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Presentation

Project Team 12: Data Within Education, DS 4200 F20

DS 4200 Fall 2020 – Prof. Cody Dunne, Northeastern University

Project motivation

Modern Learning Management Systems (LMS) collect vast amounts of data previously untapped through technology.

Current data visualization techniques falls short at providing detailed data to end users.

Partner Keo Plus LMS

Learning management system provider specializing in online education

Data Ranging from Submission Cycles to Student Grades

The screenshot shows a mobile-style LMS interface. At the top, a header bar displays the course title "Database Engineering and its application in Machine Learning" and a gear icon for settings. On the left, a vertical red sidebar contains icons for "All Classes", "Create Post", "Edit", and "Tools". Below these are sections for "Browse" (Overview, Classwork, Grades, People, Learning, Streams, Files) and "Teacher Tools" (Attendance, Invite). The main content area is titled "Learning" and features a "Create Post" button. It lists several posts: "Lecture Notes: Supervised Learning" (with a link to download), "Course preparations" (posted 07/16/2020), "Unified Modeling Language (UML) Diagrams", "Unit 3" (posted 07/16/2020), "What is a DBMS? (Database Management System)", "Unit 2" (posted 07/16/2020), and "Introduction to Databases". Each post has a three-dot menu icon. A small profile picture is at the bottom of the sidebar.

Database Engineering and its application in Machine Learning

All Classes

Browse

- Overview
- Classwork
- Grades
- People
- Learning
- Streams
- Files

Teacher Tools

- Attendance
- Invite

Learning

Create Post

Lecture Notes: Supervised Learning

For the full lecture notes, please dow...

07/16/2020 ...

Syllabus

Course preparations

07/16/2020 ...

Unified Modeling Language (UML) Diagrams

Unit 3

07/16/2020 ...

What is a DBMS? (Database Management System)

Unit 2

07/16/2020 ...

Introduction to Databases

Living area (feet²) | Price (1000\$)
2104 | 400
1600 | 330
2400 | 369
1416 | 232
3000 | 540
⋮ | ⋮

Lecture Notes: Supervised Learning

For the full lecture notes, please download the attached PDF

Lets start by talking about a few examples of supervised learning. We have a dataset giving the living areas and prices of 47 houses.

Living area (feet ²)	Price (1000\$)
2104	400
1600	330
2400	369
1416	232
3000	540
⋮	⋮

We can plot this data:

A scatter plot titled "housing prices" with the x-axis labeled "square feet" and the y-axis labeled "price (in \$1000)". The x-axis ranges from 500 to 5000, and the y-axis ranges from 0 to 1000. Blue dots represent individual data points, showing a positive correlation between living area and price.

Given data like this, how can we learn to predict the prices as a function of the size of their living areas?

