



lambda D A λ S

28-29 JULY 2022
KRAKÓW | POLAND

WELCOME



Towards Smart Mentor Dispatch



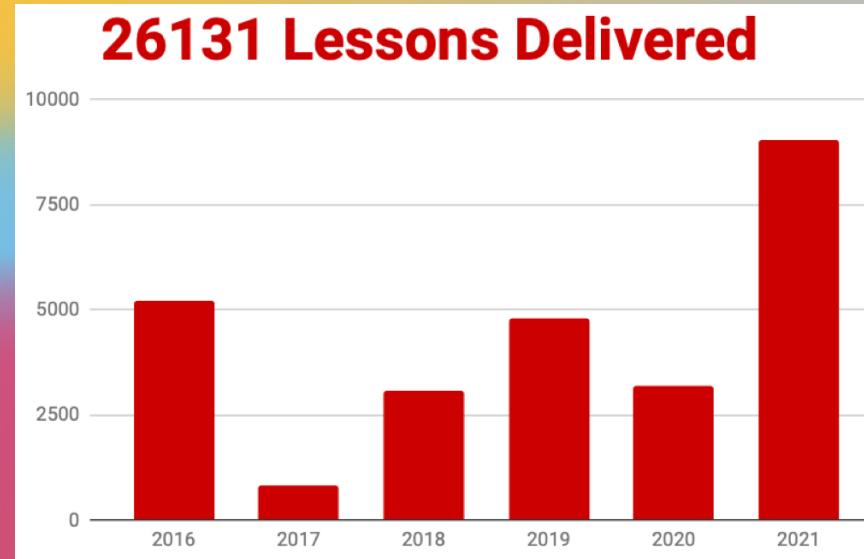
McMASTER
START
CODING

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Karunakar, **Christopher Schankula** and
Christopher Anand



McMaster Start Coding: 26131+ Lessons Delivered

- Grades 4-8 (and beyond)
- We <3 Elm
- Run by undergrad, high school and graduate student mentors
- Over 1000 classes and 26,000 students visited in past 5 years

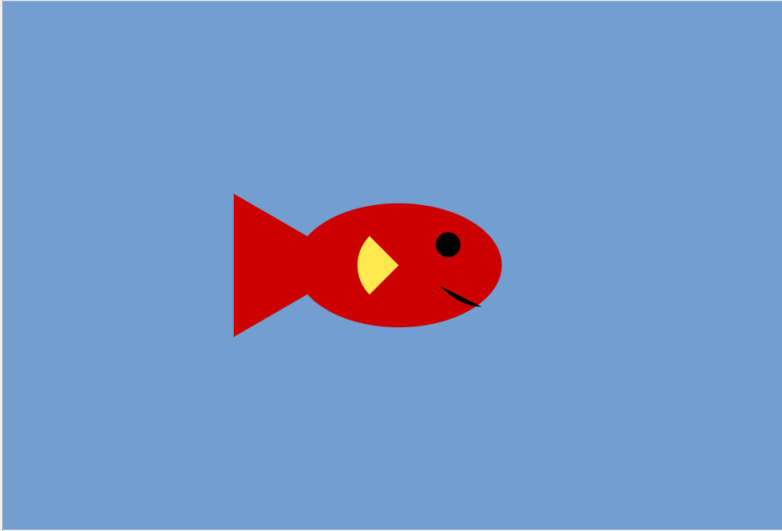


MacOutreach.Rocks (MOR)!

