Efficient Binarization for Historical Document Analysis

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Outline

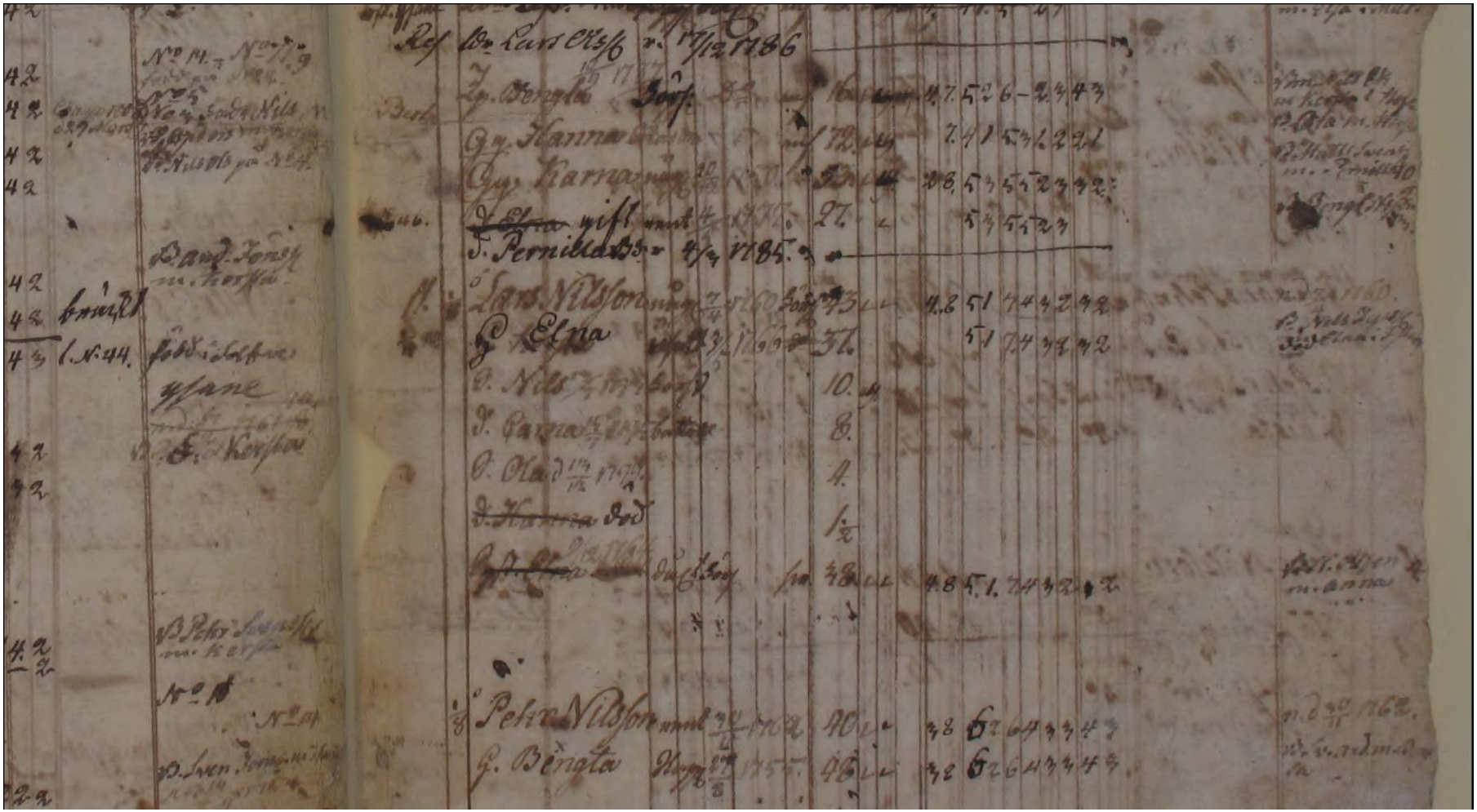
1. Document Readability
2. Howe's Binarization Algorithm
3. Heterogenous Computing
4. Binarization Pipeline

BTH & ArkivDigital

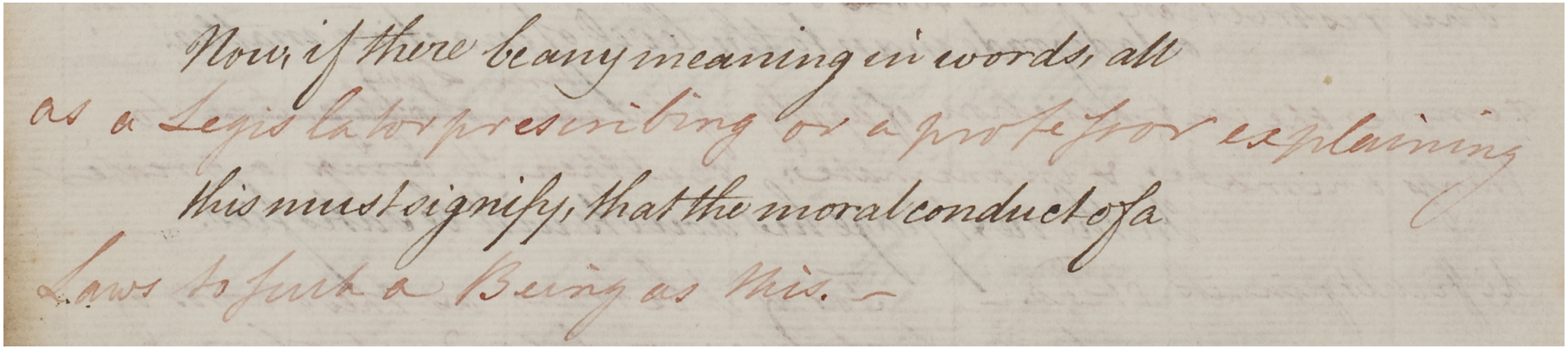
- Swedish university, established in 1989
- Over 6000 registered students
- BigData@BTH

