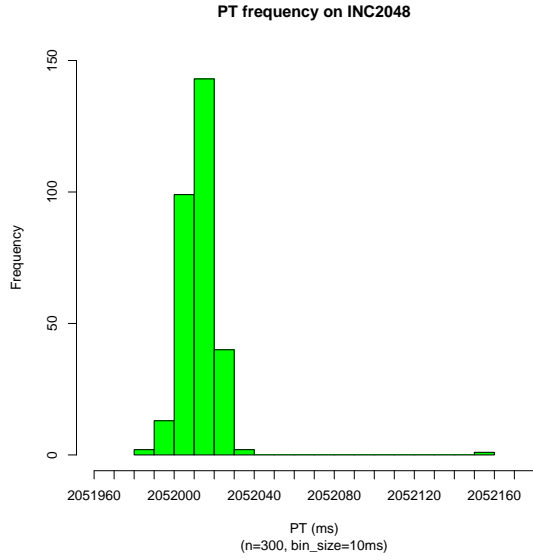(a) PT frequency on INC128

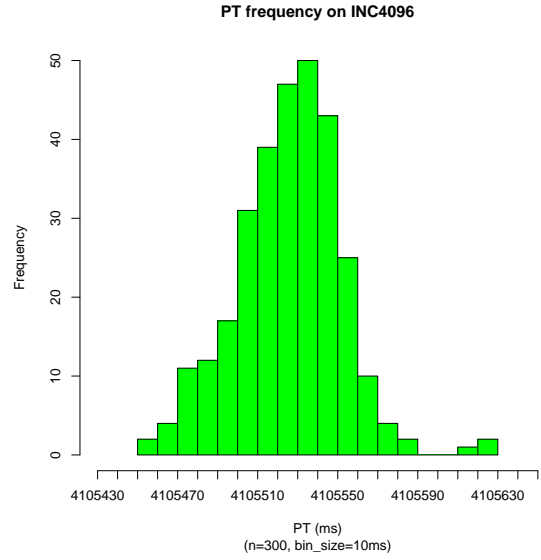(b) PT frequency on INC256

(c) PT frequency on INC512
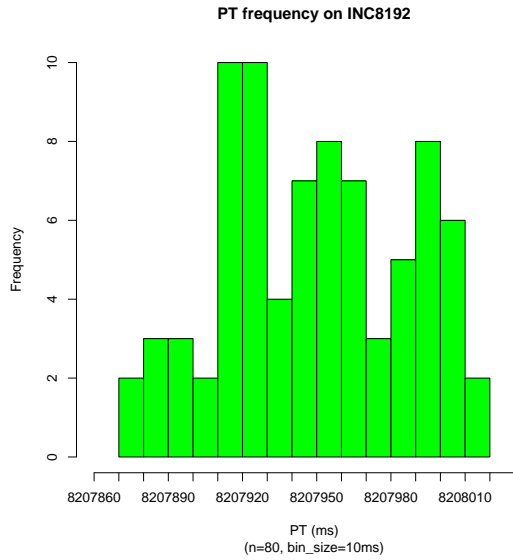
(d) PT frequency on INC1024

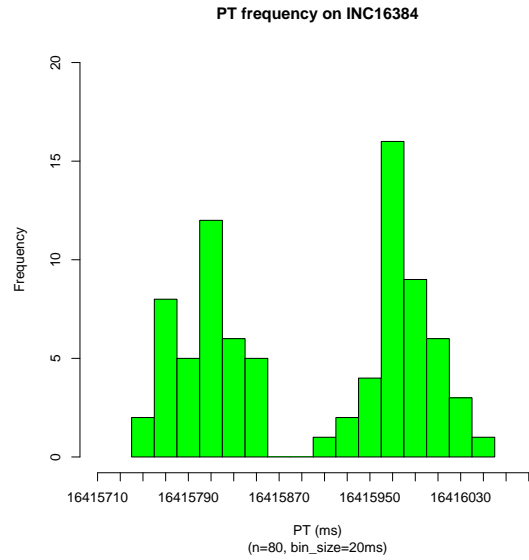Figure 8: PT Histograms of INC128 ... INC1024

