ADAM SPANNBAUER

Python Developers Survey 2019 Cluster Analysis

AGENDA

- Introduce survey questions / data
- Describe the clustering process
- Interpret cluster membership
- Present limitations / next steps of analysis

ABOUT THE SURVEY

- Survey performed by JetBrains in 2017, 2018, & 2019
- PyCharm (a JetBrains product) is a popular Python IDE
- 47,308 respondents in 2019 (no requirement to answer all questions)

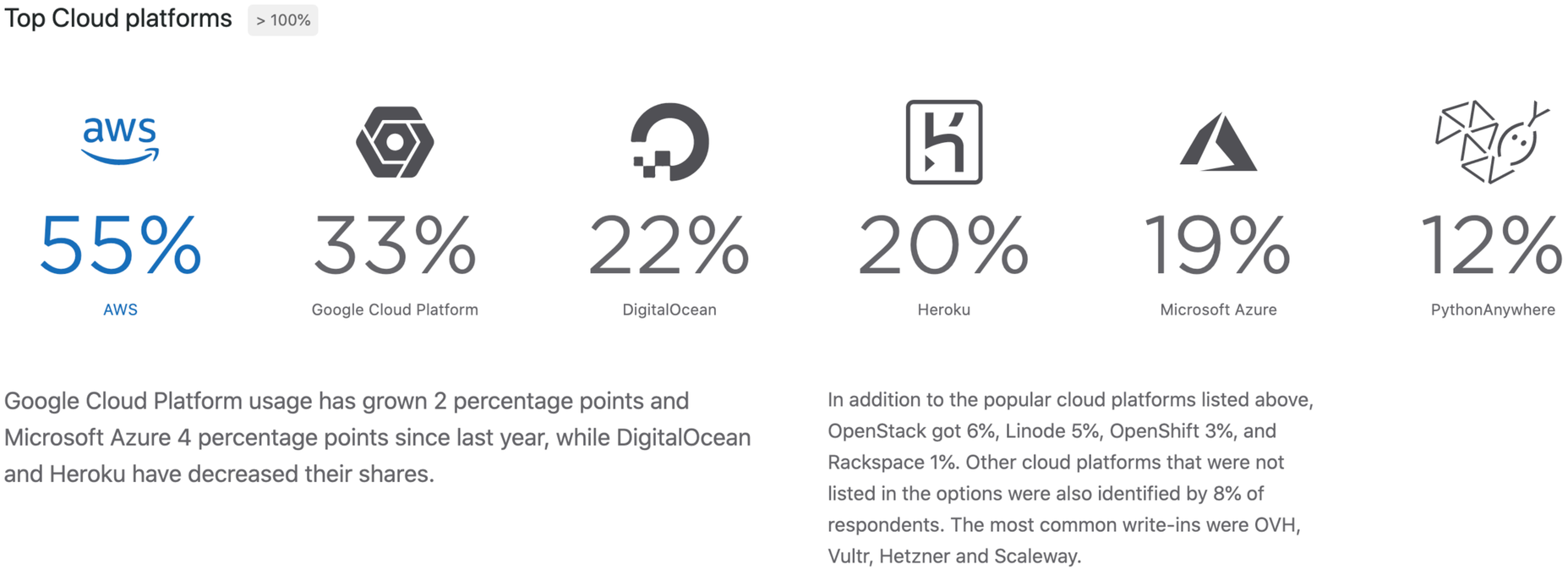
PyCharm

ABOUT THE SURVEY

- Includes questions on:
  - Python usage / programming experience
  - Company / team size
  - Area of work based on:
    - What tools do you use?
    - What's your role?

ABOUT THE SURVEY

- JetBrains has published some great exploratory analysis of the data: https://www.jetbrains.com/lp/python-developers-survey-2019/



From JetBrains analysis. Example of a "what tools do you use?" question.

ABOUT THE SURVEY

- JetBrains has published some great exploratory analysis of the data: https://www.jetbrains.com/lp/python-developers-survey-2019/

From JetBrains analysis. Example of a "what's your role?" question. Results have been cropped to top 6 bars from original viz.

ABOUT THE SURVEY

- JetBrains has published some great exploratory analysis of the data: https://www.jetbrains.com/lp/python-developers-survey-2019/
- Want to analyze the data yourself? It is free to download from the survey results link above.

ABOUT THE CLUSTERING PROCESS

- Only ordinal type questions were used for clustering
  - Examples:
    - How many years of professional coding experience do you have?
    - How often do you use Version Control Systems?
    - How involved are you with Web development?

ABOUT THE CLUSTERING PROCESS

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  - Examples:
    - How many years of professional coding experience do you have?
    - How often do you use Version Control Systems?
    - How involved are you with Web development?

1. "Less than 1 year"
2. "1–2 years"
3. "3–5 years"
4. "6–10 years"
5. "11+ years"

ABOUT THE CLUSTERING PROCESS

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  - Examples:
    - How many years of professional coding experience do you have?
    - How often do you use Version Control Systems?
    - How involved are you with Web development?

1. "Never or Almost never"
2. "From time to time"
3. "Often"

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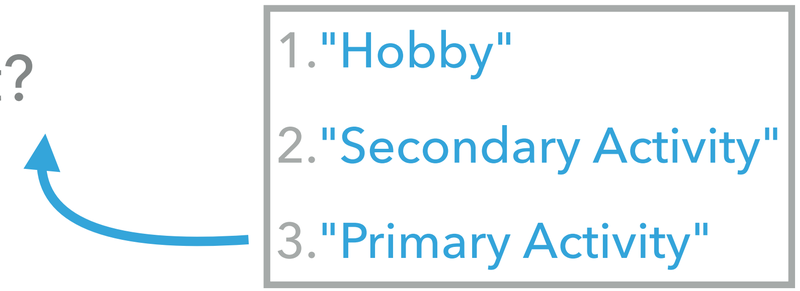

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- Only ordinal type questions were used for clustering
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    - ◉ "How many years of professional coding experience do you have?"
    - ❖ "How often do you use Version Control Systems?"
    - ✦ "How involved are you with Web development?"

3 main categories of questions used:

- ◉ General
- ❖ "How often do you..." (tools)
- ✦ "How involved are you with..." (role)

ABOUT THE CLUSTERING PROCESS

- Number of records in clustering process: 10,169
  - ~21% of original 47,308
- This was based on lack of responses to the ordinal questions being used*

*A lack of response is tricky to define on 2 of the question categories being used; see next slide

ABOUT THE CLUSTERING PROCESS

- The tools / roles questions were presented as below.
- A lack of response might be interpreted as missing or a lack of involvement

How involved are you with:

	Hobby	Secondary Activity	Primary Activity
Web Development			
Machine Learning			
Software prototyping			

