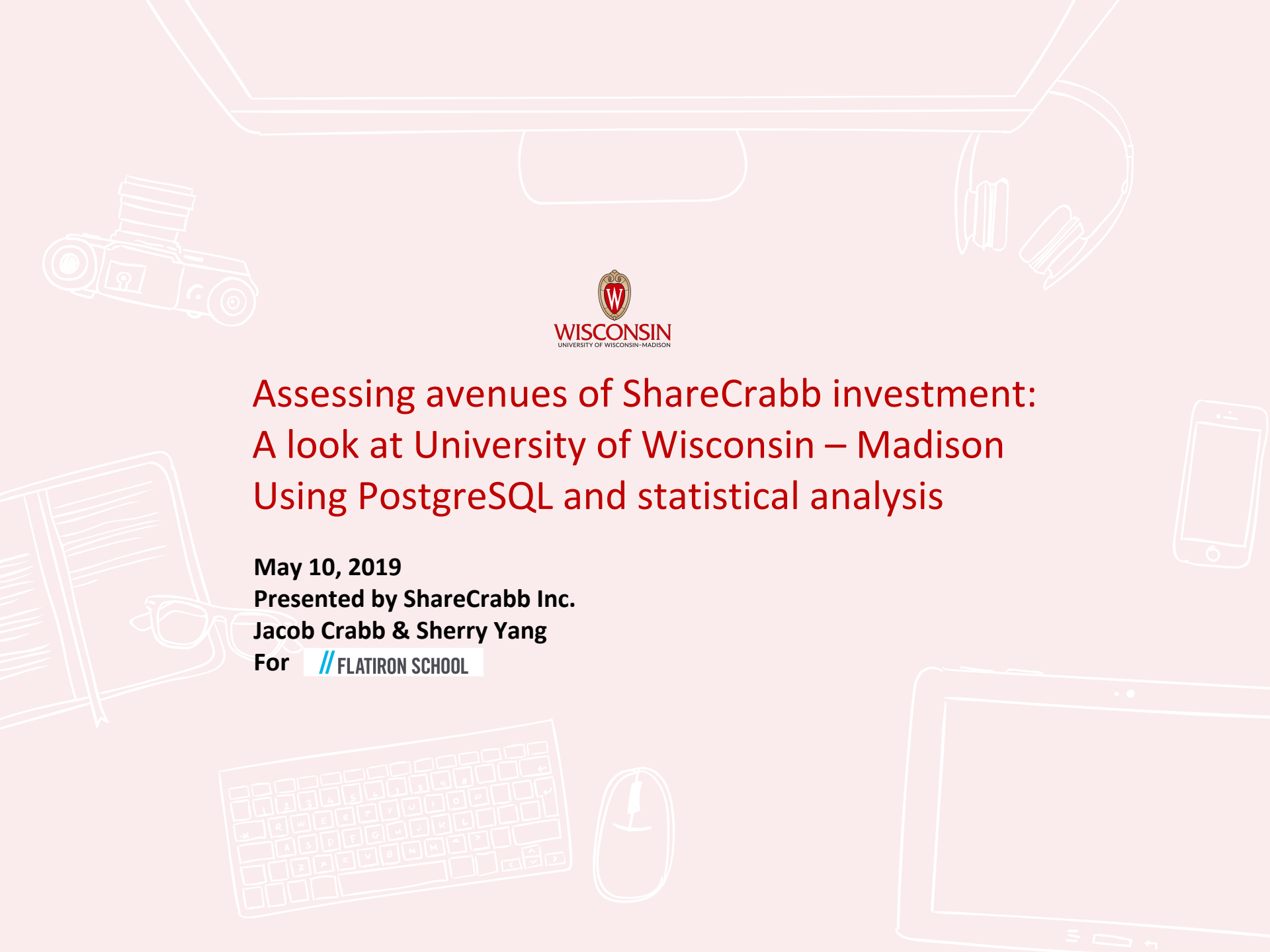

Assessing avenues of ShareCrabb investment: A look at University of Wisconsin – Madison Using PostgreSQL and statistical analysis