(a) PT frequency on INC2048

(b) PT frequency on INC4096

(c) PT frequency on INC8192

(d) PT frequency on INC16384

Figure 9: PT Histograms of INC2048 ... INC16384

4 Histograms on the EMPv5 Data

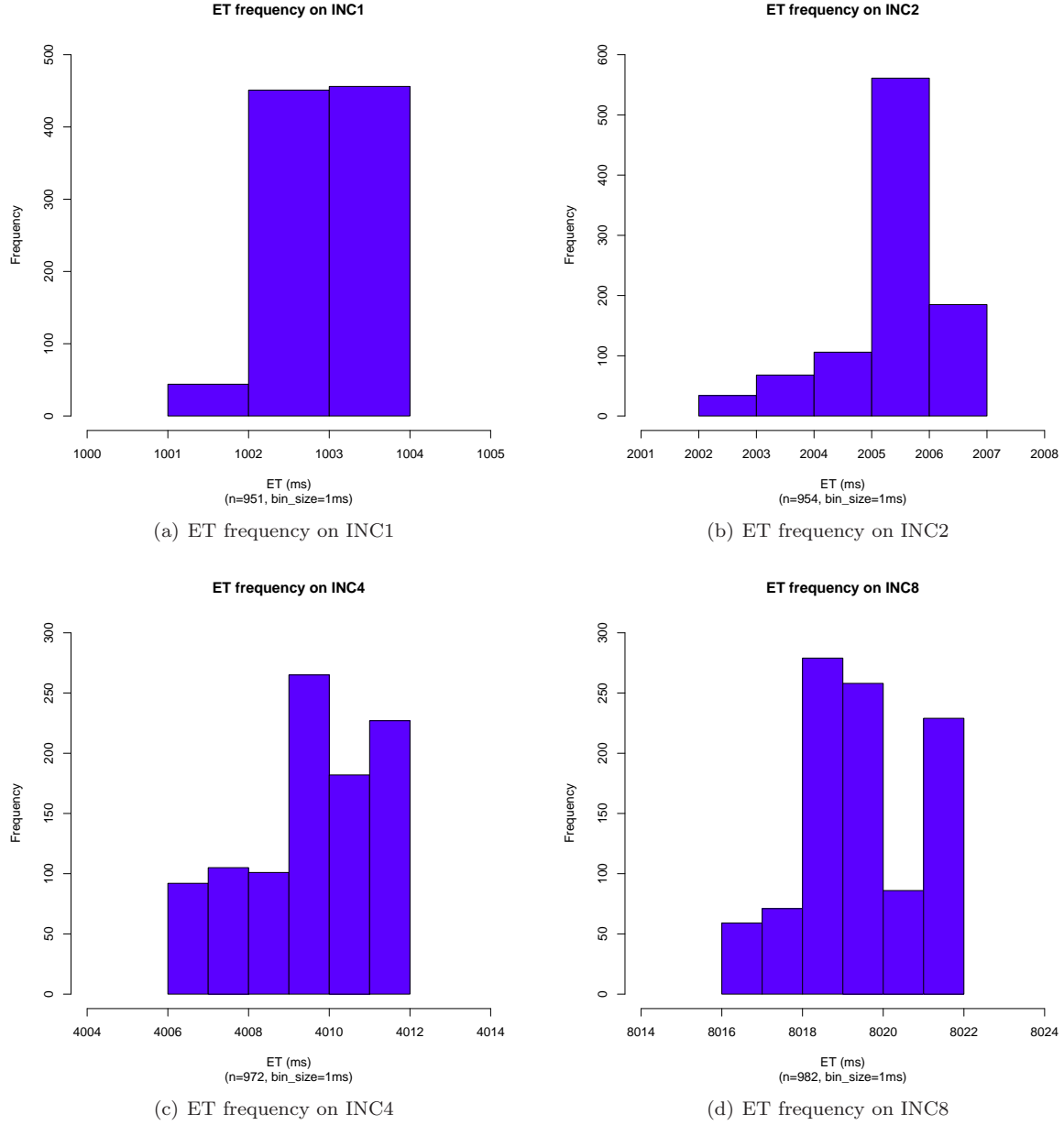We applied EMPv5 to the data described in Table 1, to get the following histograms.