To establish notation for future use, we'll use x (i) to denote

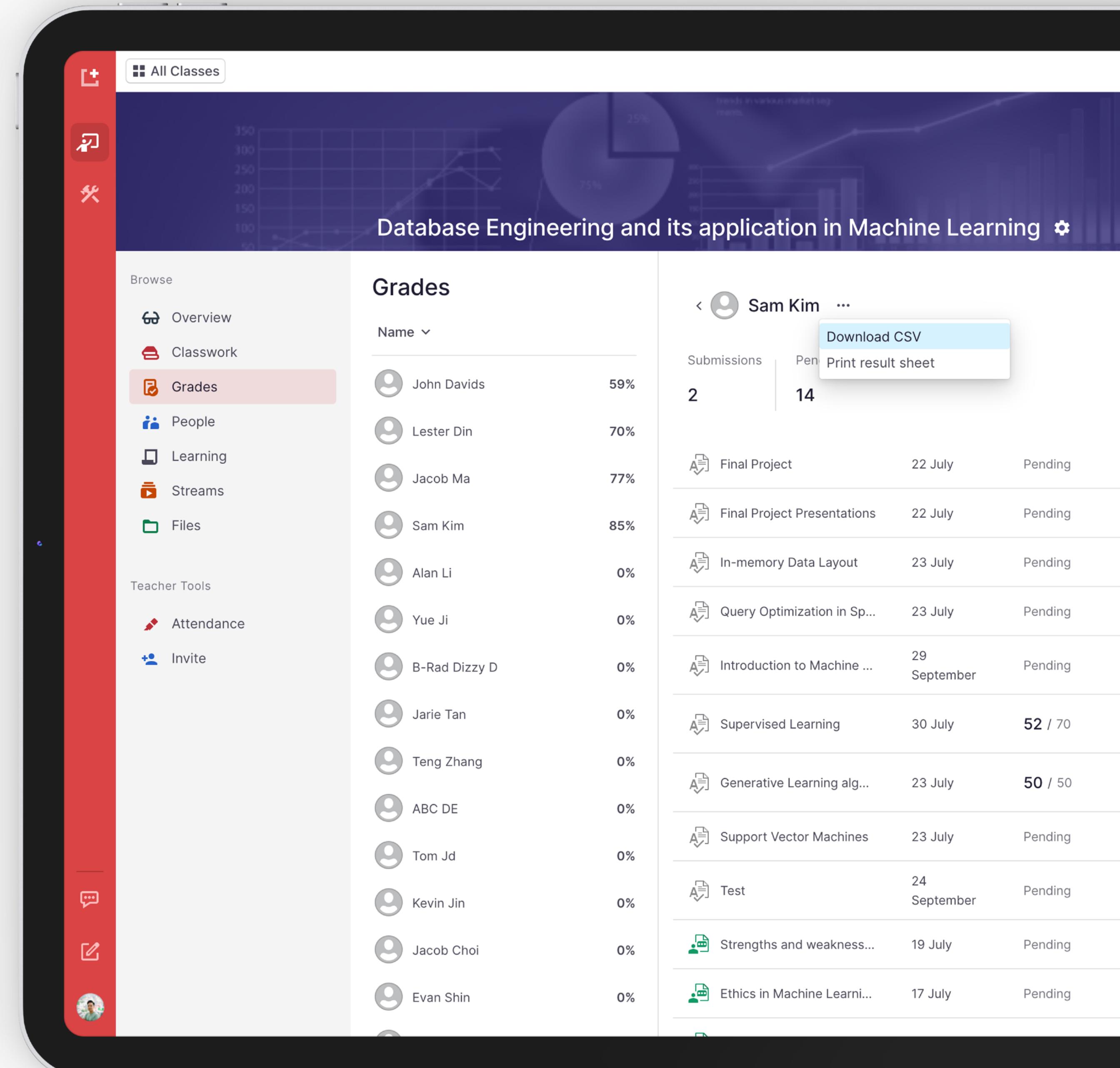