May 10, 2019

Presented by ShareCrabb Inc.
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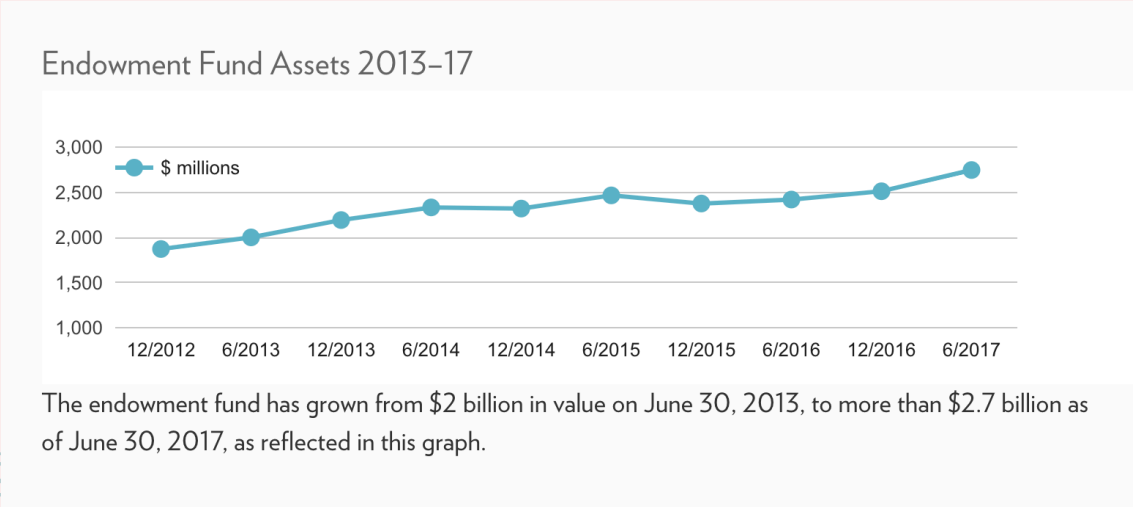
For // FLATIRON SCHOOL

Roadmap

- Background
- Purpose
- Methodology
- Challenges
- Insights
- Next Steps

Background

- ShareCrabb is meeting with its team to review how well UW-Madison students have done academically in the past decade.
- Rapidly rising university tuition costs are creating consumer consciousness in how universities spend their funds. ShareCrabb wants help their client Mr. Jenkins to invest in a university that consumers feel is spending their funds well.



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Purpose

- Today we will be answering the following questions:
  - Insight on STEM education
  - Insight on STEM and humanities progression
  - Insight on class duration
  - Insight on class size

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Methodology

- Connect tables in database using PSQL
- Feature engineer for year
- Feature engineer for weight grades
- Assess business value of various statistical measures

```
q = """
SELECT DISTINCT
  sub_m.subject_code
, sub_j.name AS sub_j_name
, grade_d.a_count
, grade_d.ab_count
, grade_d.b_count
, grade_d.bc_count
, grade_d.c_count
, grade_d.d_count
, grade_d.f_count
, grade_d.s_count
, grade_d.u_count
, grade_d.cr_count
, grade_d.n_count
, grade_d.p_count
, grade_d.i_count
, grade_d.nw_count
, grade_d.nr_count
, grade_d.other_count
, sch.start_time
, sch.end_time
,

  CASE
        WHEN term_code BETWEEN 1063 AND 1073 THEN '2006'
        WHEN term_code BETWEEN 1073 AND 1083 THEN '2007'
        WHEN term_code BETWEEN 1083 AND 1093 THEN '2008'
        WHEN term_code BETWEEN 1093 AND 1103 THEN '2009'
        WHEN term_code BETWEEN 1103 AND 1113 THEN '2010'
        WHEN term_code BETWEEN 1113 AND 1123 THEN '2011'
        WHEN term_code BETWEEN 1123 AND 1133 THEN '2012'
        WHEN term_code BETWEEN 1133 AND 1143 THEN '2013'
        WHEN term_code BETWEEN 1143 AND 1153 THEN '2014'
        WHEN term_code BETWEEN 1153 AND 1163 THEN '2015'
        WHEN term_code BETWEEN 1163 AND 1173 THEN '2016'
        WHEN term_code BETWEEN 1173 AND 1183 THEN '2017'
        ELSE 'the_world_is_over'
    END AS Year


FROM grade_distributions AS grade_d

JOIN sections sect
  ON sect.course_offering_uuid = grade_d.course_offering_uuid
  AND sect.number = grade_d.section_number

JOIN subject_memberships sub_m
  ON grade_d.course_offering_uuid = sub_m.course_offering_uuid


JOIN course_offerings cor_o
  ON cor_o.uuid = grade_d.course_offering_uuid


JOIN schedules sch
  ON sect.schedule_uuid = sch.uuid

JOIN subjects sub_j
  ON cast(sub_m.subject_code as text) = cast(sub_j.code as text)

"""
```