4.1 ET

(a) ET frequency on INC1

(b) ET frequency on INC2

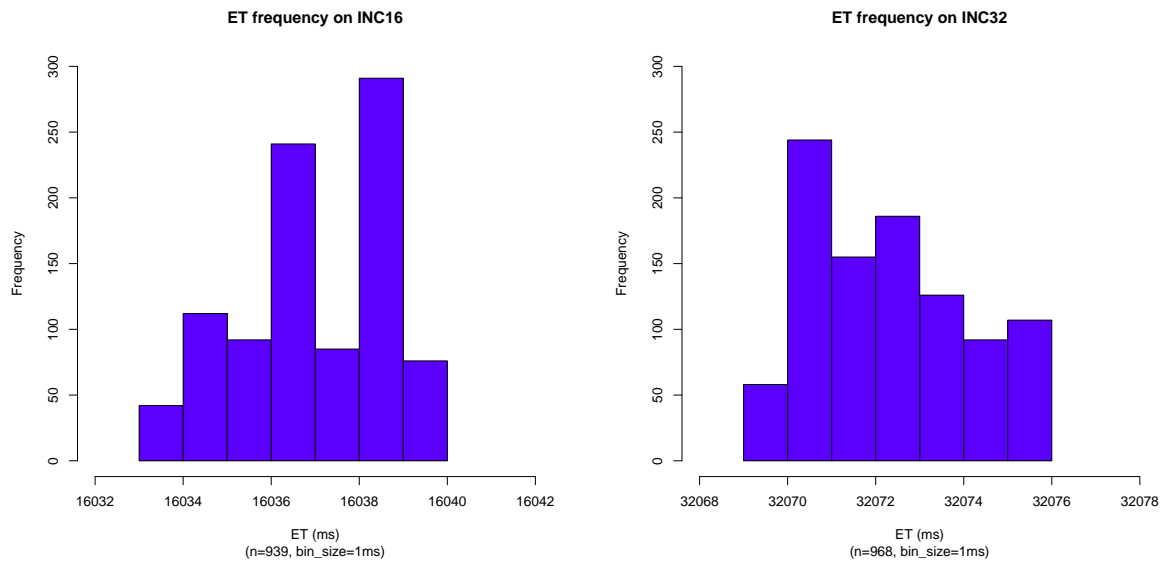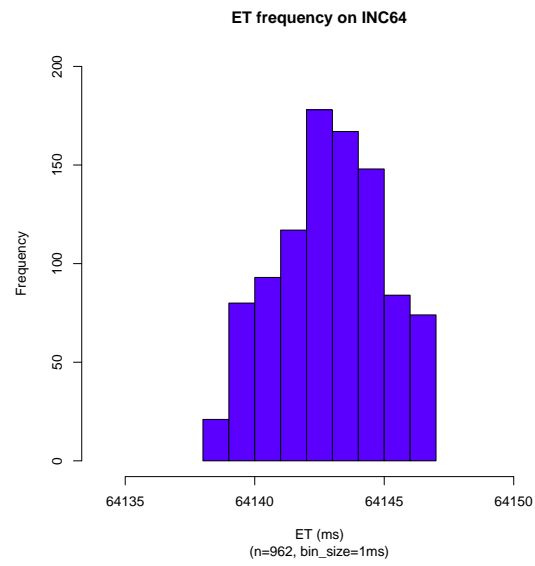(c) ET frequency on INC4

(d) ET frequency on INC8

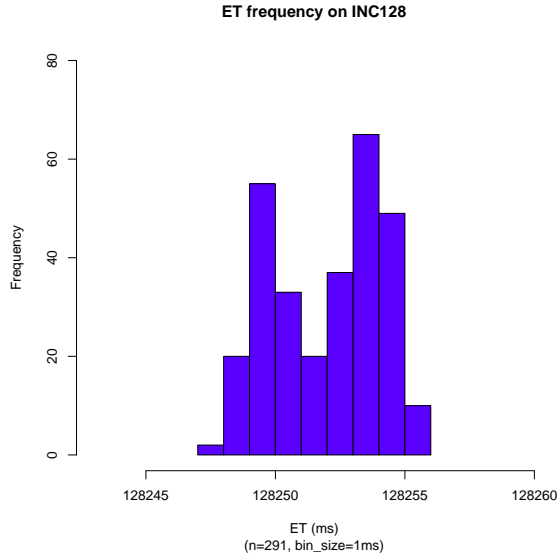Figure 10: ET Histograms of INC1 ... INC8