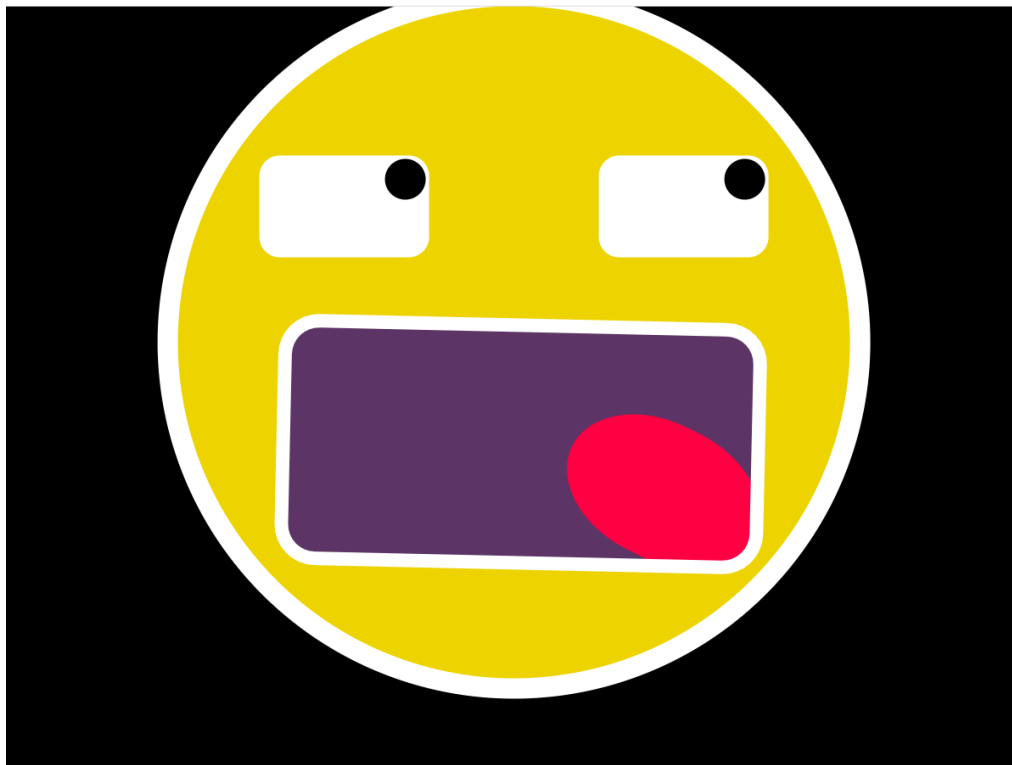
[Compile](#) MacOutreach.Rocks! with GraphicSVG, Shape Creator, Colours, Game Examples and Cool Demos. [Share](#)

Animation Slot: Make your own animation here! (last saved just now)

```
1 myShapes model = [ square 3000
2   |> filled lightblue
3   , oval 50 30
4   |> filled red
5   , ngon 3 20
6   |> filled red
7   |> move (-30,0)
8   , curve (0,0) [Pull (10,0) (20,-10)]
9   |> filled black
10  |> scale 0.5
11  |> rotate (degrees 180)
12  |> move (20,-10)
13  , circle 3
14  |> filled black
15  |> move (12,5)
16  , wedge 10 0.25
17  |> filled lightYellow
18  |> rotate (degrees 180)
19 ]
```



