Exploring the Data Structure

MIDFIELD Institute

Aug 3, 2022

MIDFIELD

Multiple-Institution Database For Investigating Engineering Longitudinal Development

Institute Objectives

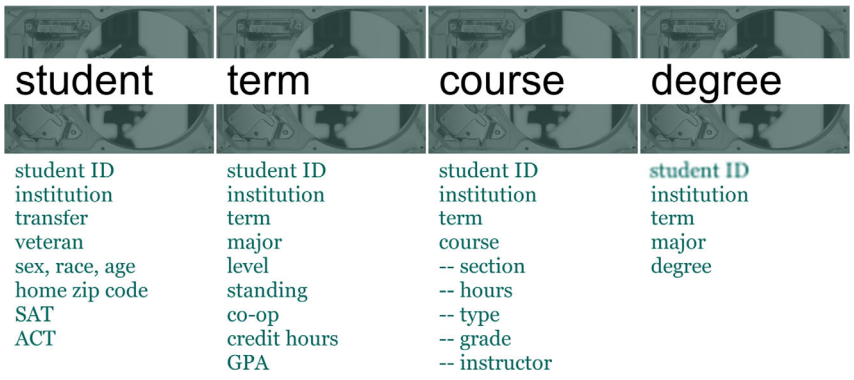
Qualitatively, by the end of the workshop participants should be able to:

1. **Describe the data available in MIDFIELD**
2. **Describe how the MIDFIELD data are organized**
3. Describe key principles of effective data visualization

Computationally, participants should be able use midfieldr, an R package specifically designed for use with MIDFIELD, to:

1. Subset MIDFIELD data to obtain a population to study
2. Classify the student records by desired groupings
3. Summarize the data by groups and display results

MIDFIELD data are organized in four tables.



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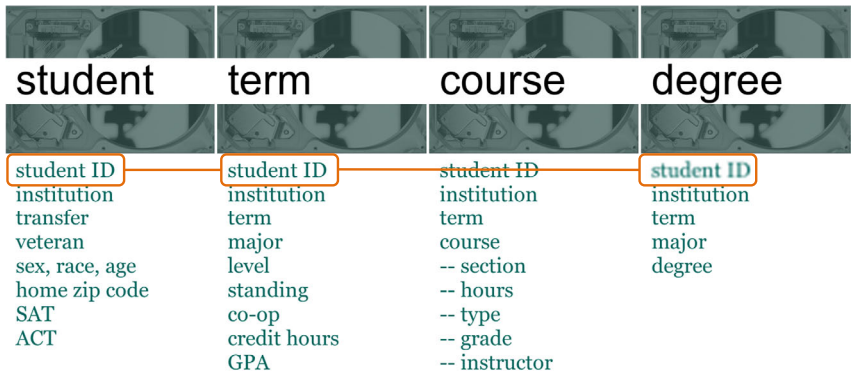
The real power of MIDFIELD is that we can link across tables.



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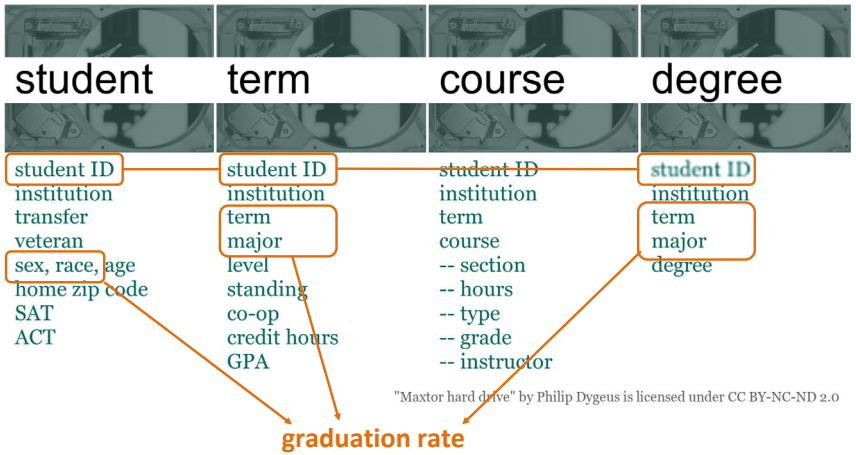

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Use the tables to answer these questions about a student.