- Swedish company, established in 2004
- Provides access to almost 60 million images
- Church books, court records, military records, census records, ...

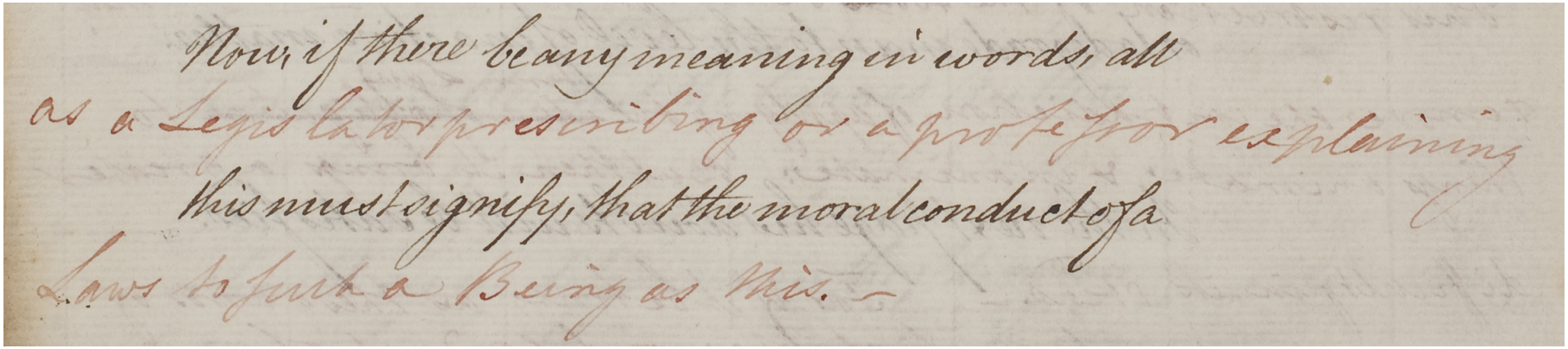
Document Readability



Approach


Now if there be any meaning in words, all
as a Legislator prescribing or a professor explaining
this must signify, that the moral conduct of a
Laws to suit a Being as this. –