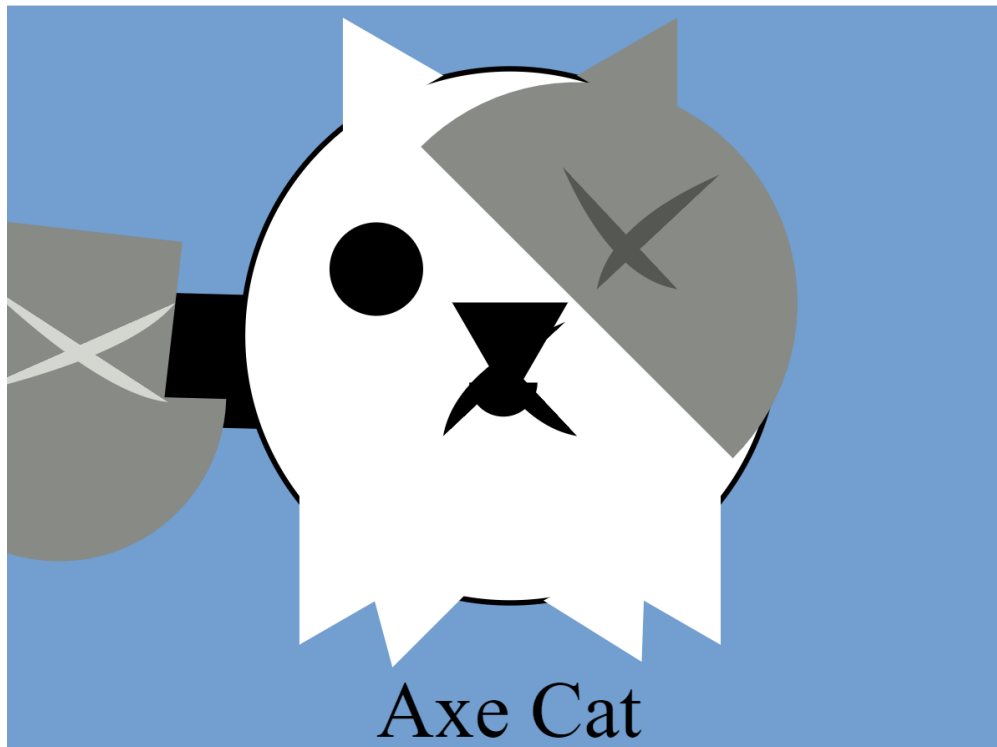
MacOutreach.Rocks Examples



MacOutreach.Rocks Examples



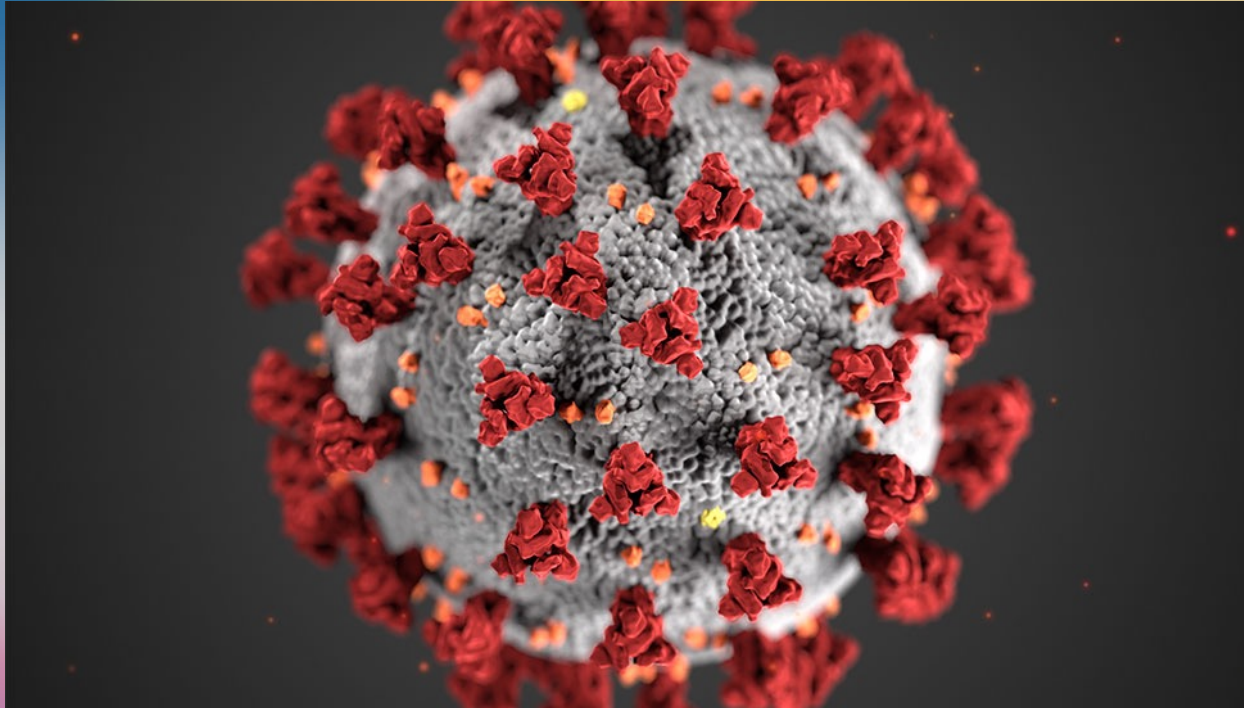
MacOutreach.Rocks Examples



In-Person Class Visits!



Pandemic!





How can we identify which students need help based on their interaction with the WebIDE MacOutreach.Rocks?



How can we empower mentors to help students when they need it the most?