ABOUT THE CLUSTERING PROCESS

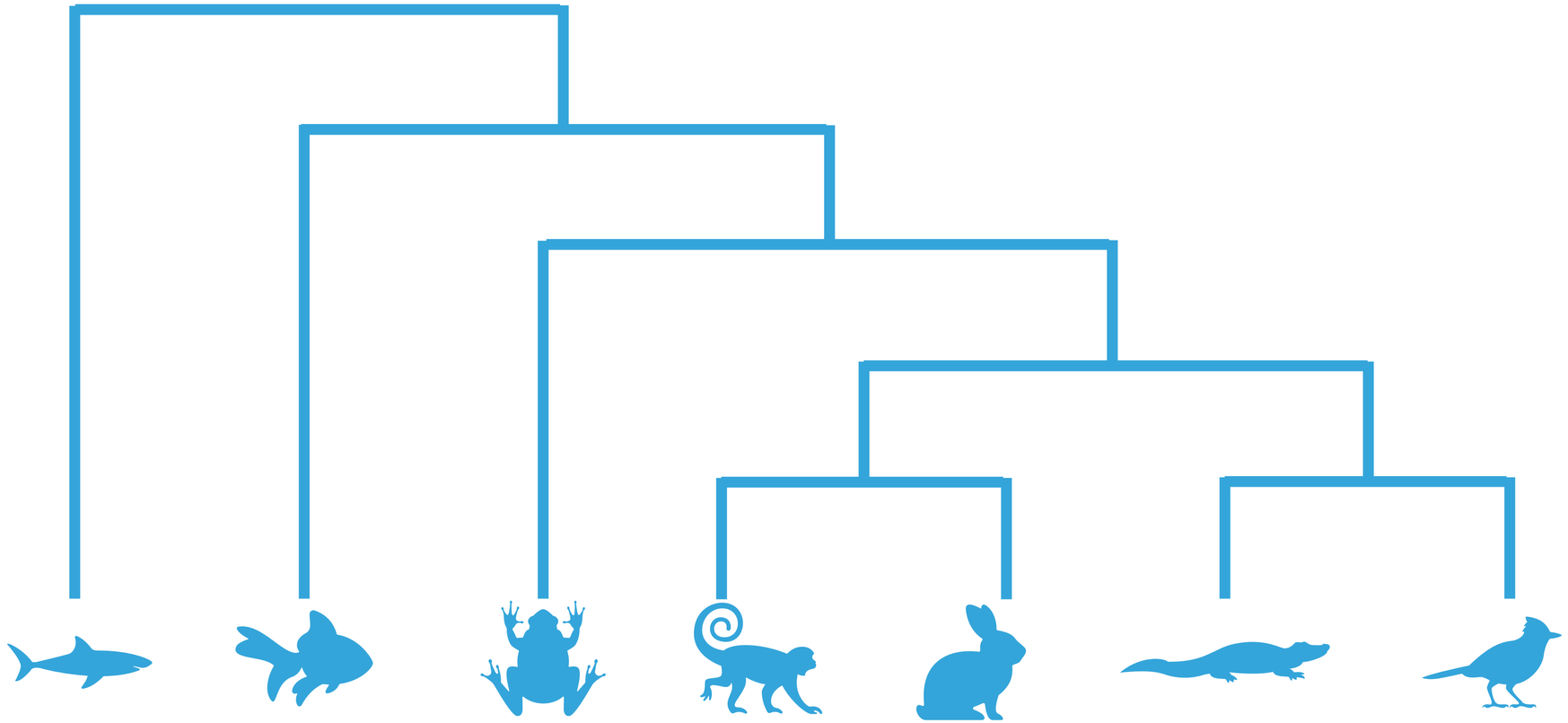
- The tools / roles questions were presented as below.
- A lack of response might be interpreted as missing or a lack of involvement.
- This analysis treated missing-ness on these questions as a lack of involvement

How involved are you with:

	Hobby	Secondary Activity	Primary Activity
Web Development			
Machine Learning			
Software prototyping			