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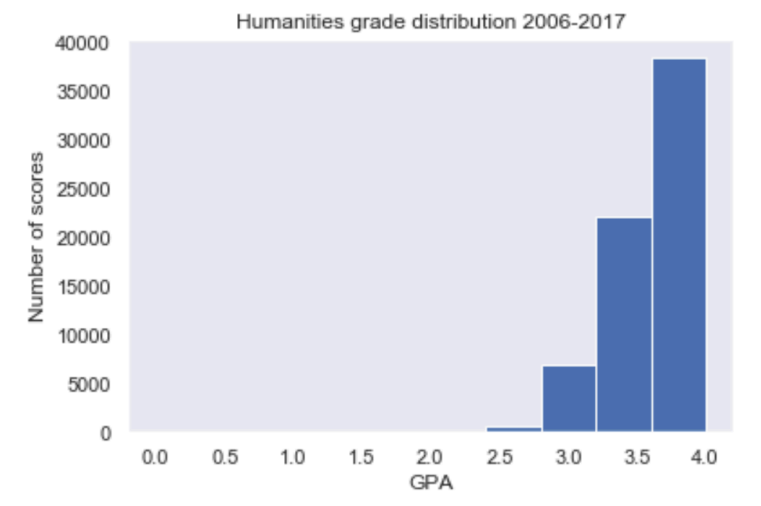
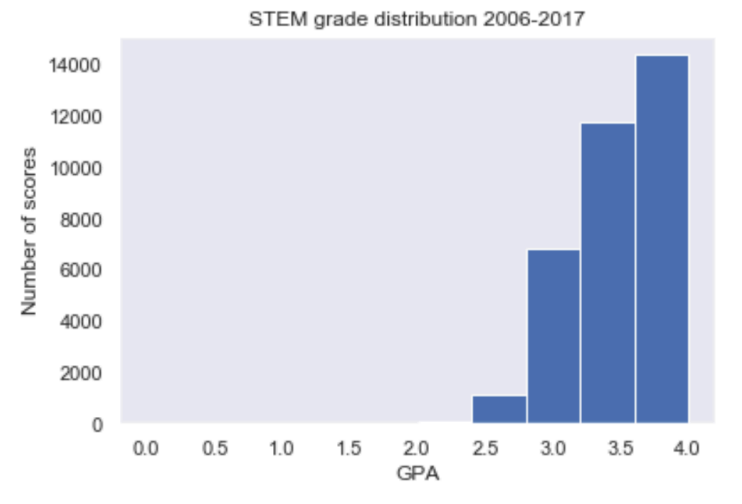
Challenges

- Connecting tables in database using PSQL
- Deciding what to do about unknown grades
- Working with class sections
- Categorizing what is STEM and what is not STEM
- Deciding what is a long and short class
- Two sample t tests were giving inconclusive results

Insight: There is not a significant difference between GPAs for STEM classes and GPAs for humanities classes at UW-Madison.