Project Planning

Task Analysis & Data Aggregation

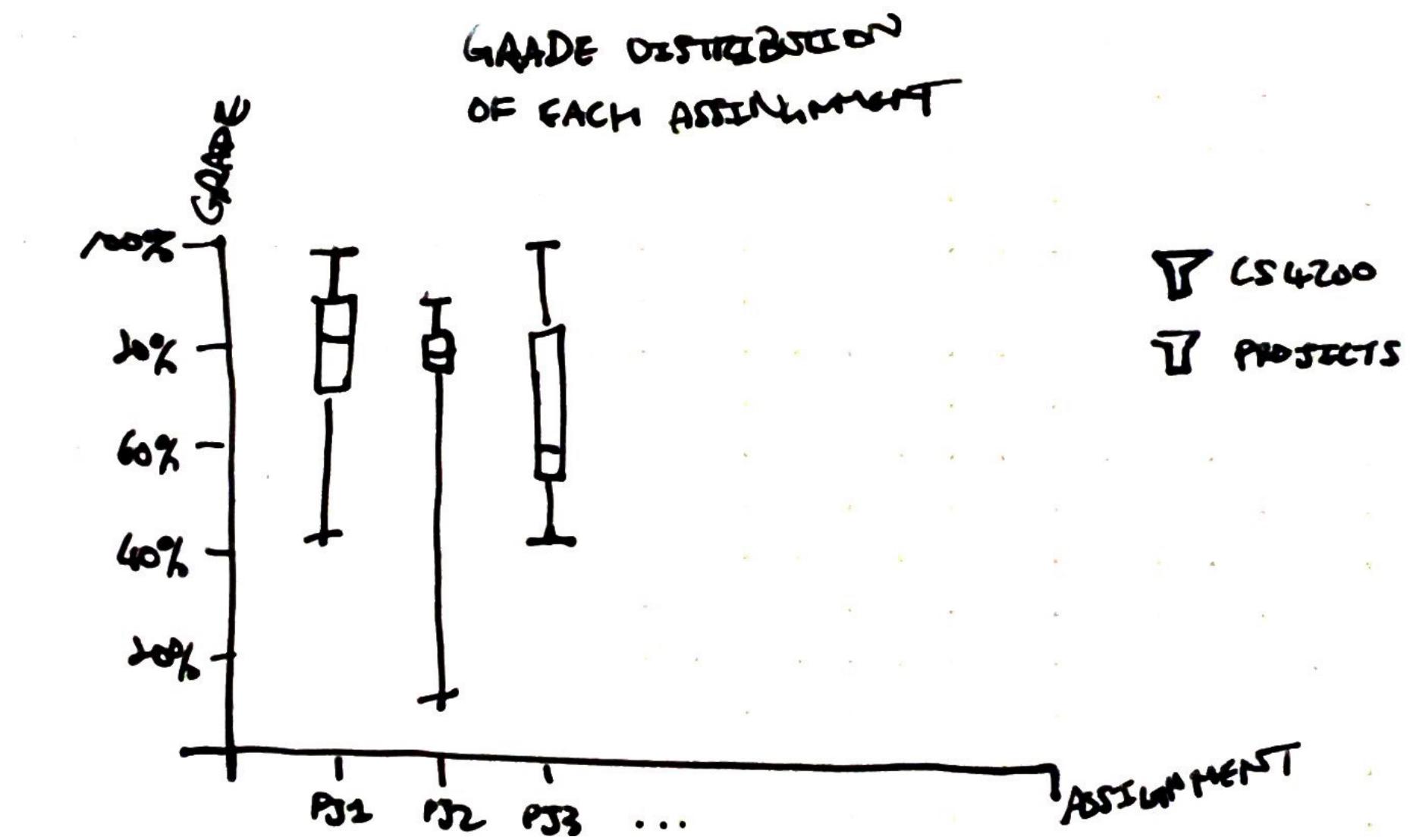
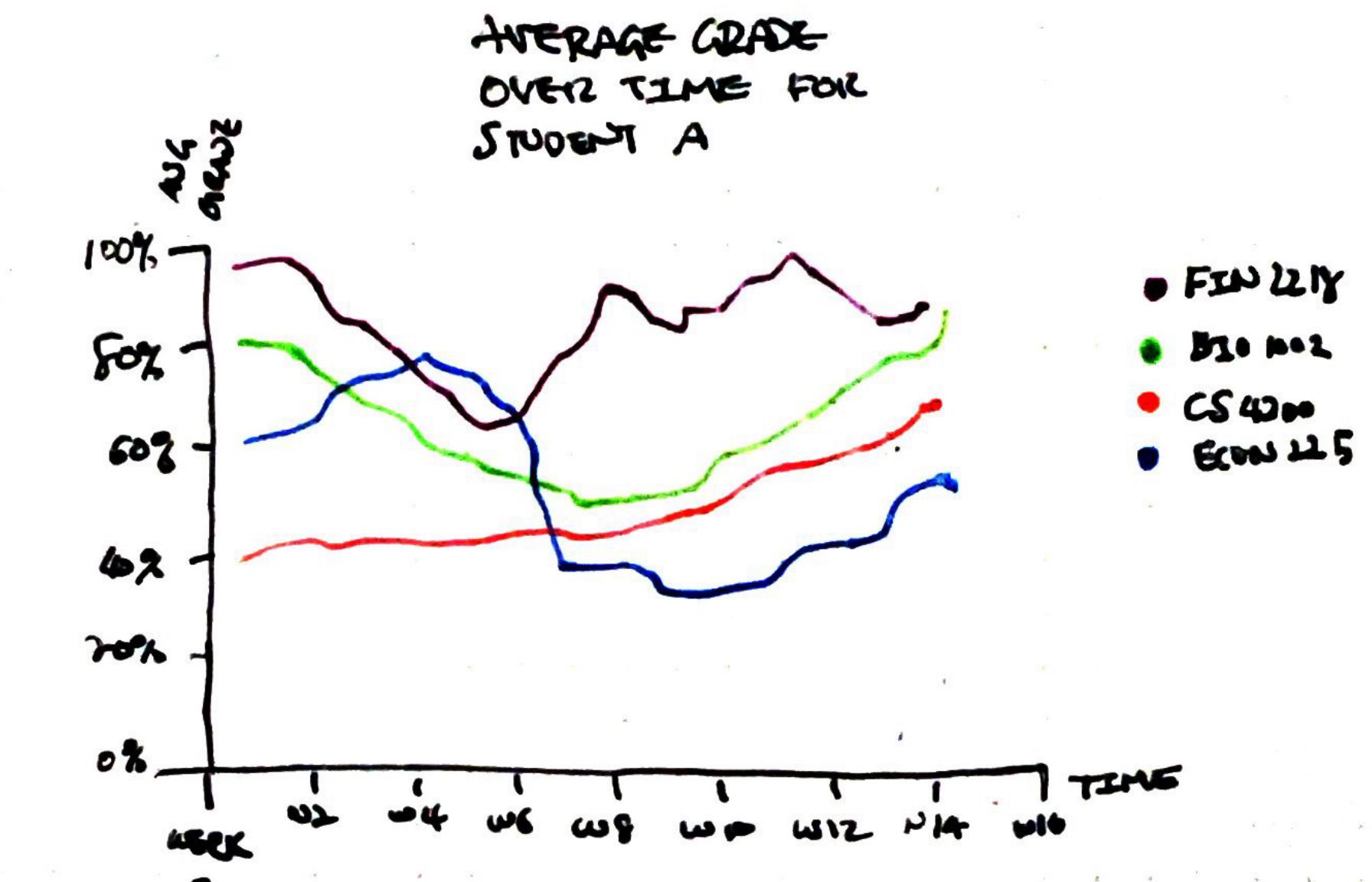