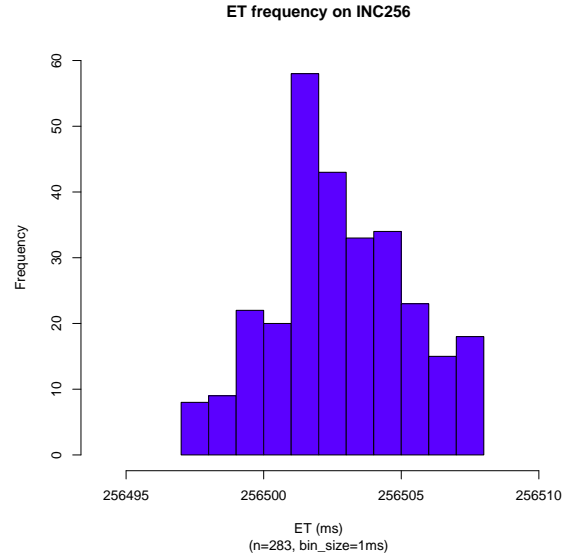(a) ET frequency on INC16

(b) ET frequency on INC32
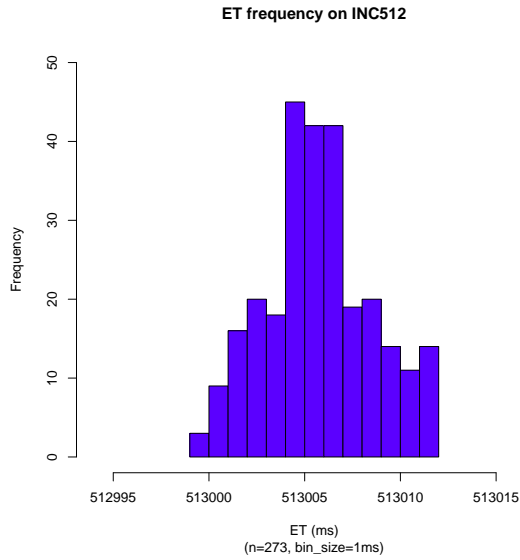

(c) ET frequency on INC64
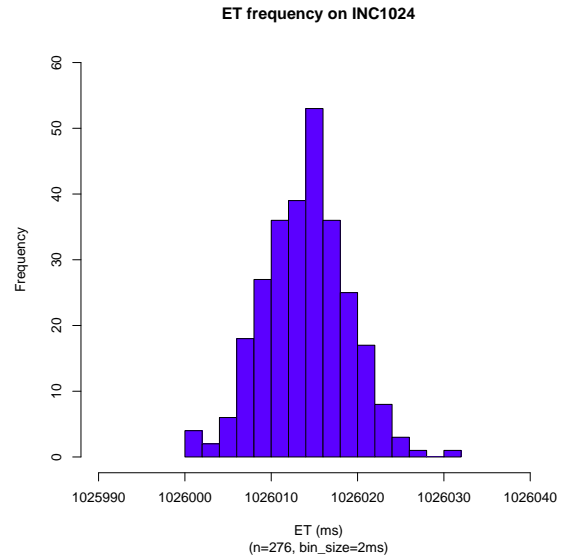
Figure 11: ET Histograms of INC16 ... INC64