Approach



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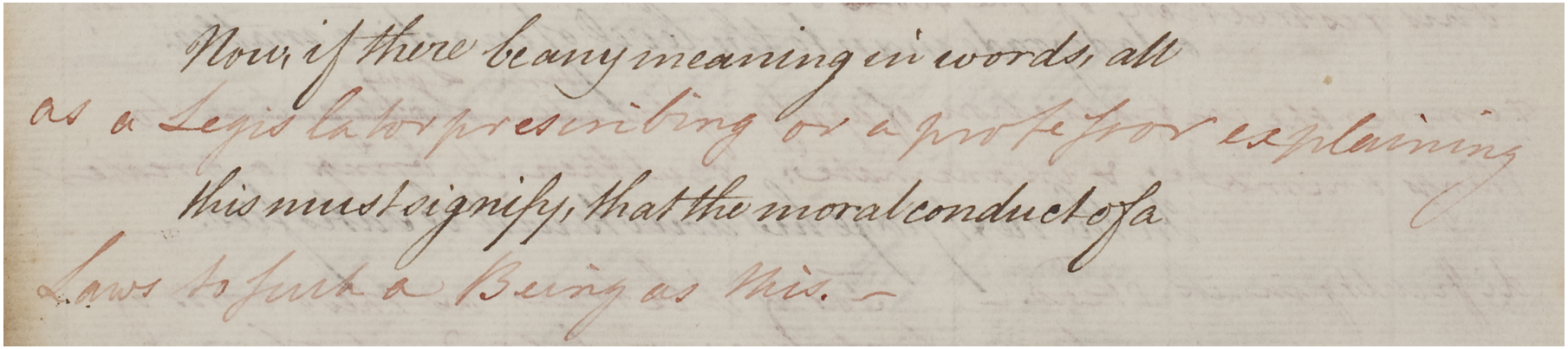
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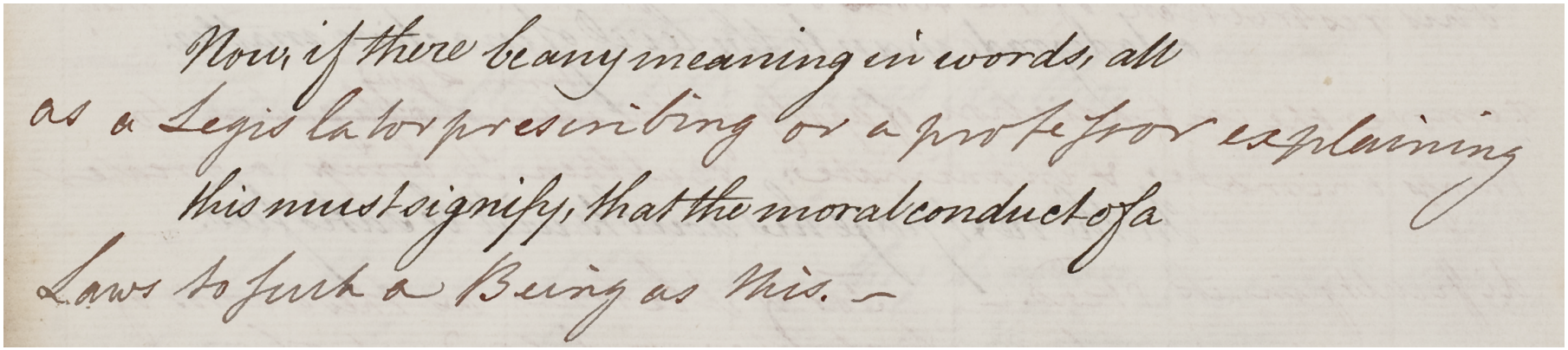
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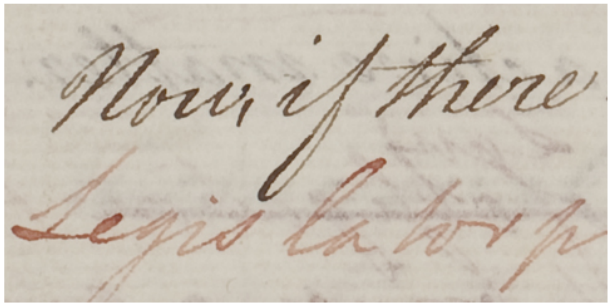
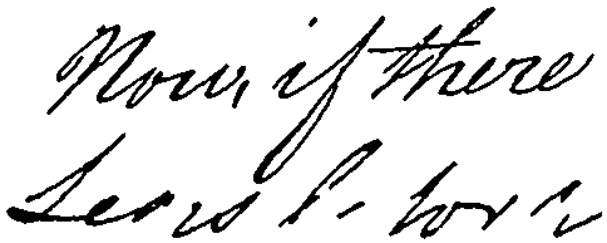
Approach - Demo