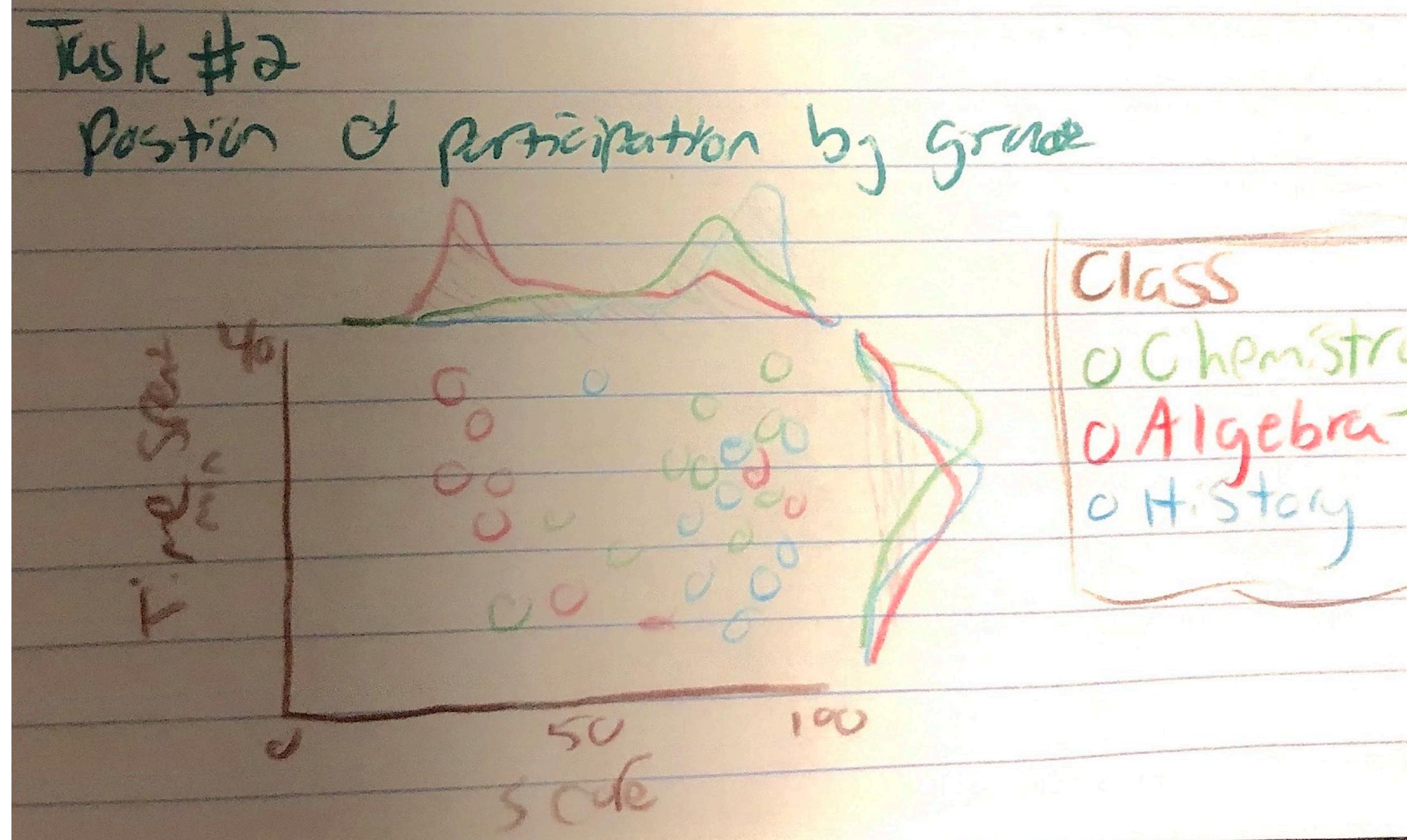
Visualize data previously not possible such as exam duration