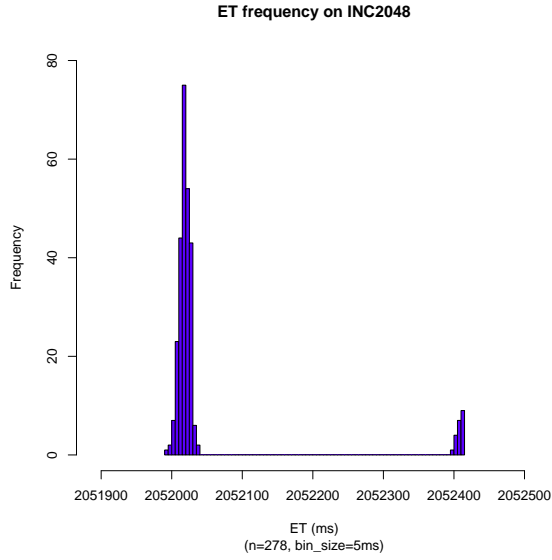(a) ET frequency on INC128

(b) ET frequency on INC256
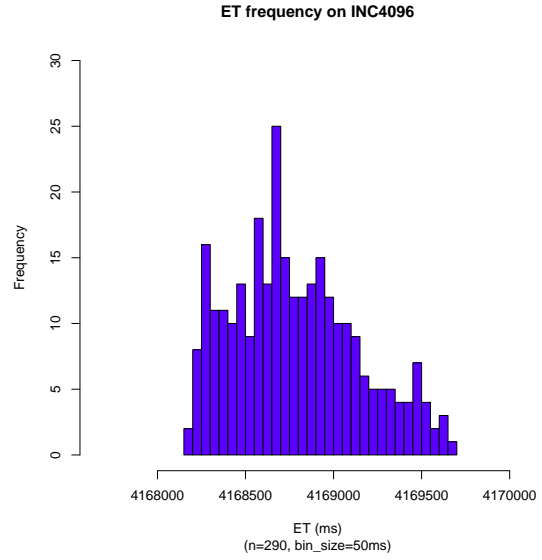
(c) ET frequency on INC512
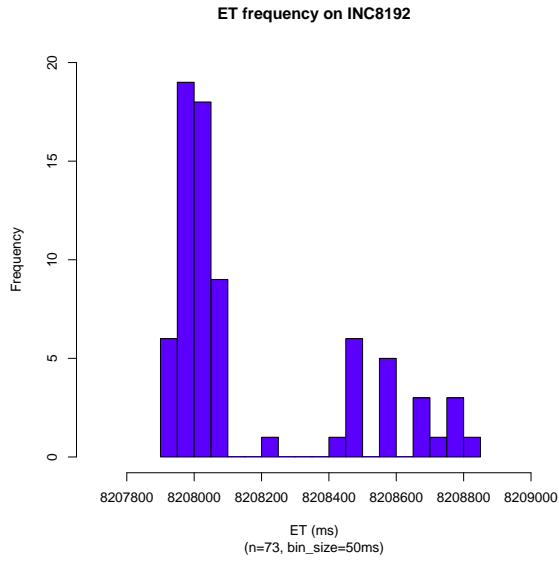
(d) ET frequency on INC1024
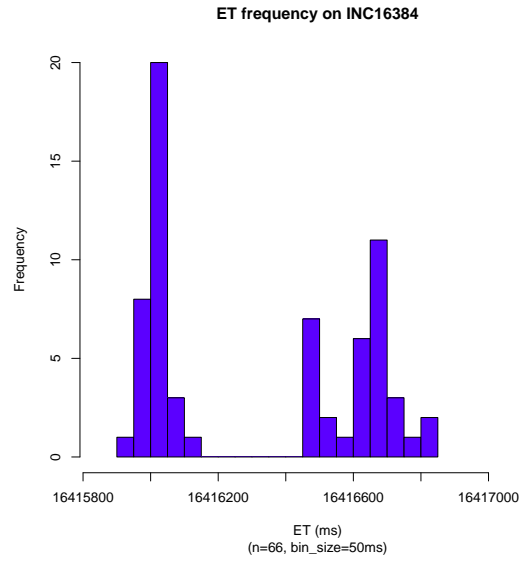
Figure 12: ET Histograms of INC128 ... INC1024