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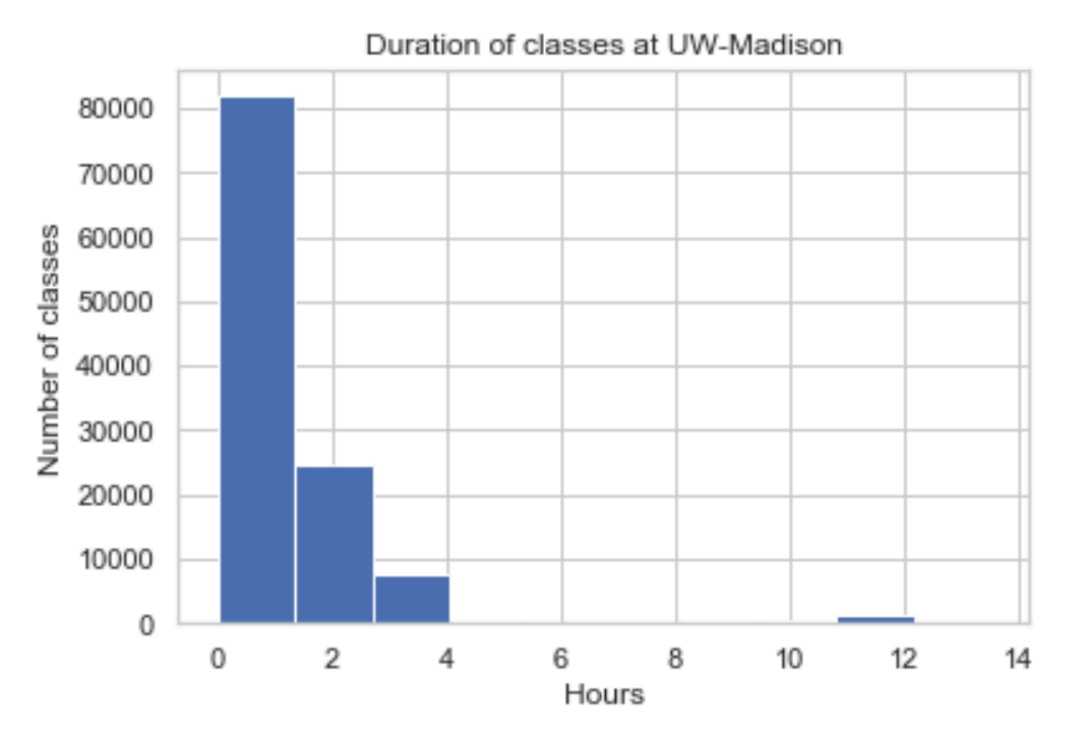
Insight: STEM grades do not get better over the last decade at a statistically significant level.

do STEM mean grades get better as time goes on?

H_0: STEM mean grades in 2007 = STEM mean grades in 2017
H_A: STEM mean grades in 2007 != STEM mean grades in 2017
once again we will be using alpha of 0.05

Insight: Longer classes are not associated with the same grades as shorter classes at a statistically significant level.



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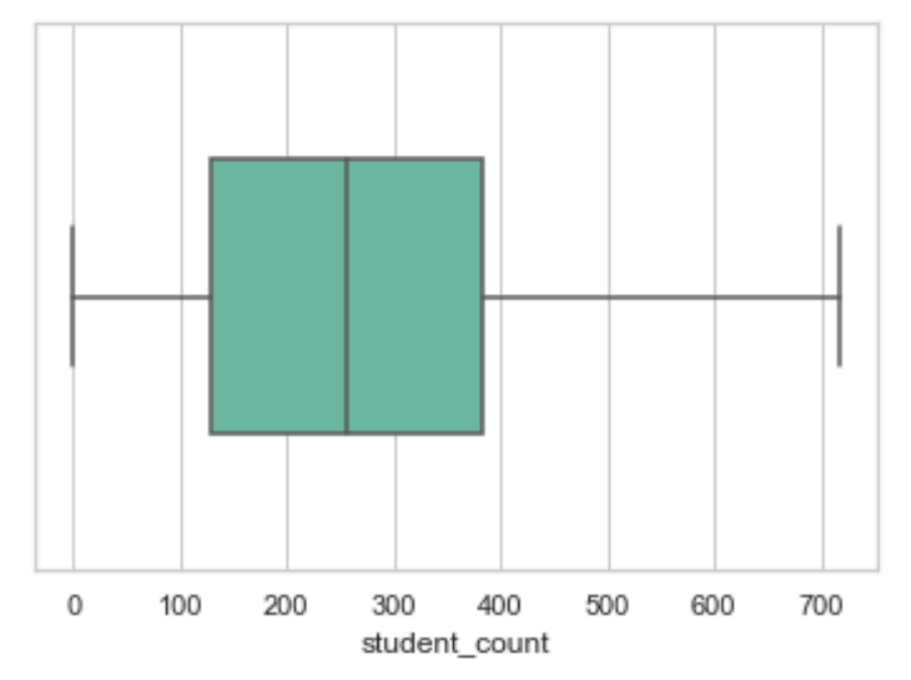
Insight: Large classes do not not produce the same grades as small classes at a statistically significant level. Large class is defined as classes greater than size = 255.



Next Steps

We need the financial data to ask the following questions:

- Does increase in endowment over the years have a statistically significant increase in grades?
- Does increase in endowment over the years correlate with the increase in percentage of high performing teachers?
- Does an increase in A's correlate with higher median salary after graduation for the class?
- Does course load have a statistically significant impact on salary outcomes after school?

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