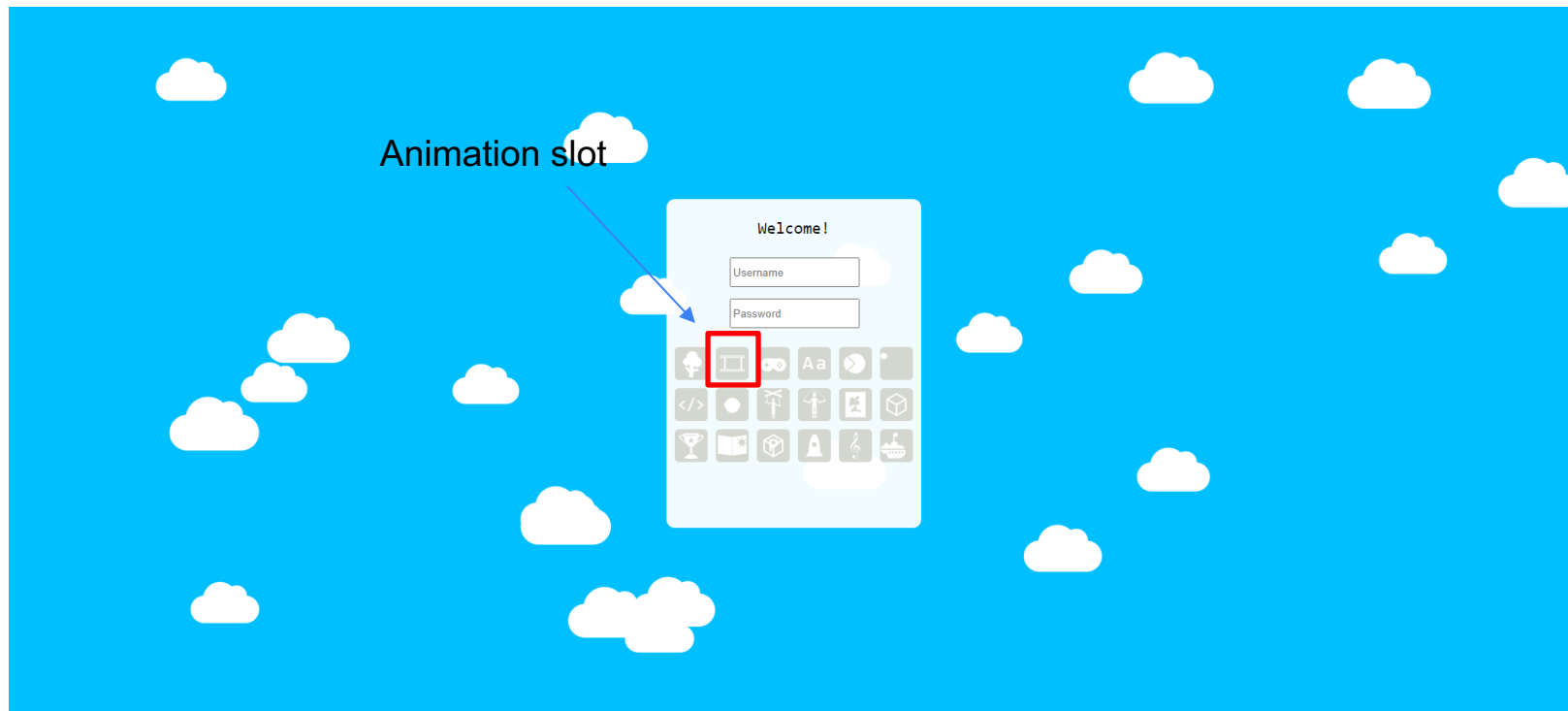
Towards Smart Mentor Dispatch

How can we address these concerns?

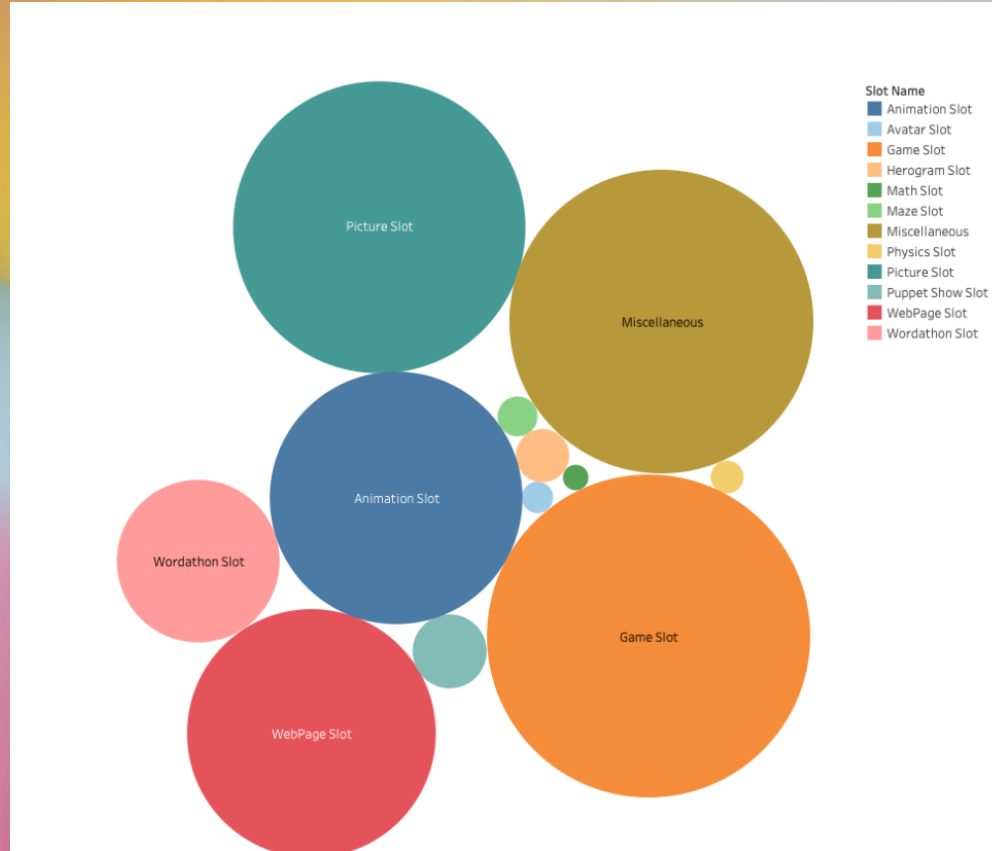
- Give mentors access to real-time insights from students' code
- Dataset of compilations and errors
- Predicting time to resolve an error
- Cluster groups of students struggling with similar problems