(a) ET frequency on INC2048

(b) ET frequency on INC4096

(c) ET frequency on INC8192

(d) ET frequency on INC16384

Figure 13: ET Histograms of INC2048 ... INC16384

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4.2 PT

(a) PT frequency on INC1

(b) PT frequency on INC2

(c) PT frequency on INC4
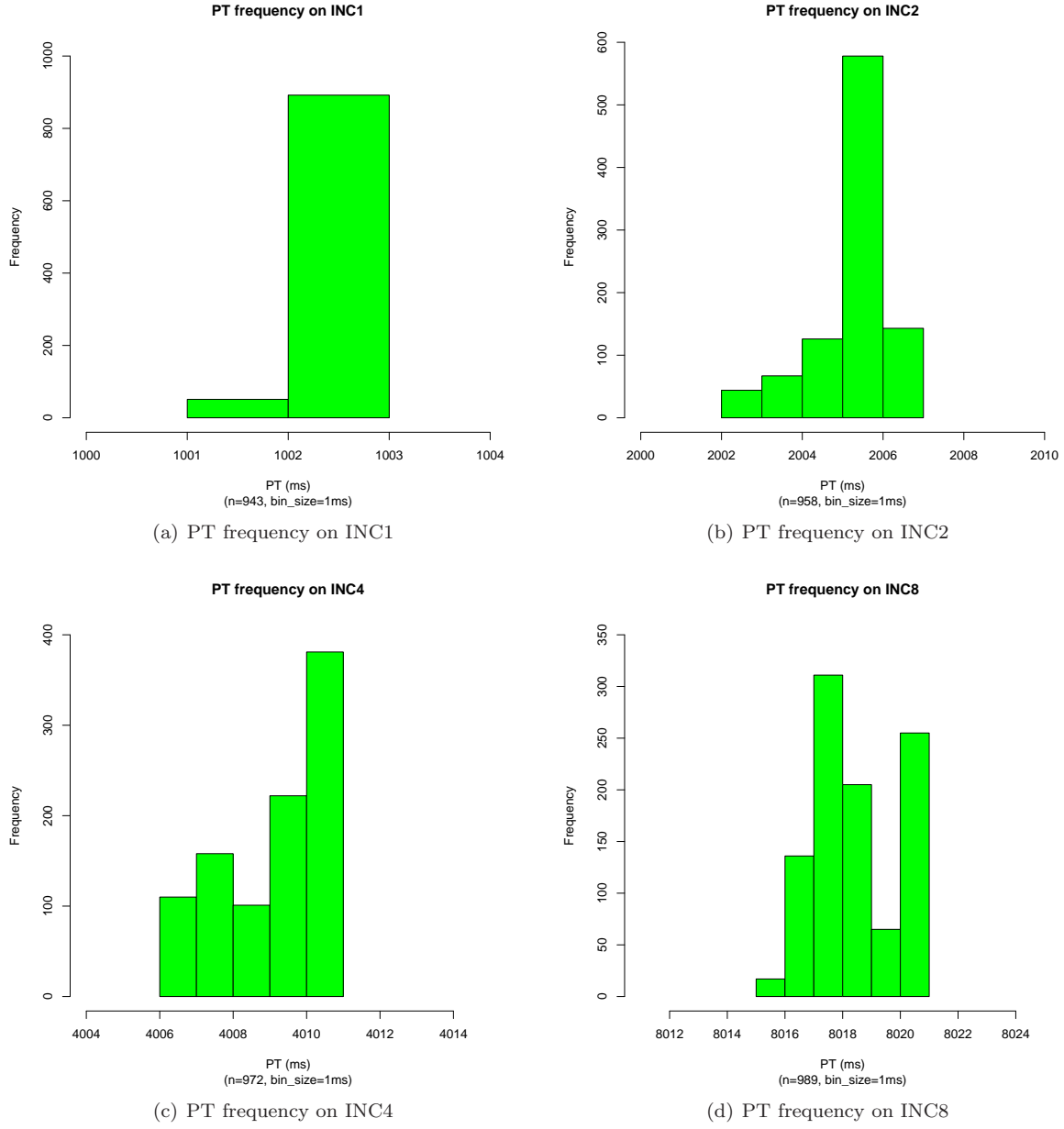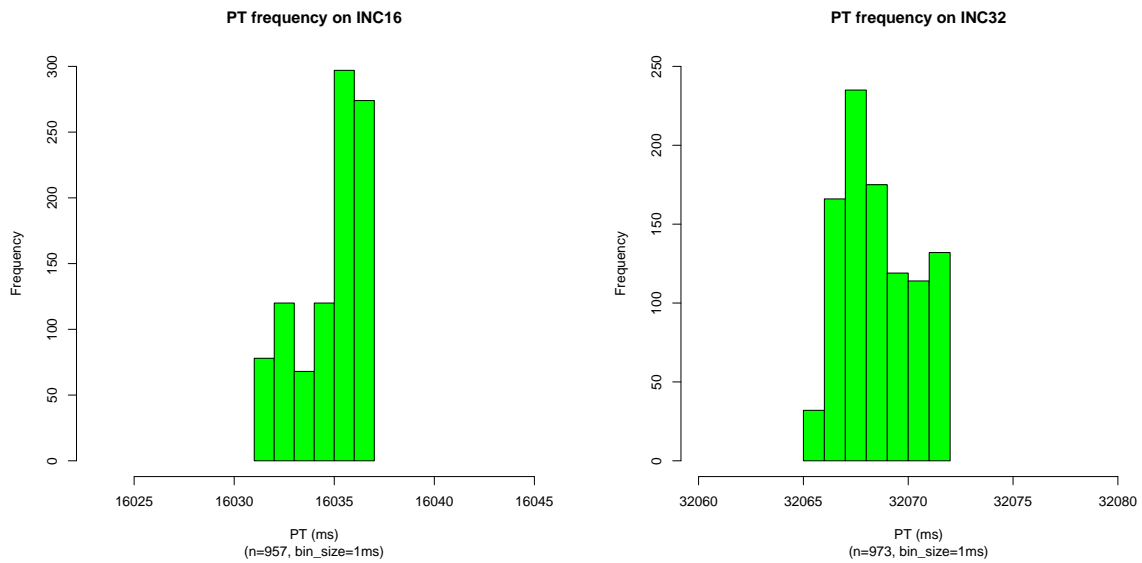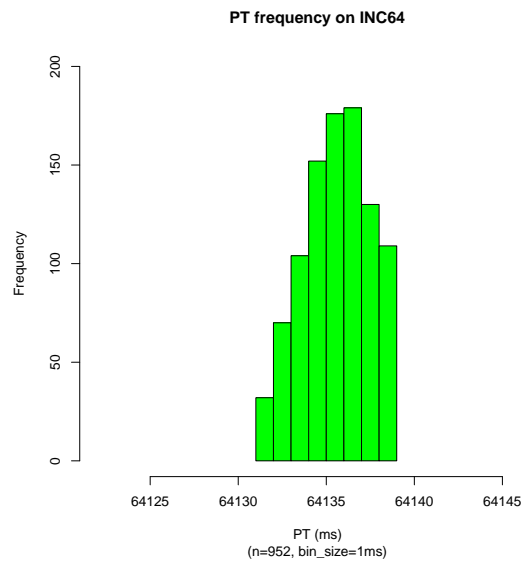

