

Detection and characterisation of open clusters with  
*Gaia*

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Emily L. Hunt

*DATE?*

Version: Draft 1



Clean Thesis Style University

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SUBJECT?

## Detection and chatacterisation of open clusters with *Gaia*

Emily L. Hunt

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| <i>1. Reviewer</i> | <b>Jane Doe</b><br>Department of Clean Thesis Style<br>Clean Thesis Style University |
| <i>2. Reviewer</i> | <b>John Doe</b><br>Department of Clean Thesis Style<br>Clean Thesis Style University |
| <i>Supervisors</i> | Jane Doe and John Smith  |

DATE?

**Emily L. Hunt**

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Reviewers: Jane Doe and John Doe

Supervisors: Jane Doe and John Smith

**Clean Thesis Style University**

*Clean Thesis Group (CTG)*

Institute for Clean Thesis Dev

Department of Clean Thesis Style

Street address

Postal Code and City

# Abstract

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## Abstract (different language)

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# Acknowledgement

Even after eight years at university, it still feels *surprising* to see myself writing this PhD thesis and reaching this stage in my life. As a child, I looked up at the planets and the stars and I saw a universe of wonder. But as a teenager, I looked around me (here on the Earth) and I felt different, outcast, and fundamentally undeserving of the future I have managed to have. This thesis is for every LGBTQ+ child who grew up thinking the world is not for them.

I will forever be eternally indebted and grateful to the many, many people without whom I would never be here.

Dr. Michelle Cuthbert, your phenomenal commitment and passion for teaching had an impact on me that I will carry with me for the rest of my life. I still remember my first lesson of Year 12 physics, where you asked those of us intending to study physics at university to raise our hands. I think one or two hands were raised, of which I was not one. You proudly remarked that you would change our minds in just eight months. By the end of Year 13, a majority of our class went on to study physics, in no small part thanks to your teaching. This thesis would never have happened had I never been exposed to your infectious passionate physics teaching.

I next thank those I know from the University of Bath where I did my undergraduate degree. Dr. Vicky Scowcroft, the summer project I did with you and your





# Contents

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>Introduction</b>  | <b>1</b>  |
| 1.1      | Postcards: My Address . . . . .  | 2         |
| 1.2      | Motivation and Problem Statement . . . . .                                 | 2         |
| 1.3      | Results . . . . .  | 3         |
| 1.3.1    | Some References . . . . .  | 3         |
| 1.4      | Thesis Structure . . . . .   | 5         |
| <b>2</b> | <b>Comparison of clustering algorithms applied to <i>Gaia</i> DR2 data</b> | <b>7</b>  |
| 2.1      | System Section 1 . . . . .   | 8         |
| 2.2      | System Section 2 . . . . .   | 9         |
| 2.3      | System Section 3 . . . . .   | 10        |
| 2.4      | Conclusion . . . . .   | 12        |
| <b>3</b> | <b>A census of star clusters with <i>Gaia</i> EDR3</b>                     | <b>13</b> |
| 3.1      | System Section 1 . . . . .   | 13        |
| 3.2      | System Section 2 . . . . .   | 15        |
| 3.3      | System Section 3 . . . . .   | 16        |
| 3.4      | Conclusion . . . . .   | 18        |
| <b>4</b> | <b>The dynamics of Milky Way star clusters</b>                             | <b>19</b> |
| 4.1      | System Section 1 . . . . .   | 19        |
| 4.2      | System Section 2 . . . . .   | 21        |
| 4.3      | System Section 3 . . . . .   | 22        |
| 4.4      | Conclusion . . . . .   | 24        |
| <b>5</b> | <b>Conclusion</b>  | <b>25</b> |
| 5.1      | System Section 1 . . . . .   | 25        |
| 5.2      | System Section 2 . . . . .   | 26        |
| 5.3      | Future Work . . . . .  | 28        |
|          | <b>Bibliography</b>  | <b>29</b> |
| <b>A</b> | <b>Example Appendix</b>  | <b>37</b> |

|                                  |           |
|----------------------------------|-----------|
| A.1 Appendix Section 1 . . . . . | 37        |
| A.2 Appendix Section 2 . . . . . | 38        |
| <b>Declaration</b>               | <b>41</b> |

# Introduction

” *You can’t do better design with a computer, but you can speed up your work enormously.*

— **Wim Crouwel**

(Graphic designer and typographer)

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## 1.1 Postcards: My Address

**Ricardo Langner**

Alfred-Schrapel-Str. 7

01307 Dresden

Germany

## 1.2 Motivation and Problem Statement

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

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[Jür00; Jür95; Mie11b; KJ11; App10a; App10b; App10c]

## 1.3 Results

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

### 1.3.1 Some References

[@Fre10; @Mie11a] And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written

in of the original language. There is no need for special content, but the length of words should match the language.