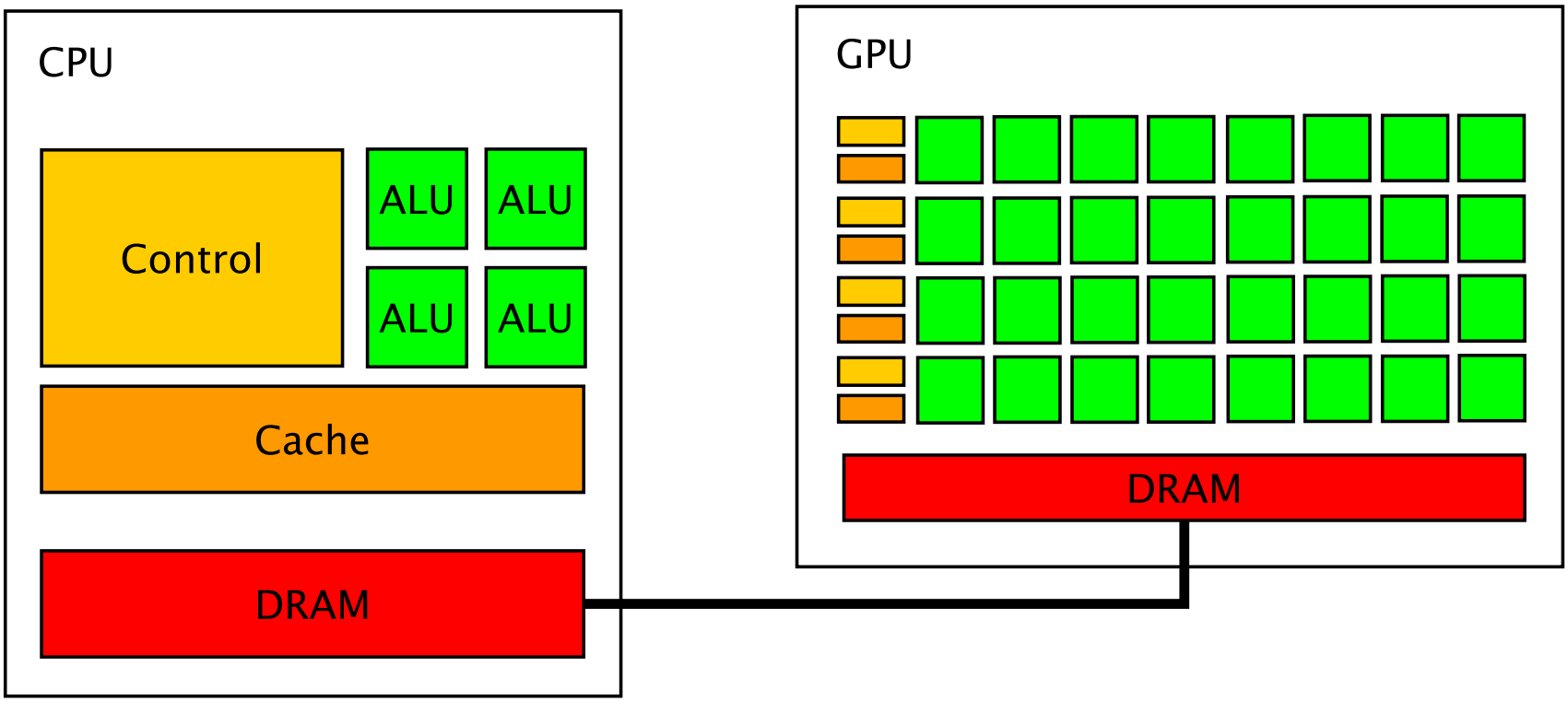
Howe's Binarization Algorithm



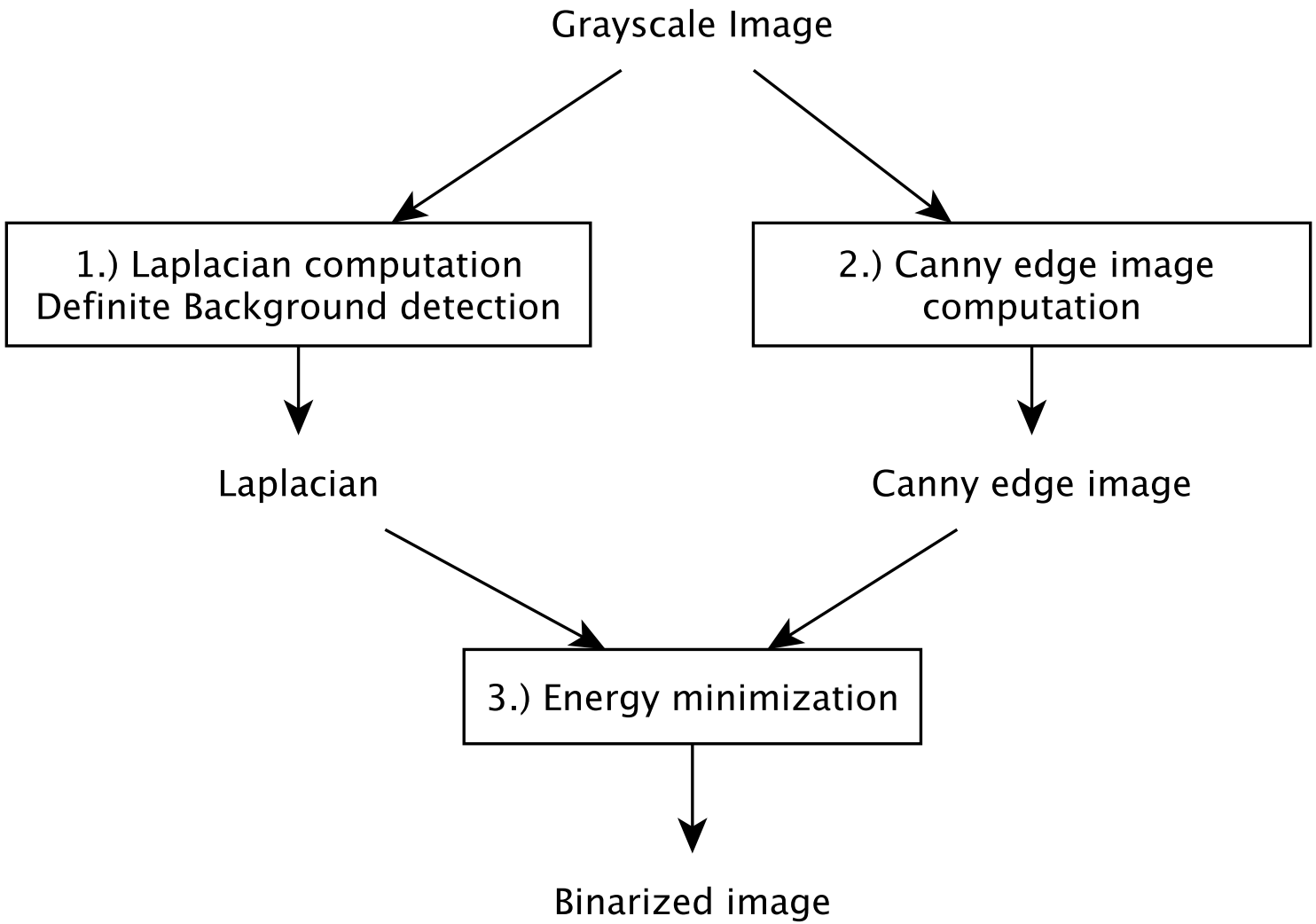
Howe's Binarization Algorithm (Cont.)