Receives CSV Data exports from Keo directly

Requirement to sanitize data to visualize



Early Sketches



Walkthrough

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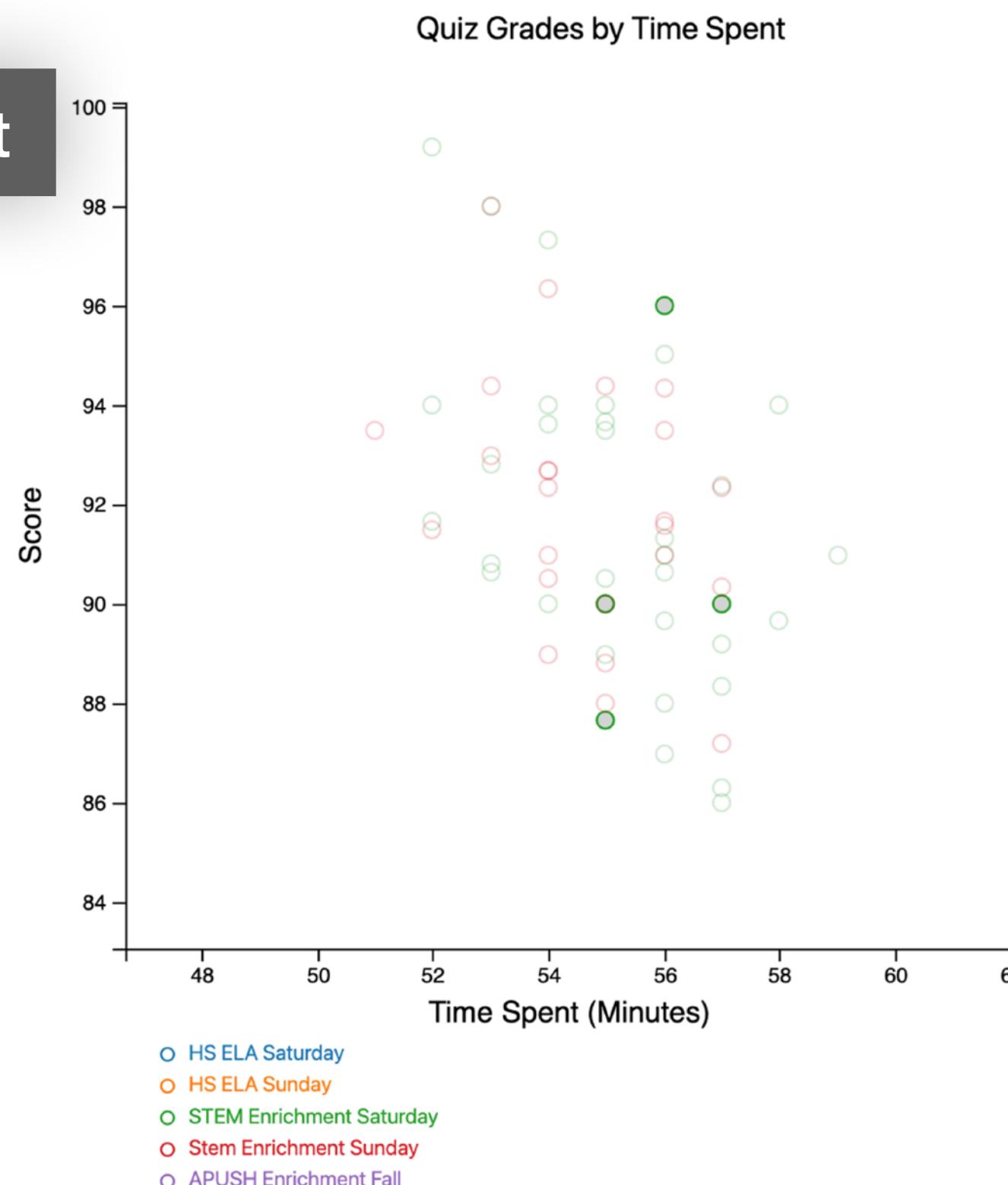
Visualization Design

Class Timed Quiz Grade Distribution

Interact with the scatter plot or table through dragging or clicking to isolate and zoom in to the scatter plot.