(d) PT frequency on INC8

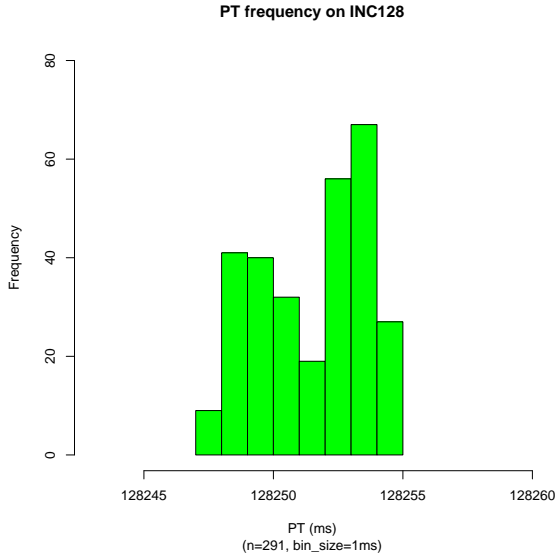Figure 14: PT Histograms of INC1 ... INC8

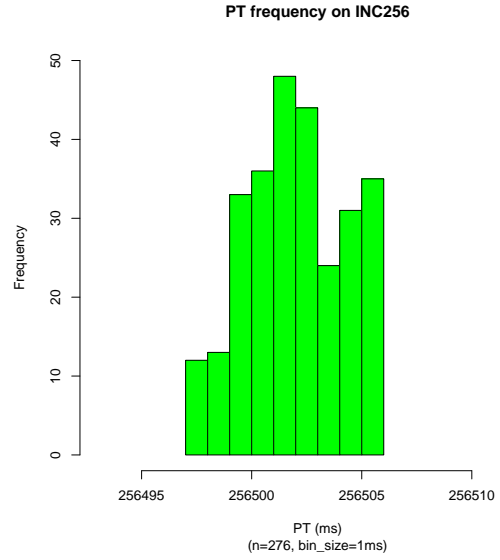(a) PT frequency on INC16

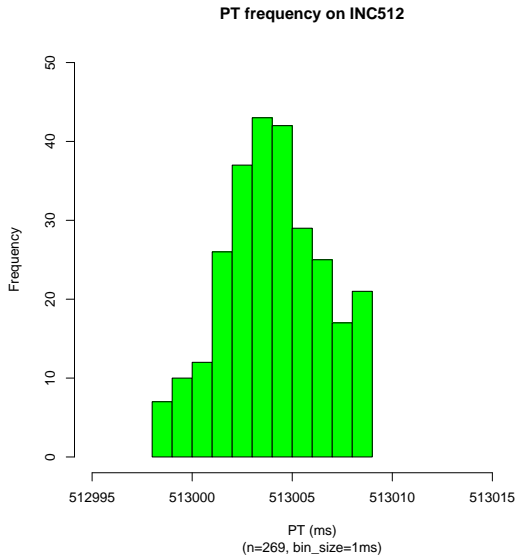(b) PT frequency on INC32

(c) PT frequency on INC64
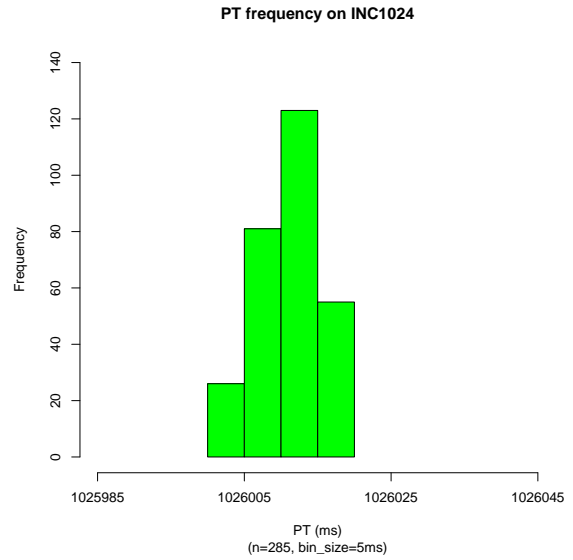
Figure 15: PT Histograms of INC16 ... INC64