Heterogenous Computing



Binarization Pipeline

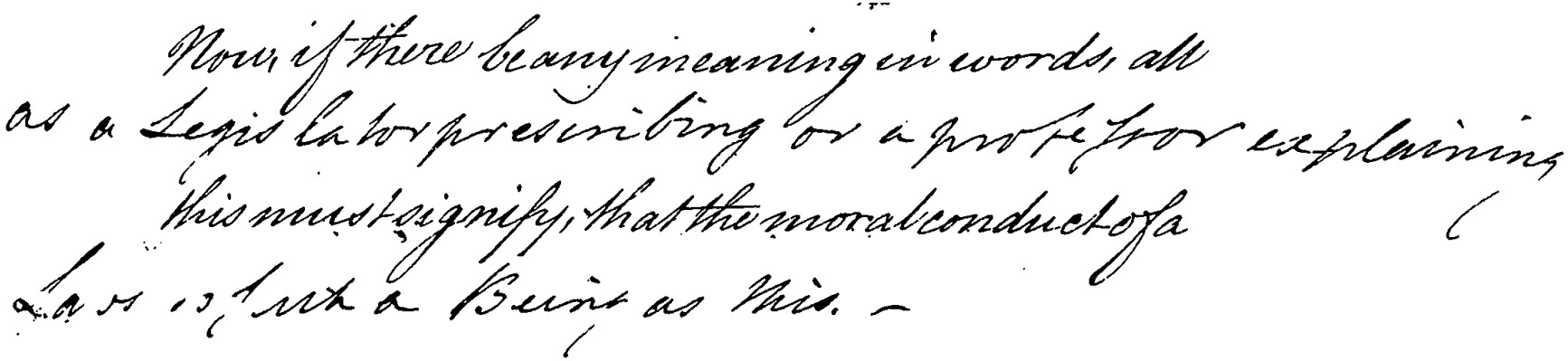


Binarization Pipeline (Cont.)

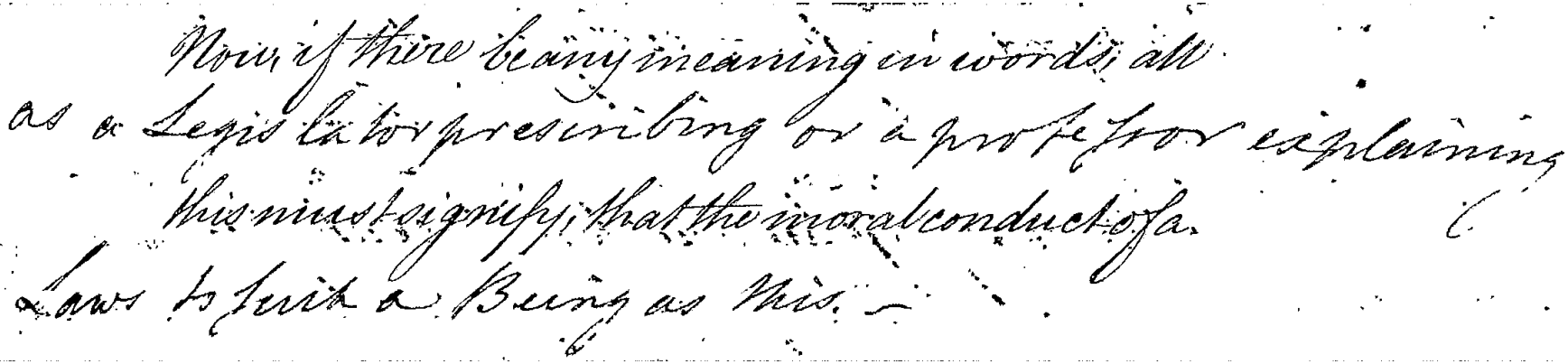
	I	II	III	IV	V	VI	VII	VIII
1	CPU	GPU	CPU	GPU	CPU	GPU	CPU	GPU
2	CPU	CPU	GPU	GPU	CPU	CPU	GPU	GPU
3	CPU	CPU	CPU	CPU	GPU	GPU	GPU	GPU