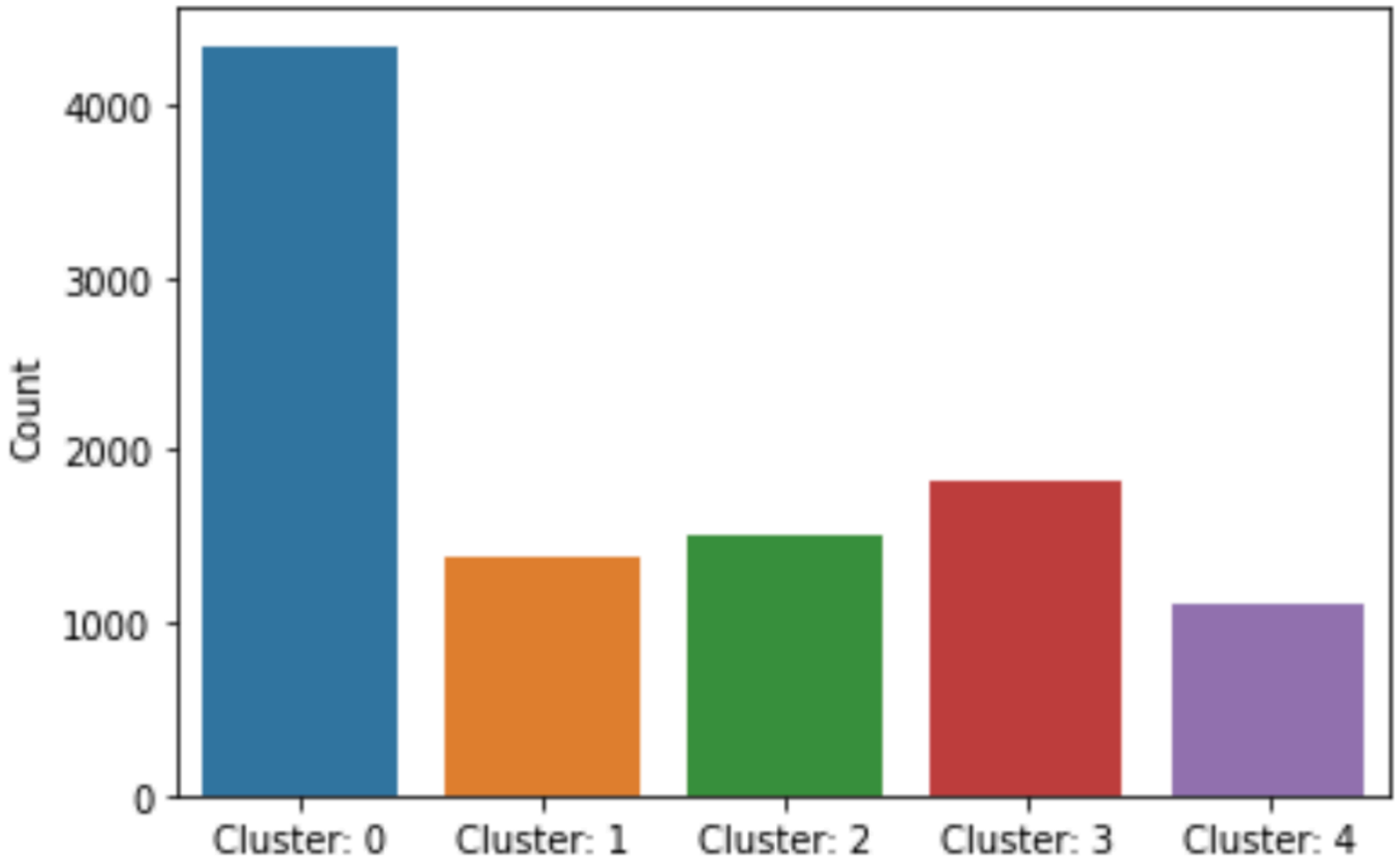
ABOUT THE CLUSTERING PROCESS

- Hierarchical clustering was used to cluster similar observations into 5 groups



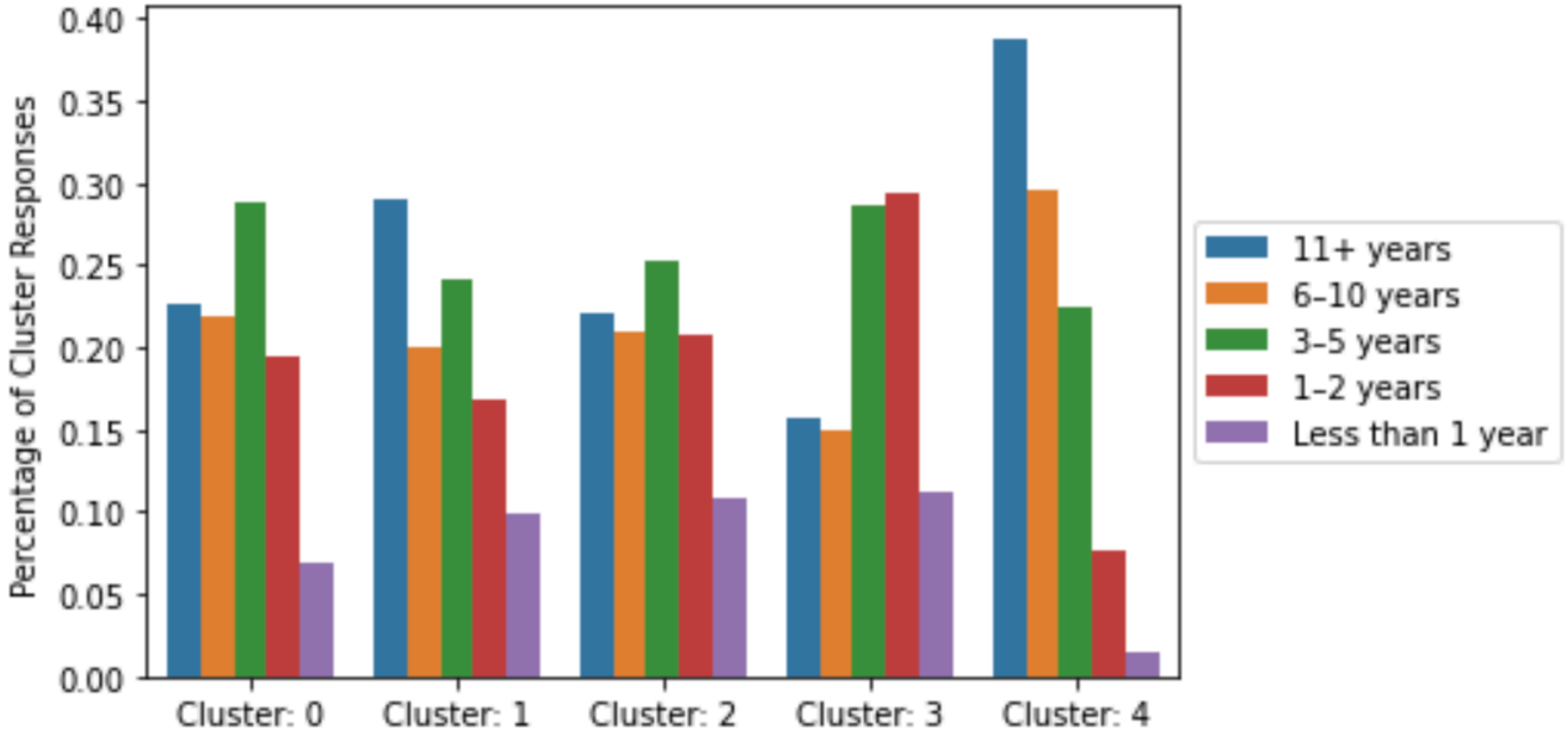
ABOUT THE CLUSTERS

- Cluster size



ABOUT THE CLUSTERS

- How many years of professional coding experience do you have?



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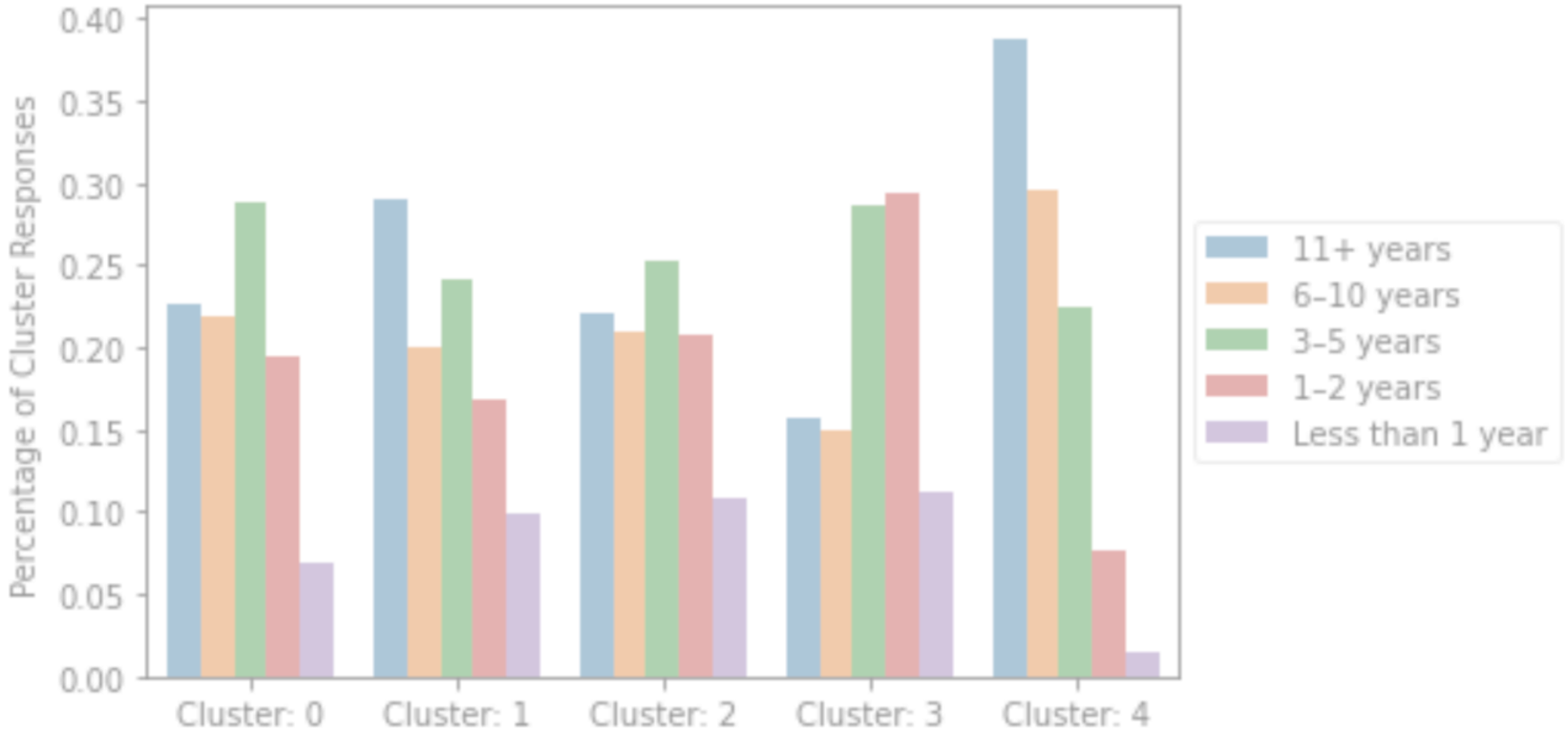

Clusters in order of average experience (most to least):