1. What can you tell about their **demographics**?
2. When did they **start**?
3. What was their **starting major**?
4. Did they **change majors**? To what and when?
5. What courses did they do well in?
6. Did they repeat any courses?
7. Did they **graduate**? **How long** did it take?

https://bit.ly/MIDFIELD-Institute

mcid	institution	transfer	race	sex
MID25836044	Institution M	First-Time in College	White	Female

Additional variables in midfielddata
age
us_citizen
home_zip
high_school
hours_transfer
sat_math
sat_verbal
act_comp

mcid	institution	term
MID25836044	Institution M	20001
MID25836044	Institution M	20003
MID25836044	Institution M	20011
MID25836044	Institution M	20013
MID25836044	Institution M	20021
MID25836044	Institution M	20023
MID25836044	Institution M	20025
MID25836044	Institution M	20031
MID25836044	Institution M	20033

term is in the format YYYYT

20011 = Fall 2001

YYYY: Academic year (AY)
2001 : 2001-2002
Fall 2001 – Summer 2002

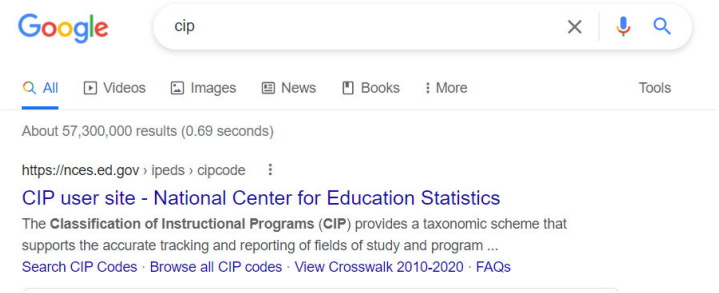
T: Term of the AY:
1 : fall
2 : winter (quarter)
3 : spring
4, 5, and 6 : summer

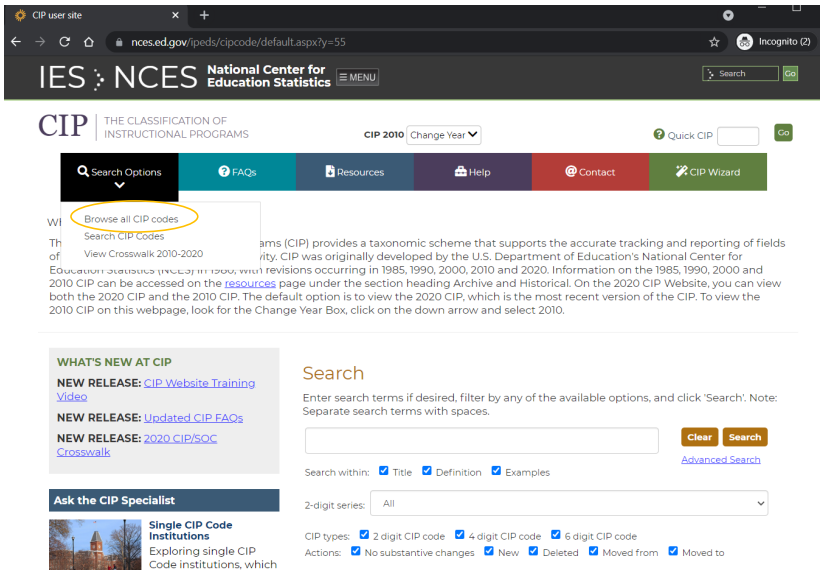
20013 = Spring 2002

mcid	institution	term	cip6	level	hours_ term
MID25836044	Institution M	20001	140102	01 Freshman	11
MID25836044	Institution M	20003	140102	01 Freshman	15
MID25836044	Institution M	20011	140801	02 Sophomore	15
MID25836044	Institution M	20013	140801	02 Sophomore	12
MID25836044	Institution M	20021	140801	03 Junior	16
MID25836044	Institution M	20023	140801	03 Junior	16
MID25836044	Institution M	20025	140801	04 Senior	7
MID25836044	Institution M	20031	140801	04 Senior	15
MID25836044	Institution M	20033	140801	04 Senior	15

Additional variables
standing
hours_cumul
hours_cumul_ attempt
gpa_term
gpa_cumul

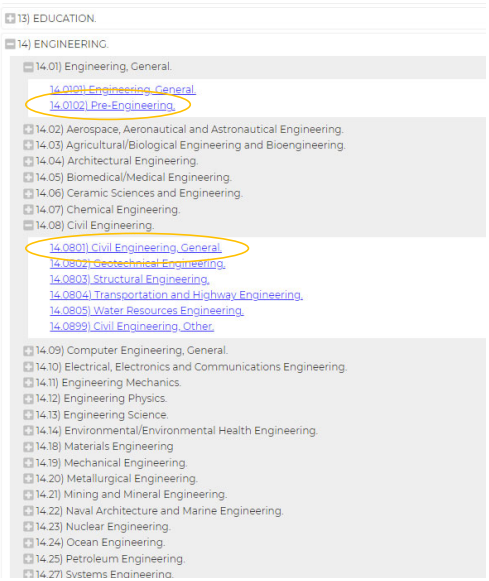
cip6





CIP

term	cip6
20001	140102
20003	140102
20011	140801
20013	140801
20021	140801
20023	140801
20025	140801
20031	140801
20033	140801