(a) PT frequency on INC128
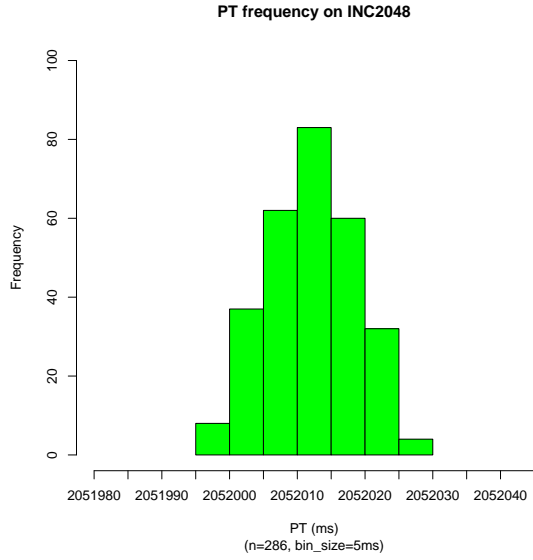

(b) PT frequency on INC256
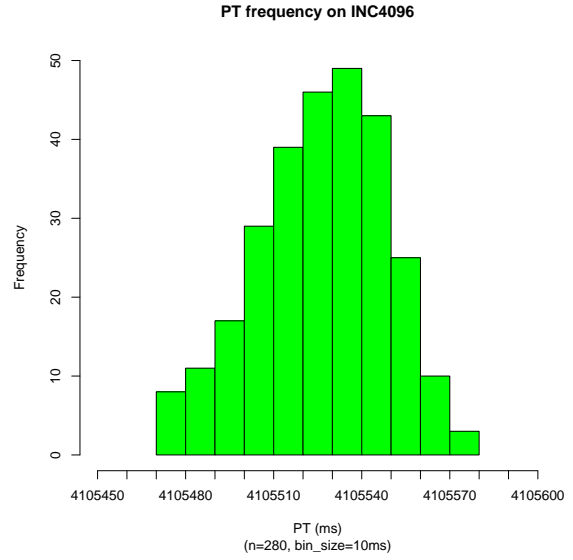

(c) PT frequency on INC512
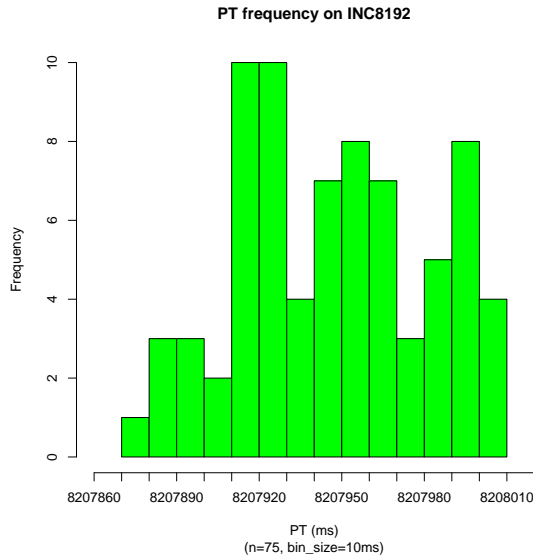

(d) PT frequency on INC1024

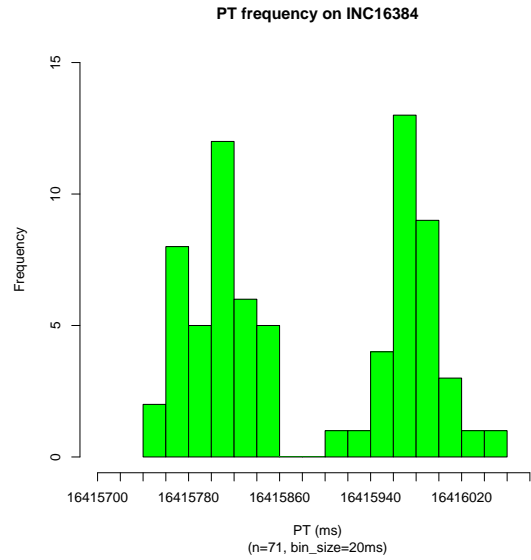Figure 16: PT Histograms of INC128 ... INC1024

(a) PT frequency on INC2048

(b) PT frequency on INC4096

(c) PT frequency on INC8192

(d) PT frequency on INC16384

Figure 17: PT Histograms of INC2048 ... INC16384