Preliminary Results

Reference Implementation

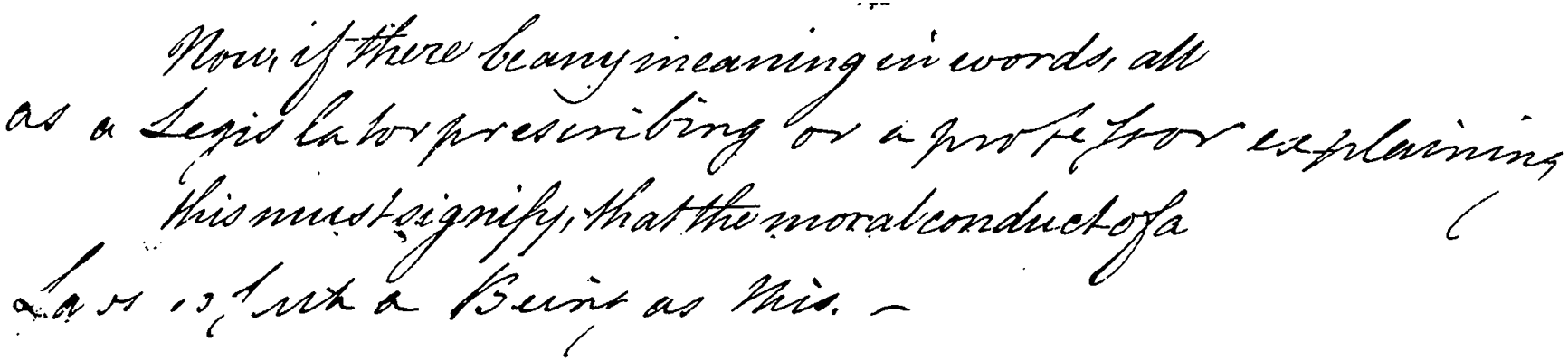


Configuration IV

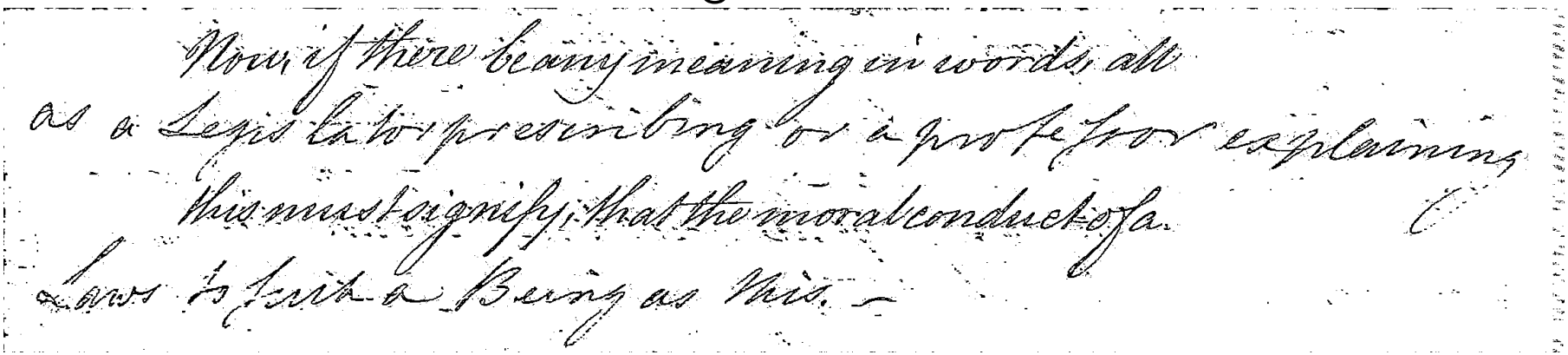


Preliminary Results (Cont.)