Table

Scatterplot



Student name	Class	Assignment	Grade	Due	Time submitted
Yang Li	STEM Enrichment Saturday	Final (Mock)	468/500	10-09-20	10/9/2020 18:40:39
Brian Liu	STEM Enrichment Saturday	Mid Term (Mock)	263/300	08-21-20	8/21/2020 20:9:55
Brian Liu	STEM Enrichment Saturday	Mock (SAT II Math 1 & 2)	180/200	09-18-20	9/18/2020 16:11:19
Brian Liu	STEM Enrichment Saturday	Mcok (SAT II Math 1 & 2)	270/300	09-25-20	9/25/2020 23:38:54
Brian Liu	STEM Enrichment Saturday	Final (Mock)	480/500	10-09-20	10/9/2020 17:54:23
Johnasson Yu	STEM Enrichment Saturday	Mid Term (Mock)	265/300	08-21-20	8/21/2020 16:13:37
Johnasson Yu	STEM Enrichment Saturday	Mock (SAT II Math 1 & 2)	188/200	09-18-20	9/18/2020 23:39:22
Johnasson Yu	STEM Enrichment Saturday	Mcok (SAT II Math 1 & 2)	272/300	09-25-20	9/25/2020 16:20:56
Johnasson Yu	STEM Enrichment Saturday	Final (Mock)	440/500	10-09-20	10/9/2020 21:16:27
Jocelyn Ding	STEM Enrichment Saturday	Mid Term (Mock)	272/300	08-21-20	8/21/2020 16:12:7
Jocelyn Ding	STEM Enrichment Saturday	Mock (SAT II Math 1 & 2)	187/200	09-18-20	9/18/2020 17:30:55
Jocelyn Ding	STEM Enrichment Saturday	Mcok (SAT II Math 1 & 2)	274/300	09-25-20	9/25/2020 16:55:27
Jocelyn Ding	STEM Enrichment Saturday	Final (Mock)	455/500	10-09-20	10/9/2020 16:33:5
Christina White	STEM Enrichment Saturday	Mid Term (Mock)	294/300	08-21-20	8/21/2020 17:0:51
Christina White	STEM Enrichment Saturday	Mock (SAT II Math 1 & 2)	178/200	09-18-20	9/18/2020 17:5:29
Christina White	STEM Enrichment Saturday	Mcok (SAT II Math 1 & 2)	292/300	09-25-20	9/25/2020 20:46:41
Christina White	STEM Enrichment Saturday	Final (Mock)	464/500	10-09-20	10/9/2020 20:44:4
Gregory Sims	STEM Enrichment Saturday	Mid Term (Mock)	273/300	08-21-20	8/21/2020 20:22:47
Gregory Sims	STEM Enrichment Saturday	Mock (SAT II Math 1 & 2)	172/200	09-18-20	9/18/2020 20:33:25
Gregory Sims	STEM Enrichment Saturday	Final (Mock)	496/500	10-09-20	10/9/2020 23:26:48
Letian Xie	STEM Enrichment Saturday	Mid Term (Mock)	269/300	08-21-20	8/21/2020 16:14:40
Letian Xie	STEM Enrichment Saturday	Mock (SAT II Math 1 & 2)	181/200	09-18-20	9/18/2020 21:9:20
Letian Xie	STEM Enrichment Saturday	Mcok (SAT II Math 1 & 2)	269/300	09-25-20	9/25/2020 16:14:2
Letian Xie	STEM Enrichment Saturday	Final (Mock)	462/500	10-09-20	10/9/2020 17:51:17
Stephanie Meyers	STEM Enrichment Saturday	Mock (SAT II Math 1 & 2)	180/200	09-18-20	9/18/2020 19:21:3
Stephanie Meyers	STEM Enrichment Saturday	Mcok (SAT II Math 1 & 2)	281/300	09-25-20	9/25/2020 16:14:2

Visualization Design

Student Average Grade Over Time

Select a student from the drop down below to get started. The line graph and table both dynamically updates according to the student selection.