student term **course** degree

mcid	institution	term	course	abbrev	number	grade
MID25836044	Institution M	20001		CH	101	B
MID25836044	Institution M	20001		ENGL	102	B
MID25836044	Institution M	20001		ENGR	101	A
MID25836044	Institution M	20001		MTHSC	106	B
MID25836044	Institution M	20001		SOC	201	B
MID25836044	Institution M	20003		CH	102	CR
MID25836044	Institution M	**20003**		**CP SC**	**120**	**A**
MID25836044	Institution M	20003		CU	101	A
MID25836044	Institution M	20003		ENGR	120	B
MID25836044	Institution M	20003		MTHSC	108	A
MID25836044	Institution M	20003		PHYS	122	A
MID25836044	Institution M	20011		C E	251	A
MID25836044	Institution M	20011		C E	253	A
MID25836044	Institution M	20011		C E	255	B
MID25836044	Institution M	**20011**		**E M**	**201**	**D**
MID25836044	Institution M	20011		MTHSC	206	B
MID25836044	Institution M	20013		A A H	210	B
MID25836044	Institution M	20013		E G	209	C
MID25836044	Institution M	20013		E M	201	B
MID25836044	Institution M	20013		E M	202	CR
MID25836044	Institution M	20013		MTHSC	208	B
MID25836044	Institution M	20013		PHYS	221	B

mcid	institution	term	course	abbrev	number	grade
MID25836044	Institution M	20021		C E	200	C
MID25836044	Institution M	20021		C E	351	B
MID25836044	Institution M	20021		ECON	211	B
MID25836044	Institution M	20021		ENGL	314	A
MID25836044	Institution M	20021		EX ST	301	A
MID25836044	Institution M	20023		**C E**	301	B
MID25836044	Institution M	20023		**C E**	311	A
MID25836044	Institution M	20023		**C E**	331	C
MID25836044	Institution M	20023		**C E**	341	B
MID25836044	Institution M	20023		**C E**	352	B
MID25836044	Institution M	20023		**C E**	353	A
MID25836044	Institution M	20025		C E	321	B
MID25836044	Institution M	20025		SPCH	250	B
MID25836044	Institution M	20031		C E	342	B
MID25836044	Institution M	20031		C E	406	C
MID25836044	Institution M	20031		C E	421	A
MID25836044	Institution M	20031		ECON	212	B
MID25836044	Institution M	20031		EE&S	401	B
MID25836044	Institution M	20033		C E	402	B
MID25836044	Institution M	20033		C E	433	B
MID25836044	Institution M	20033		C E	459	A
MID25836044	Institution M	20033		ENGL	206	B

Additional variables
section
type
faculty_rank
hours_course
pass_fail

student term course **degree**

mcid	institution	term	cip6	degree
MID25836044	Institution M	20033	140801	Bachelor of Science

Take a few minutes to explore Example 2 (MID26035311). Use the following guiding questions

1. What can you tell about their **demographics**?
2. When did they **start**?
3. What was their **starting major**?
4. Did they **change majors**? To what and when?
5. What courses did they do well in?
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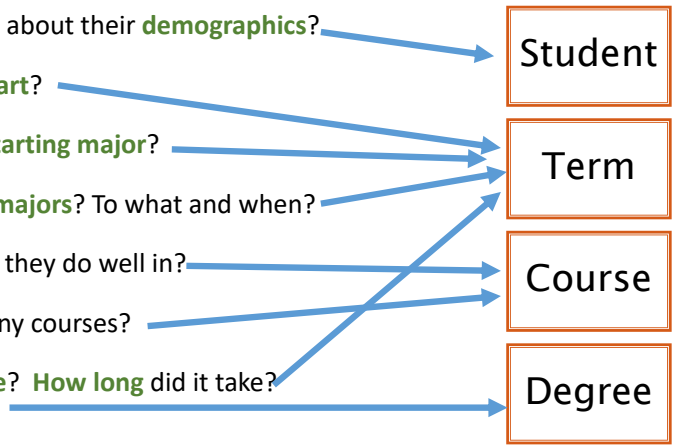
7. Did they **graduate**? **How long** did it take?



Check your results for Example 2.

1. What can you tell about their **demographics**? **Hispanic/Latinx male, FTIC**
2. When did they **start**? **20041 -> Fall 2004**
3. What was their **starting major**? **140701 -> Chemical Engineering**
4. Did they **change majors**? If so, to what and when? **Yes. 141001 -> Electrical Engineering in Spring of sophomore year**
5. What courses did they do well in? **Senior Design, microecon, intro to CS**
6. Did they repeat any courses? **Calculus III , digital circuits, phys 1**
7. Did they **graduate**? **How long** did it take them? **Yes. 20084 -> Summer 2009, so 5 years (Fall to Summer is one year). Side note- the student did not take any undergrad courses in the last year**

How do we see the story of many students?

- Utilize data manipulation and analysis software such as R
- Excel is insufficient to open the full dataset
  - 1,048,000 row limit
- Some questions will require advanced quantitative methods
- *midfieldr* has tools for working with *midfielddata*

Next up:

- Break
- 3:00-5:00 ET Guided Practice
  - Back to Institute website (https://midfieldr.github.io/2022-midfield-institute/agenda.html#wednesday-august-3)
- Please check in with us before leaving the virtual meeting.
  - How far did you get?
  - What are you thinking of using MIDFIELD for?