- Cluster 4
- Cluster 1
- Cluster 0
- Cluster 2
- Cluster 3

ABOUT THE CLUSTERS

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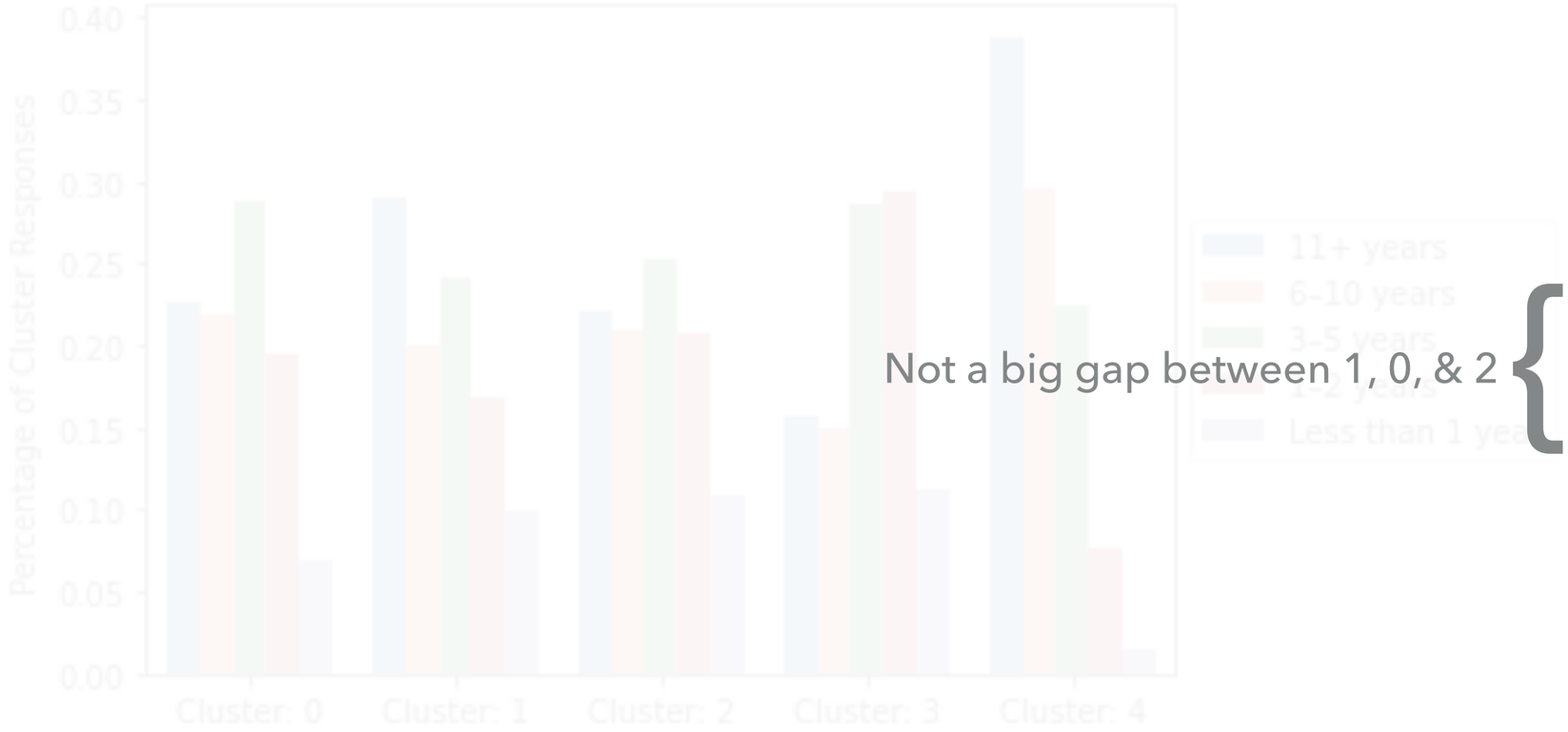


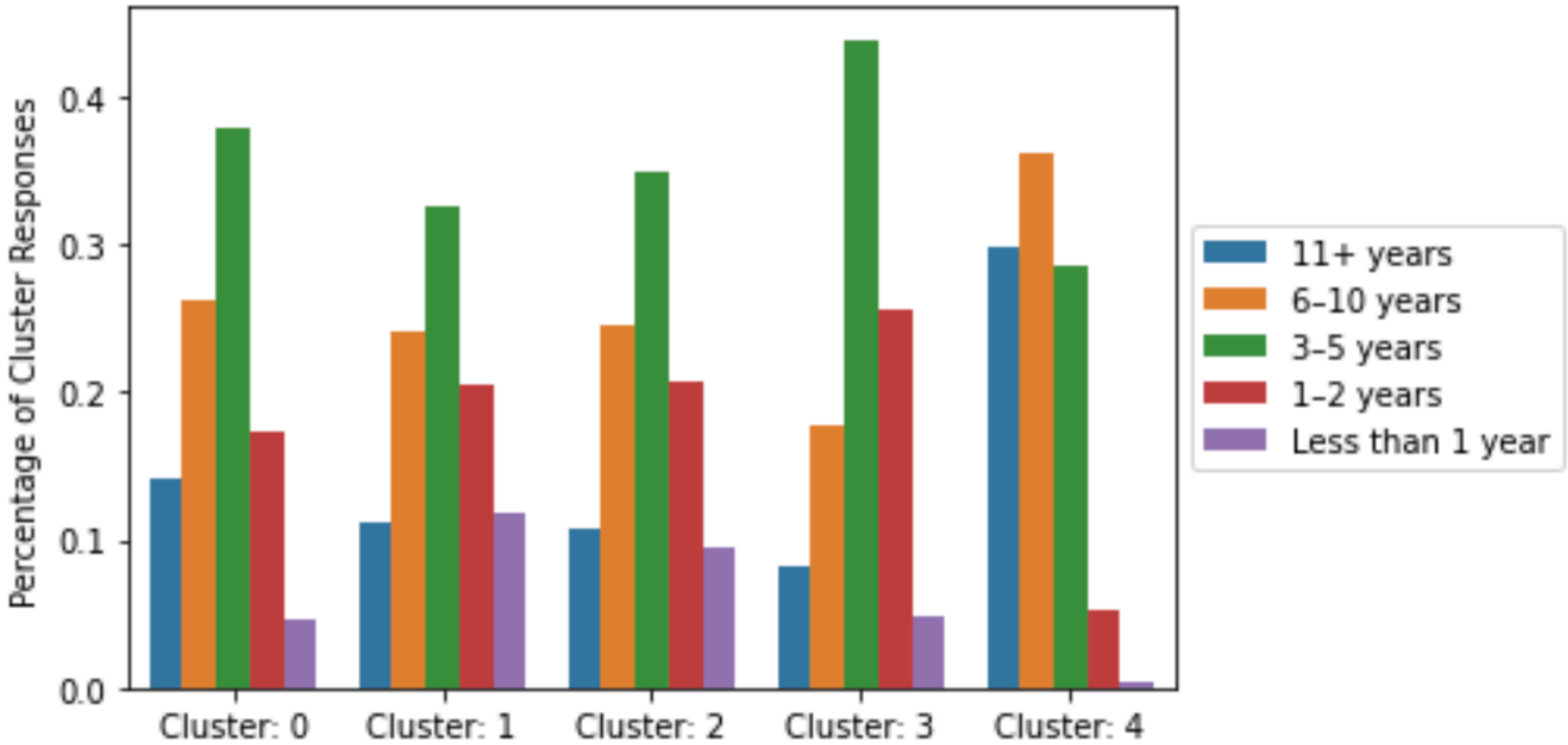
Not a big gap between 1, 0, & 2

Clusters in order of average experience (most to least):

- Cluster 4
- Cluster 1
- Cluster 0
- Cluster 2
- Cluster 3

ABOUT THE CLUSTERS

- How long have you been programming in Python?



ABOUT THE CLUSTERS

- How long have you been programming in Python?

Clusters in order of average experience (most to least):

- Cluster 4
- Cluster 0
- Cluster 2
- Cluster 1
- Cluster 3

ABOUT THE CLUSTERS

- How long have you been programming in Python?