Selected Student: Brian Liu ▾

Linegraph

The line graph displays the average grade of Brian Liu over time. The Y-axis represents the Grade (0 to 100) and the X-axis represents the Submission Time (from 2020-08-02 to 2020-10-04). The average grade starts at approximately 45 in early August, rises steadily to about 82 by mid-September, and then remains relatively flat around 90 through October. A horizontal green line represents the overall average grade for all students.

Grade Average Of: Brian Liu

Grade

Submission Time

HS ELA Saturday

STEM Enrichment Saturday

APUSH Enrichment Fall

Student name	Class	Assignment	Grade	Due	Time submitted
Brian Liu	HS ELA Saturday	Homework 1 (Power of Habit)	95/100	7/31/2020 20:40:51	07-31-20
Brian Liu	HS ELA Saturday	Homework 2 (Power of Habit)	90/100	8/7/2020 18:49:45	08-07-20
Brian Liu	HS ELA Saturday	Homework 3 (Power of Habit)	87/100	8/14/2020 18:55:15	08-14-20
Brian Liu	HS ELA Saturday	Homework 4 Essay (Power of Habit)	275/300	8/21/2020 19:46:8	08-21-20
Brian Liu	HS ELA Saturday	Homework 5 (Brave new World)	88/100	8/28/2020 16:32:40	08-28-20
Brian Liu	HS ELA Saturday	Homework 6 (Brave new World)	93/100	9/4/2020 16:24:54	09-04-20
Brian Liu	HS ELA Saturday	Homework 7 (Brave new World)	94/100	9/11/2020 17:34:49	09-11-20
Brian Liu	HS ELA Saturday	Homework 8 Outline (Brave new World)	188/200	9/18/2020 20:51:48	09-18-20
Brian Liu	HS ELA Saturday	Homework 9 Essay (Brave new World)	276/300	9/25/2020 17:31:0	09-25-20
Brian Liu	HS ELA Saturday	Final	460/500	10/9/2020 19:59:42	10-09-20
Brian Liu	STEM Enrichment Saturday	Homework 1 (SAT II Math)	0/100	not submitted	07-31-20
Brian Liu	STEM Enrichment Saturday	Homework 2 (SAT II Math)	91/100	8/7/2020 21:28:14	08-07-20
Brian Liu	STEM Enrichment Saturday	Homework 3 (SAT II Math)	89/100	8/14/2020 18:17:51	08-14-20
Brian Liu	STEM Enrichment Saturday	Mid Term (Mock)	263/300	8/21/2020 20:9:55	08-21-20
Brian Liu	STEM Enrichment Saturday	Homework 5 (SAT II Math 2)	97/100	8/28/2020 16:33:34	08-28-20
Brian Liu	STEM Enrichment Saturday	Homework 6 (SAT II Math 2)	88/100	9/4/2020 16:30:47	09-04-20
Brian Liu	STEM Enrichment Saturday	Homework 7 (SAT II Math 2)	90/100	9/11/2020 23:32:18	09-11-20
Brian Liu	STEM Enrichment Saturday	Mock (SAT II Math 1 & 2)	180/200	9/18/2020 16:11:19	09-18-20
Brian Liu	STEM Enrichment Saturday	Mcok (SAT II Math 1 & 2)	270/300	9/25/2020 23:38:54	09-25-20
Brian Liu	STEM Enrichment Saturday	Final (Mock)	480/500	10/9/2020 17:54:23	10-09-20
Brian Liu	APUSH Enrichment Fall	Homework 1 (Chapt. 1~10)	92/100	8/7/2020 22:42:42	08-07-20
Brian Liu	APUSH Enrichment Fall	Homework 2 (Chapt. 12~19)	90/100	8/21/2020 22:52:46	08-21-20
Brian Liu	APUSH Enrichment Fall	Homework 3 (Chapt. 20~31)	90/100	9/4/2020 23:19:52	09-04-20
Brian Liu	APUSH Enrichment Fall	Homework 4 (Chapt. 32~41)	92/100	9/18/2020 22:54:4	09-18-20
Brian Liu	APUSH Enrichment Fall	Mock Final	545/600	10/9/2020 19:51:40	10-09-20

Table

Summary & Future