## Methodology

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

**Strategy 1** Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

```
1  #!/usr/bin/env python
2  print "Hello World"
```

**Listing 1.1:** This simple helloworld.py file prints Hello World.

**Strategy 2** This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a

difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

```
1  #!/usr/bin/env python
2  def bubble_sort(list):
3      for num in range(len(list)-1,0,-1):
4          for i in range(num):
5              if list[i]>list[i+1]:
6                  tmp = list[i]
7                  list[i] = list[i+1]
8                  list[i+1] = tmp
9
10 alist = [34,67,2,4,65,16,17,95,20,31]
11 bubble_sort(list)
12 print(list)
```

**Listing 1.2:** This is a bubble sort function.

## 1.4 Thesis Structure

### Chapter ??

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

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### **Chapter 5**

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.



## Comparison of clustering algorithms applied to *Gaia* DR2 data

” *Innovation distinguishes between a leader and a follower.*

— **Steve Jobs**  
(CEO Apple Inc.)

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

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## 2.1 System Section 1

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.



**Fig. 2.1.:** Figure example: (a) example part one, (c) example part two; (c) example part three

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look.

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## 2.2 System Section 2

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.



**Fig. 2.2.:** Another Figure example: (a) example part one, (c) example part two; (c) example part three

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## 2.3 System Section 3

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## 2.4 Conclusion

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## A census of star clusters with *Gaia* EDR3

” *Innovation distinguishes between a leader and a follower.*

— **Steve Jobs**  
(CEO Apple Inc.)

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### 3.1 System Section 1

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**Fig. 3.1.:** Figure example: (a) example part one, (c) example part two; (c) example part three

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## 3.2 System Section 2

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**Fig. 3.2.:** Another Figure example: (a) example part one, (c) example part two; (c) example part three

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### 3.3 System Section 3

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### 3.4 Conclusion

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# The dynamics of Milky Way star clusters

” *Innovation distinguishes between a leader and a follower.*

— **Steve Jobs**  
(CEO Apple Inc.)

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## 4.1 System Section 1

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**Fig. 4.1.:** Figure example: (a) example part one, (c) example part two; (c) example part three

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## 4.2 System Section 2

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**Fig. 4.2.:** Another Figure example: (a) example part one, (c) example part two; (c) example part three

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## 4.3 System Section 3

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## 4.4 Conclusion

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## 5.2 System Section 2

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After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

## 5.3 Future Work

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

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# List of Figures

|     |  |    |
|-----|--|----|
| 2.1 | Figure example: (a) example part one, (c) example part two; (c) example part three . . . . .         | 8  |
| 2.2 | Another Figure example: (a) example part one, (c) example part two; (c) example part three . . . . . | 9  |
| 3.1 | Figure example: (a) example part one, (c) example part two; (c) example part three . . . . .         | 14 |
| 3.2 | Another Figure example: (a) example part one, (c) example part two; (c) example part three . . . . . | 15 |
| 4.1 | Figure example: (a) example part one, (c) example part two; (c) example part three . . . . .         | 20 |
| 4.2 | Another Figure example: (a) example part one, (c) example part two; (c) example part three . . . . . | 21 |



# List of Tables

A.1 This is a caption text. . . . . 37

A.2 This is a caption text. . . . . 38



## List of Listings

|     |  |   |
|-----|--|---|
| 1.1 | This simple helloworld.py file prints Hello World. . . . . | 4 |
| 1.2 | This is a bubble sort function. . . . .                    | 5 |



## Example Appendix

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

### A.1 Appendix Section 1

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

| Alpha | Beta | Gamma |
|-------|------|-------|
| 0     | 1    | 2     |
| 3     | 4    | 5     |

**Tab. A.1.:** This is a caption text.

## A.2 Appendix Section 2

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

| Alpha | Beta | Gamma |
|-------|------|-------|
| 0     | 1    | 2     |
| 3     | 4    | 5     |

**Tab. A.2.:** This is a caption text.

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.



## Colophon

This thesis was typeset with  $\text{\LaTeX}$ 2<sub>ε</sub>. It uses the *Clean Thesis* style developed by Ricardo Langner. The design of the *Clean Thesis* style is inspired by user guide documents from Apple Inc.

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*City, DATE?*

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Emily L. Hunt