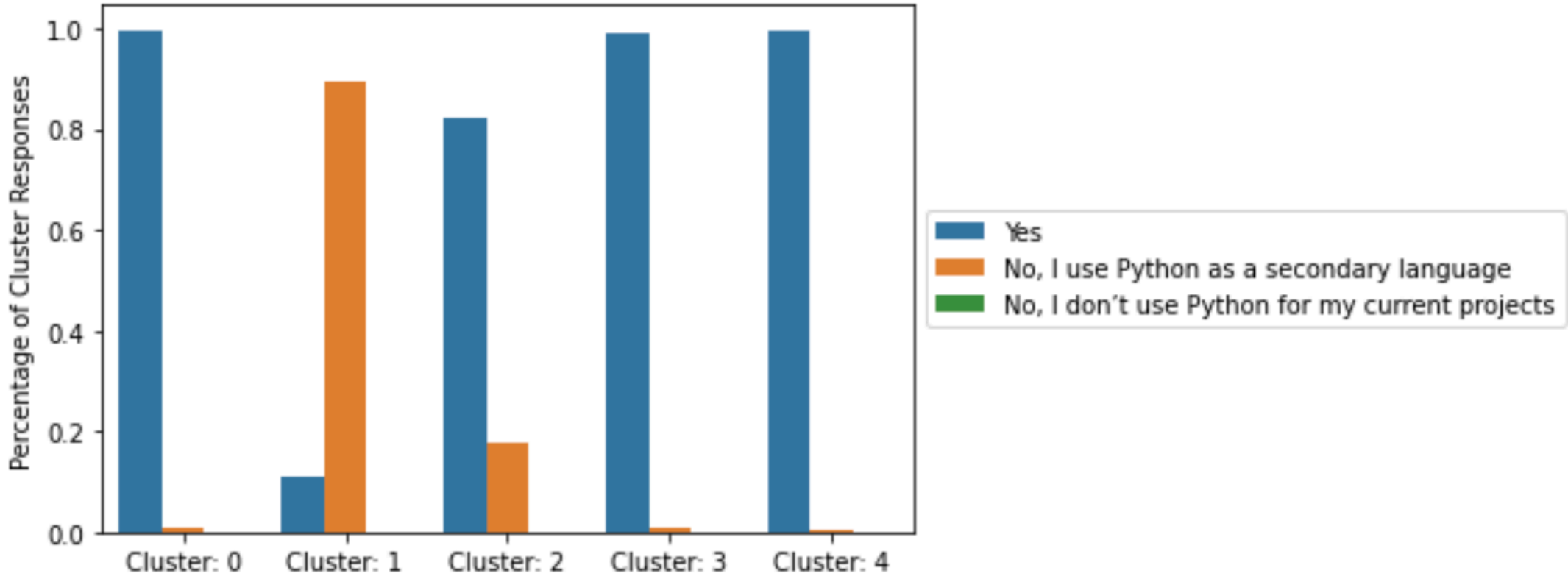
Cluster 1 was 2nd most experienced for programming, but 2nd least experienced in Python

Clusters in order of average experience (most to least):

- Cluster 4
- Cluster 0
- Cluster 2
- Cluster 1
- Cluster 3

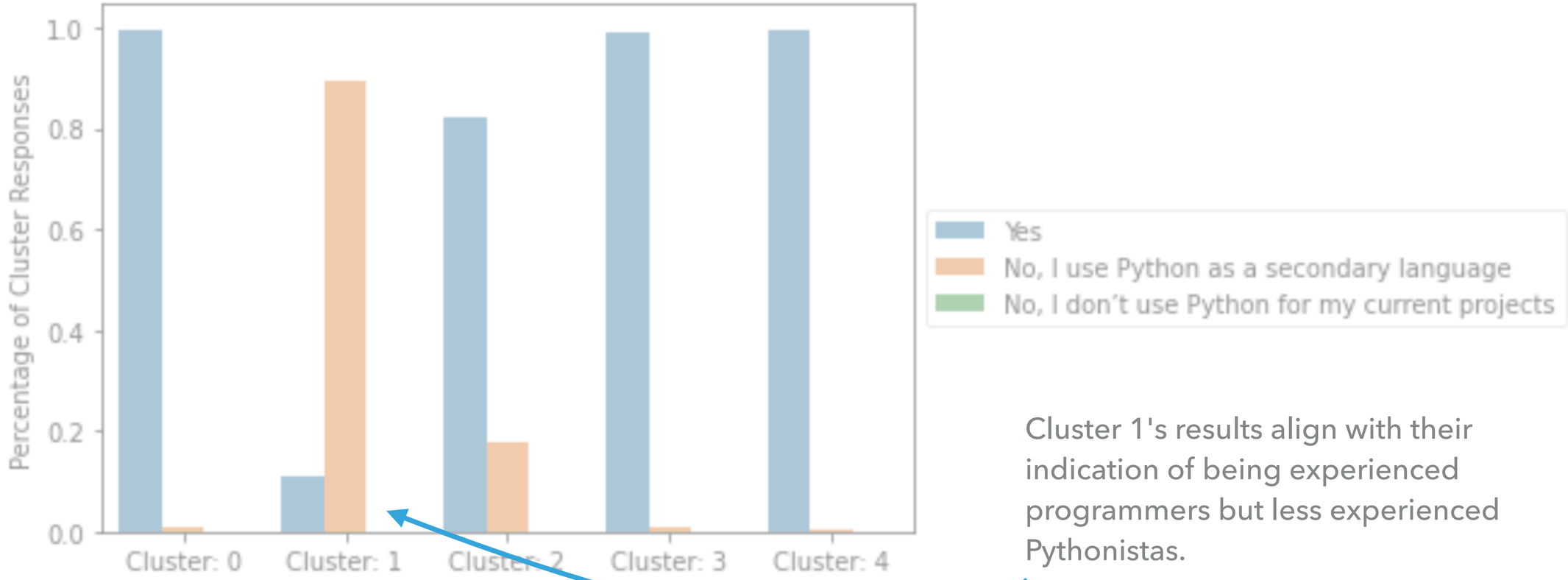
ABOUT THE CLUSTERS

- Is Python the main language you use for your current projects?



ABOUT THE CLUSTERS

- Is Python the main language you use for your current projects?



Cluster 1's results align with their indication of being experienced programmers but less experienced Pythonistas.