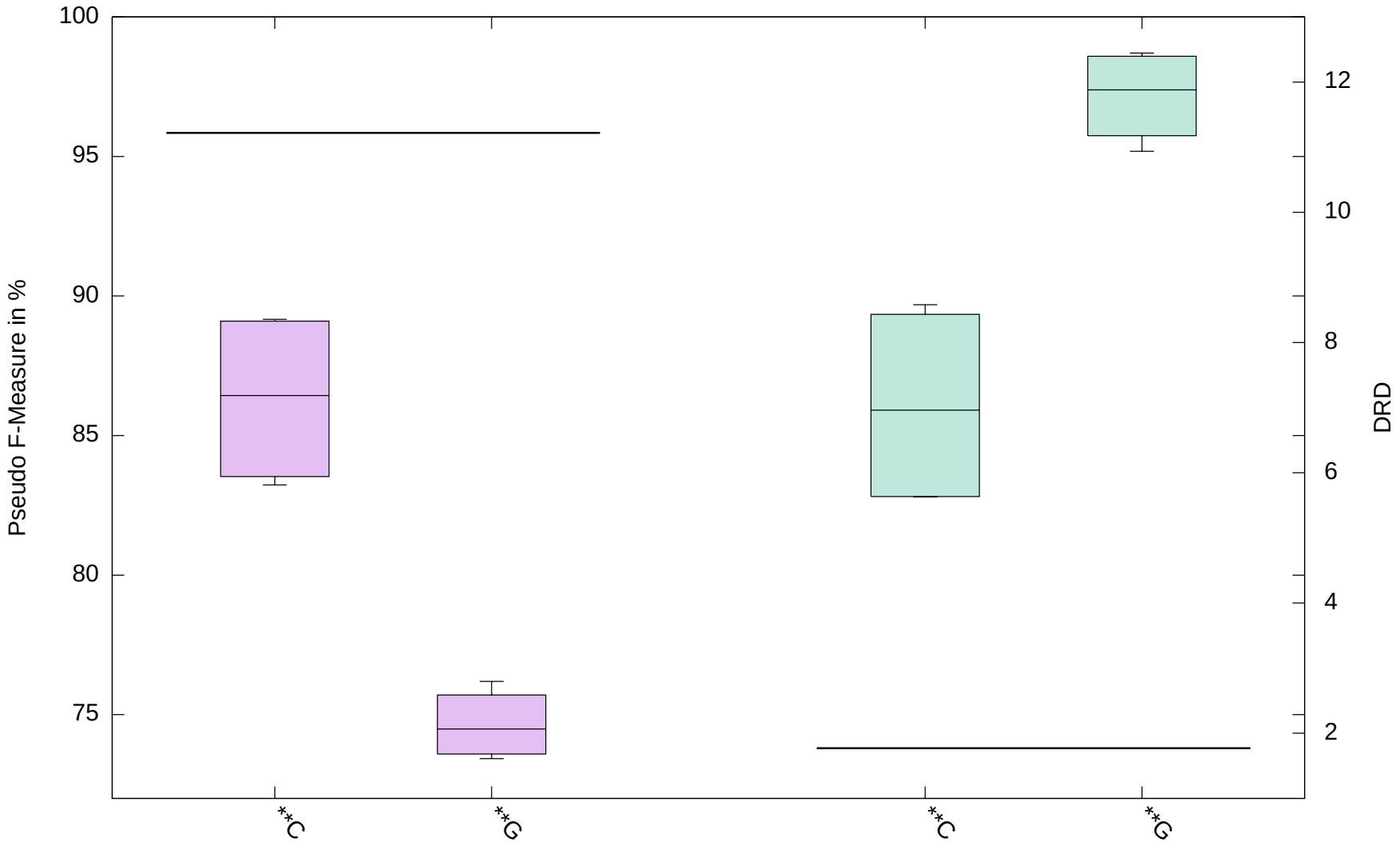
Reference Implementation



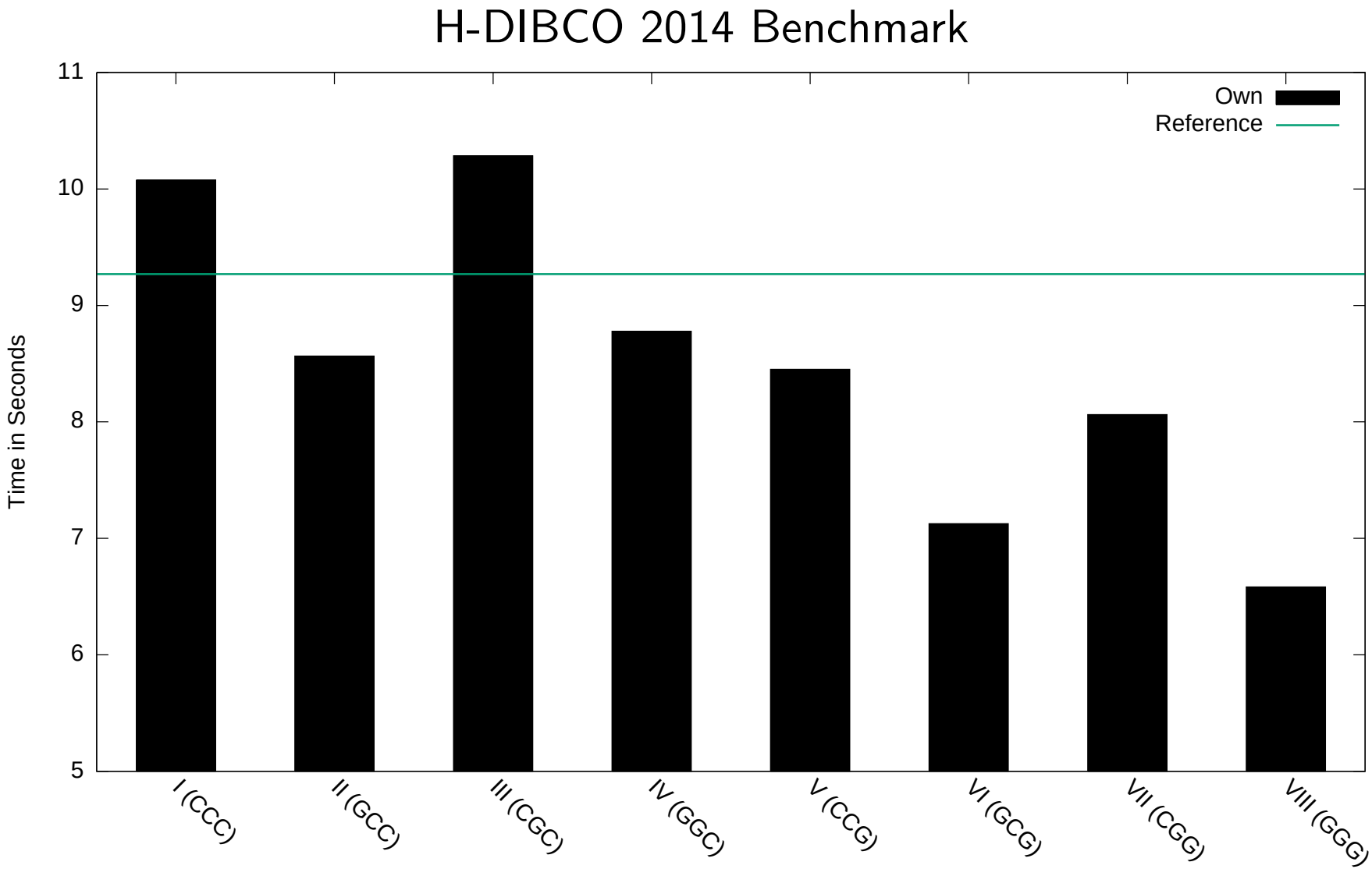
Configuration VIII



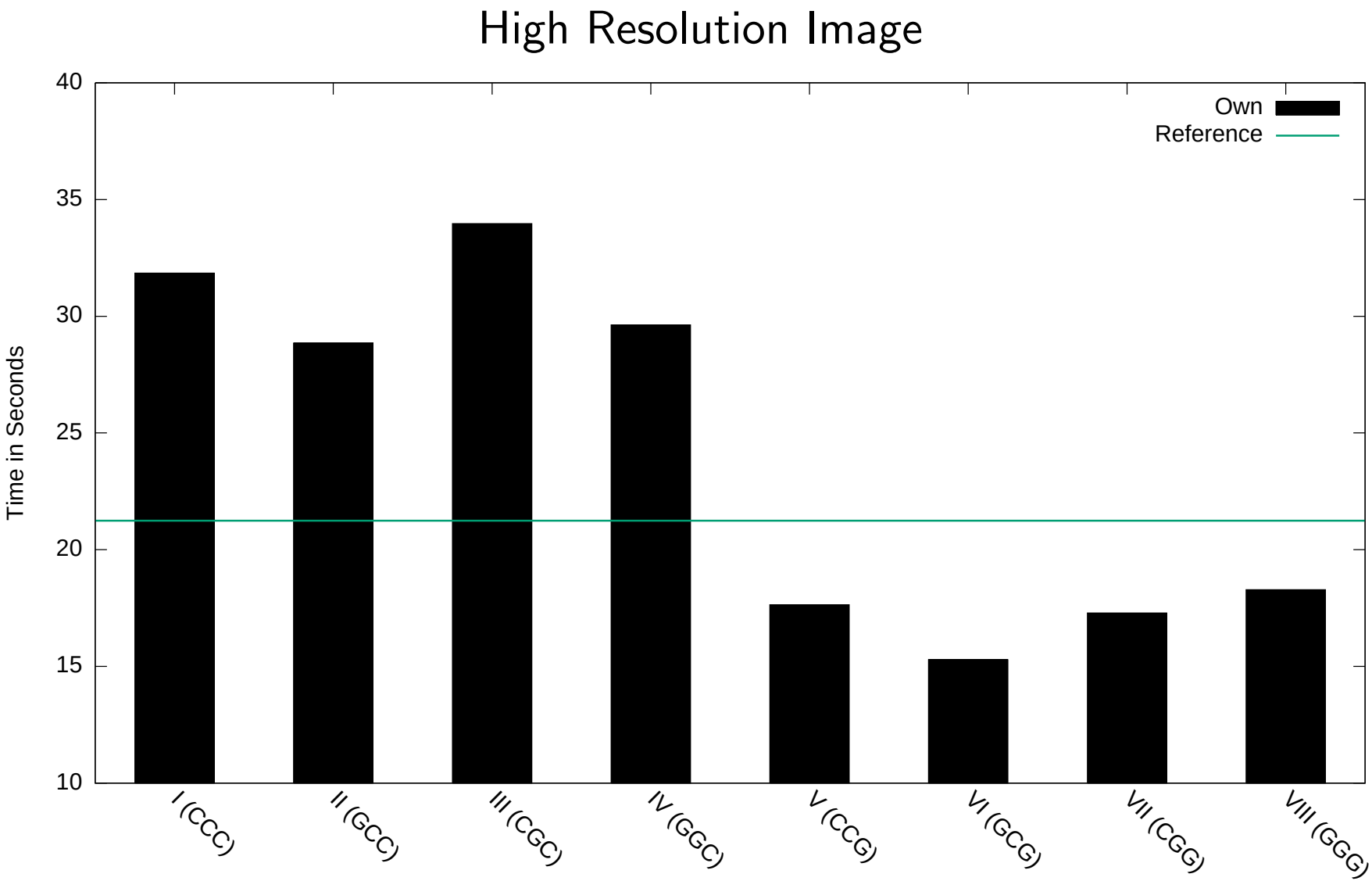
Preliminary Results - Binarization Performance



Preliminary Results - Time



Preliminary Results - Time (cont.)



Preliminary Results - Time per Step

Time taken in each binarization step for the used high resolution image.

	1	2	3
CPU	2.27 s	0.17 s	28.76 s
GPU	0.39 s	0.11 s	14.54 s

Next Steps

- Revision of the implementation
- Implementation of the binarization pipeline

Acknowledgements

We would like to thank ArkivDigital for providing us with access to their image database.

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