ABOUT THE CLUSTERS

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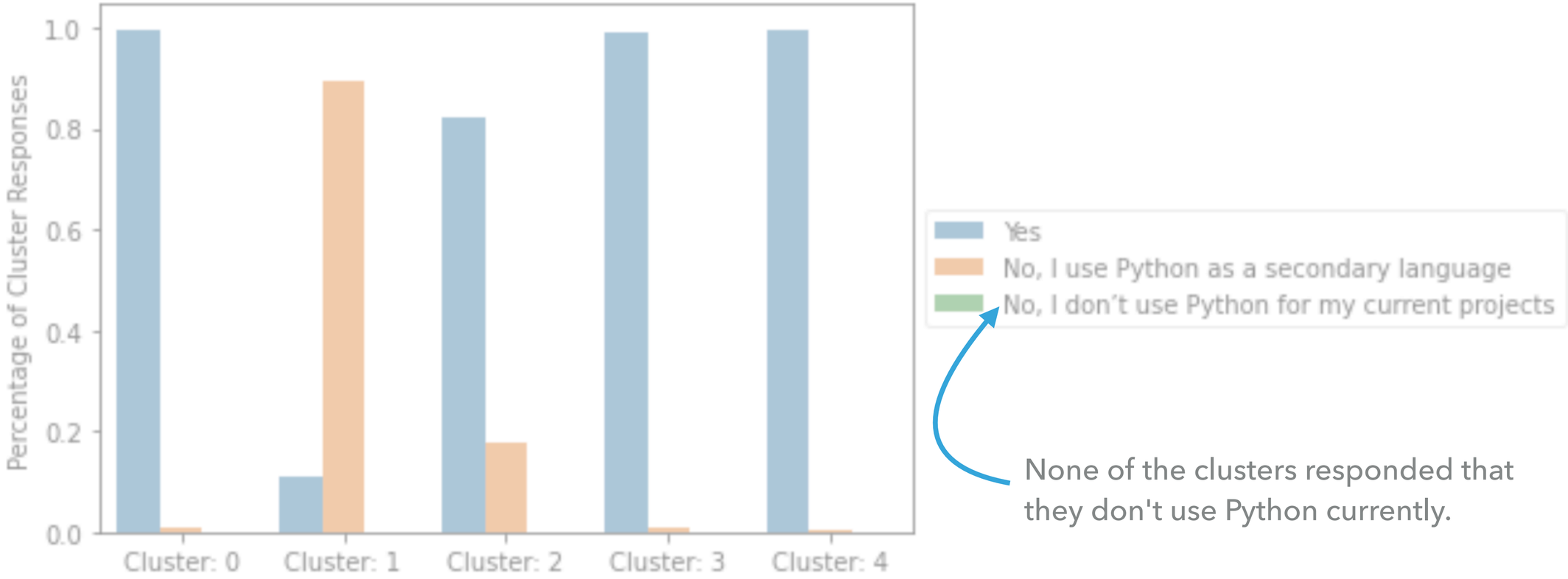
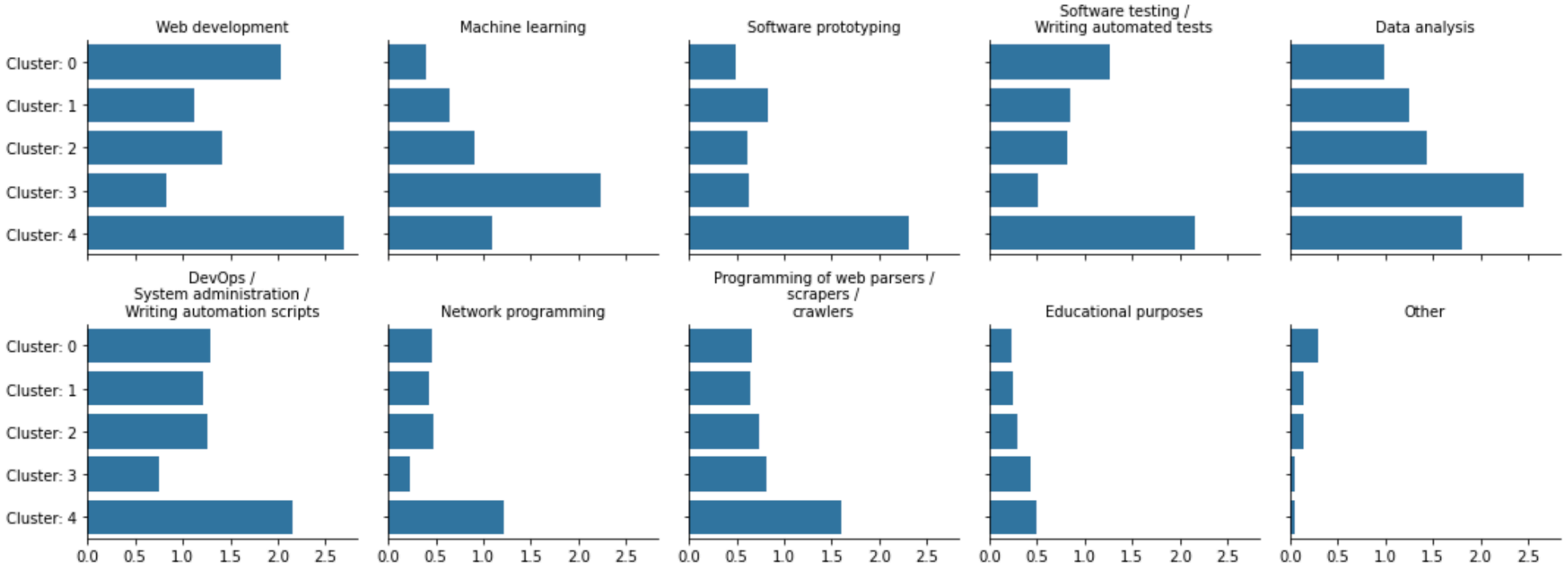


ABOUT THE CLUSTERS

- How involved are you with... ?

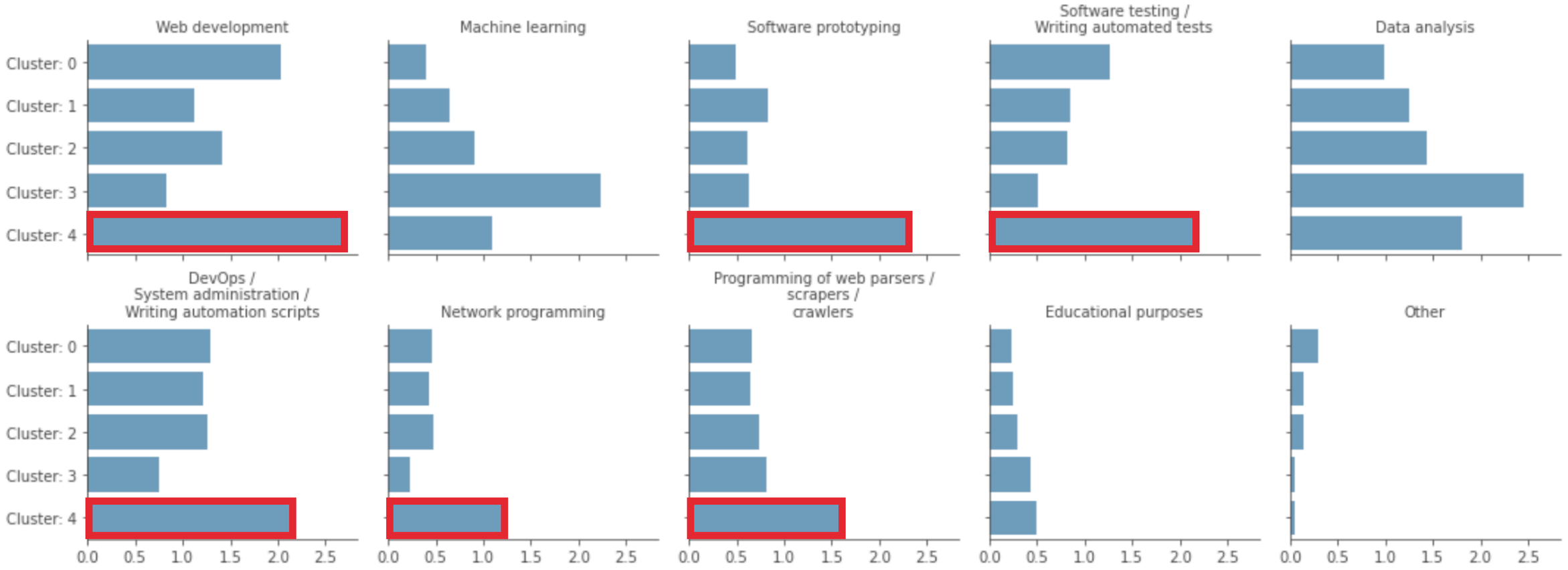


There were other 'involved' questions, but these were the top 10 for differentiating cluster members.

ABOUT THE CLUSTERS

Our most experienced cluster is the most involved with varying techniques

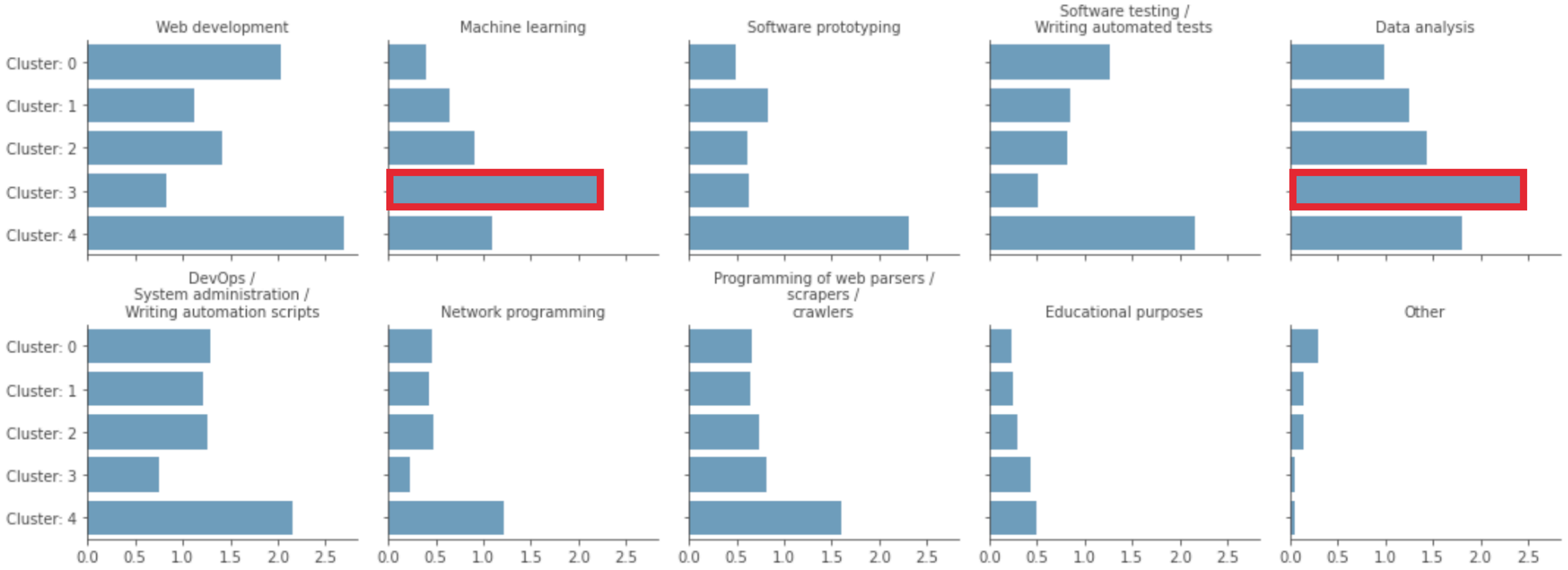
- How involved are you with... ?



ABOUT THE CLUSTERS

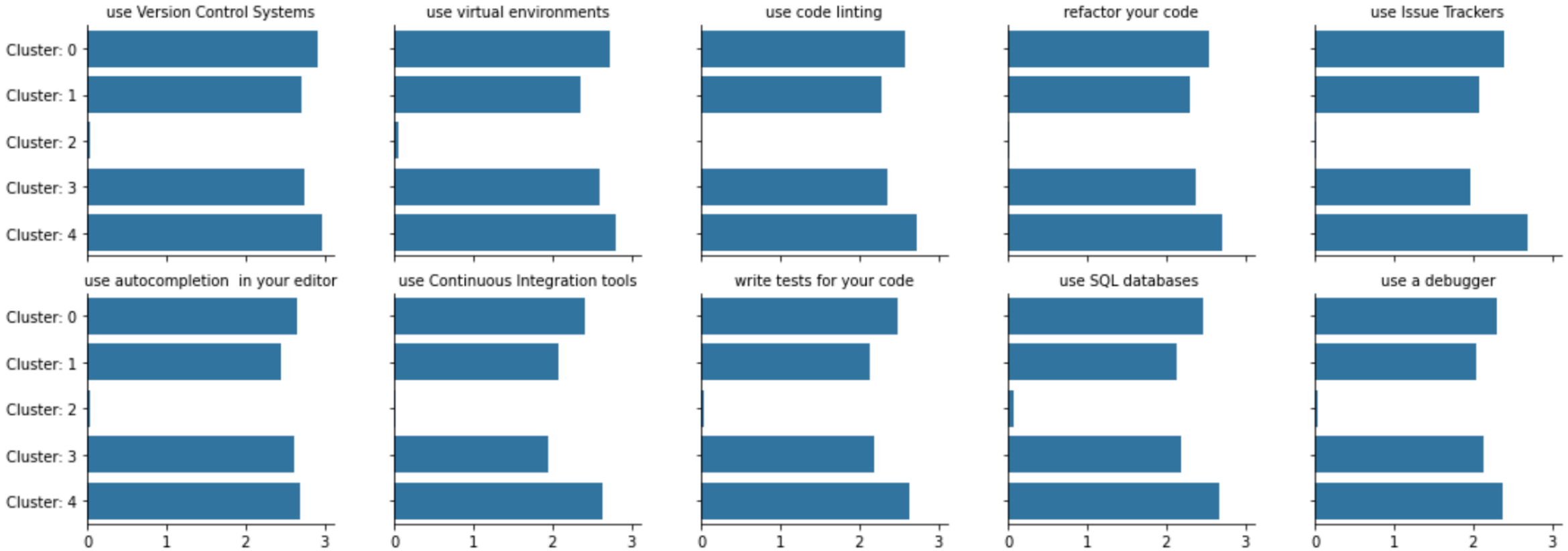
Our least experienced cluster is the most involved with more "Data Science" techniques.

- How involved are you with... ?



ABOUT THE CLUSTERS

- How often do you... ?

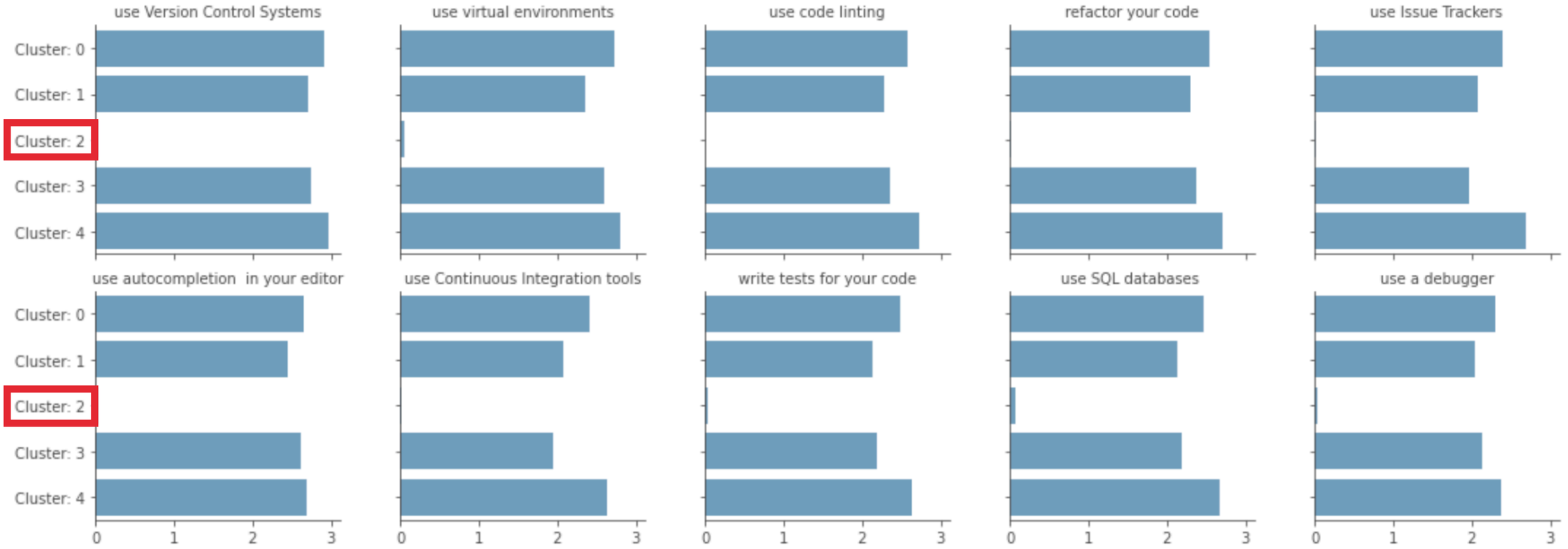


There were other 'how often' questions, but these were the top 10 for differentiating cluster members.

ABOUT THE CLUSTERS

Cluster 2 did not mark that they did any of these activities 🤦

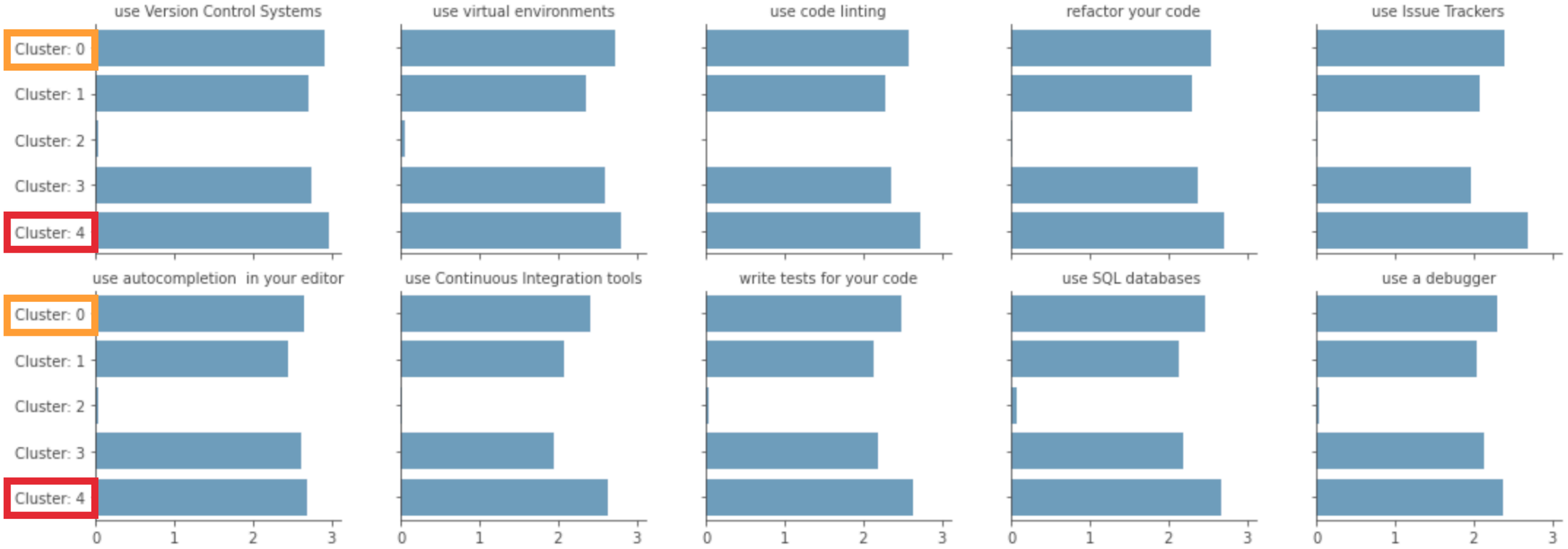
- How often do you... ?



ABOUT THE CLUSTERS

- How often do you... ?

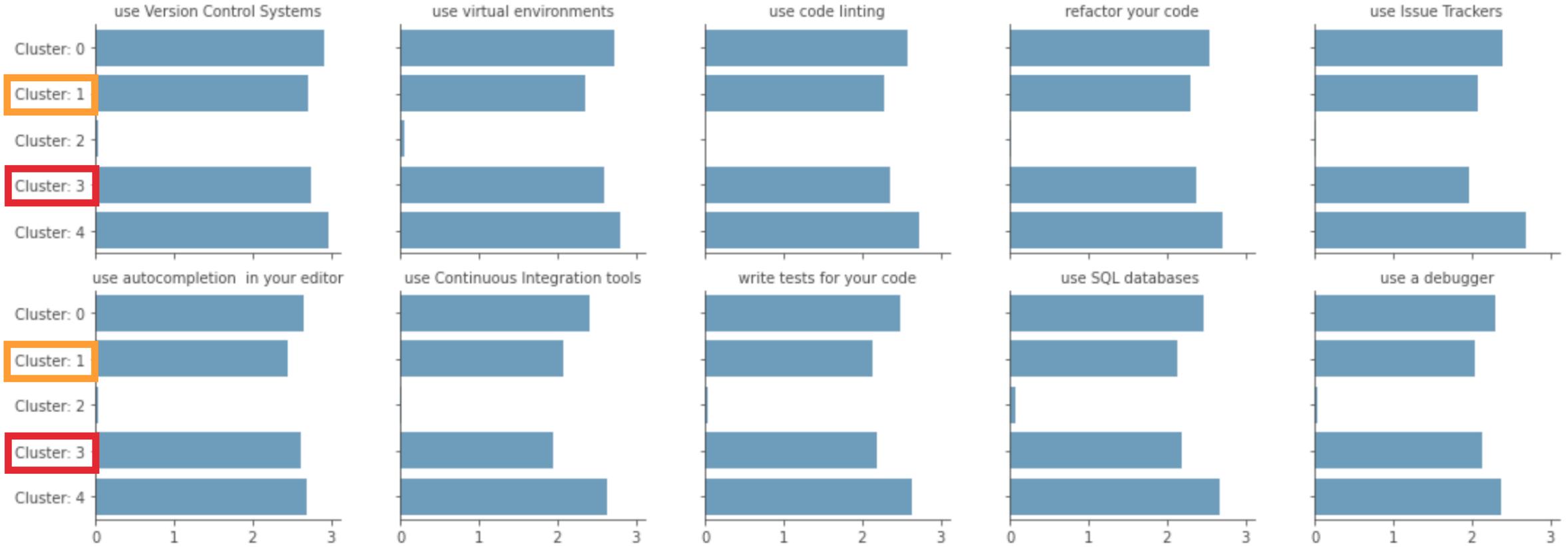
Cluster 4 (most experienced programmers) does all of these activities the most. Cluster 0 is right behind.



ABOUT THE CLUSTERS

- How often do you... ?

Cluster 1 (non-Pythonistas) & Cluster 3 (less experienced programmers) are hard to differentiate based on these responses.



ABOUT THE CLUSTERS – SUMMARY STATEMENTS

- Cluster 1
  - Python is not their first choice for programming. They are experienced programmers, and they use varying technologies and techniques
- Cluster 2
  - Might not be a cluster of interest. Membership seems mostly based on not answering the "How often do you… ?" series of questions.

ABOUT THE CLUSTERS – SUMMARY STATEMENTS

- Cluster 3
  - Less experienced programmers with a focus on data science style tasks. Is their lack of programming experience due to a lack of experience in industry or due to a heavier focus on the math/stats of data science tasks?
- Cluster 4
  - Most experienced Programmers and most experienced Pythonistas. They are more classical programmers than they are data scientists.

ABOUT THE CLUSTERS – SUMMARY STATEMENTS

- Cluster 0
  - Appears to be more of a 'catch-all' cluster for the remaining participants. Future work might include a more granular cluster analysis.

LIMITATIONS

- This analysis ignored many of the survey participants and many of the questions
  - These decisions were made due to a short project timeline
- Treating a lack of response as an indication of not using a technology / technique should be revisited
- There is survey data available for 2017, 2018, & 2019. Only 2019 was considered. Could previous results be leveraged in analysis?

(POTENTIAL) ACTIONABLE NEXT STEPS

- If these clusters were to be used to segment PyCharm customers. The main groups might be:

    1. Less experienced programmers, interested in more Data Science focused features (Cluster 3)

    2. More experienced programmers, interested in more traditional Software Engineering features (Clusters 1 & 4)

- Analyzing / polling these groups might lead to valuable market analysis of these segments

Q & A