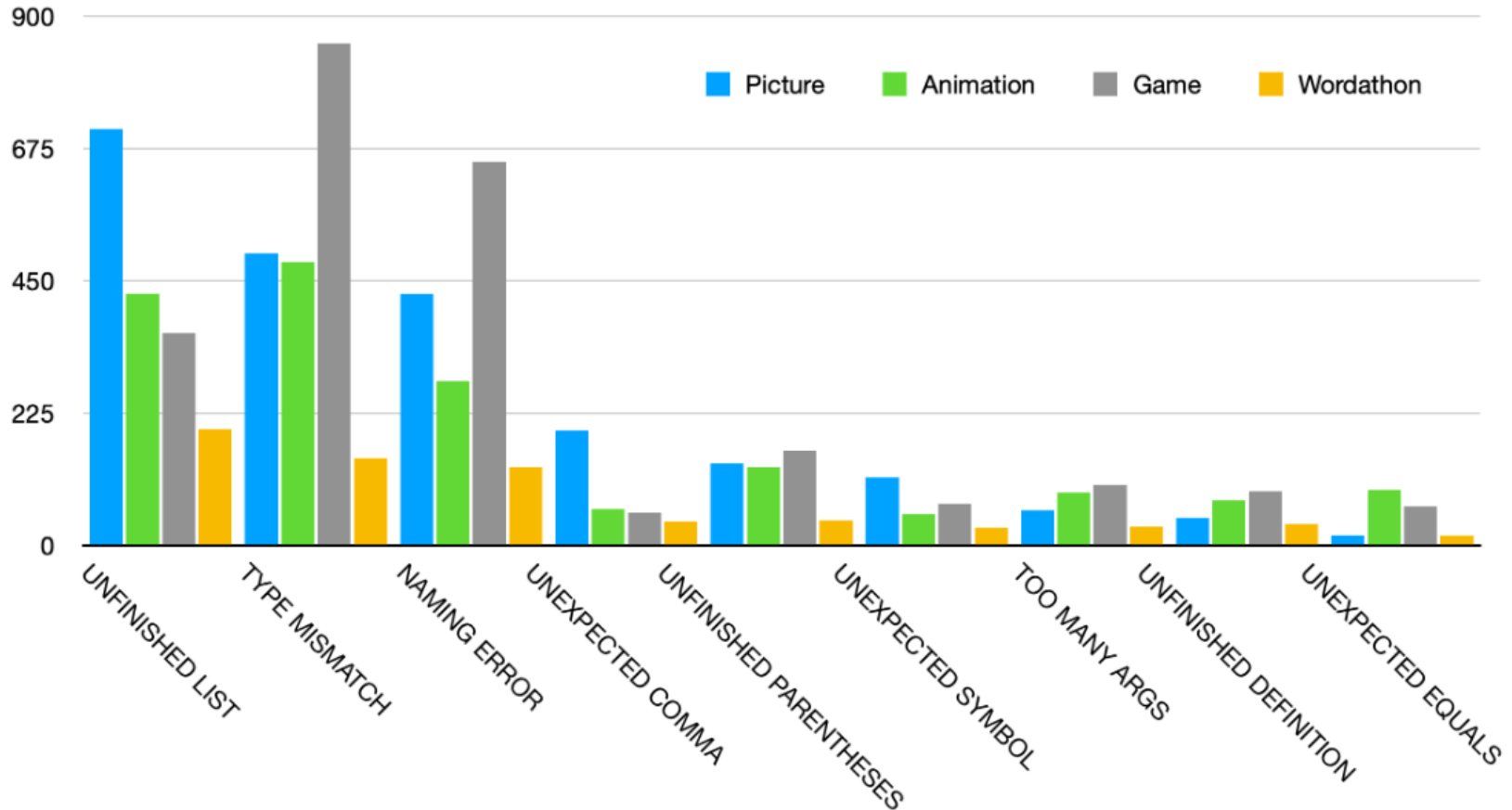
Old MOR Homepage with Slots



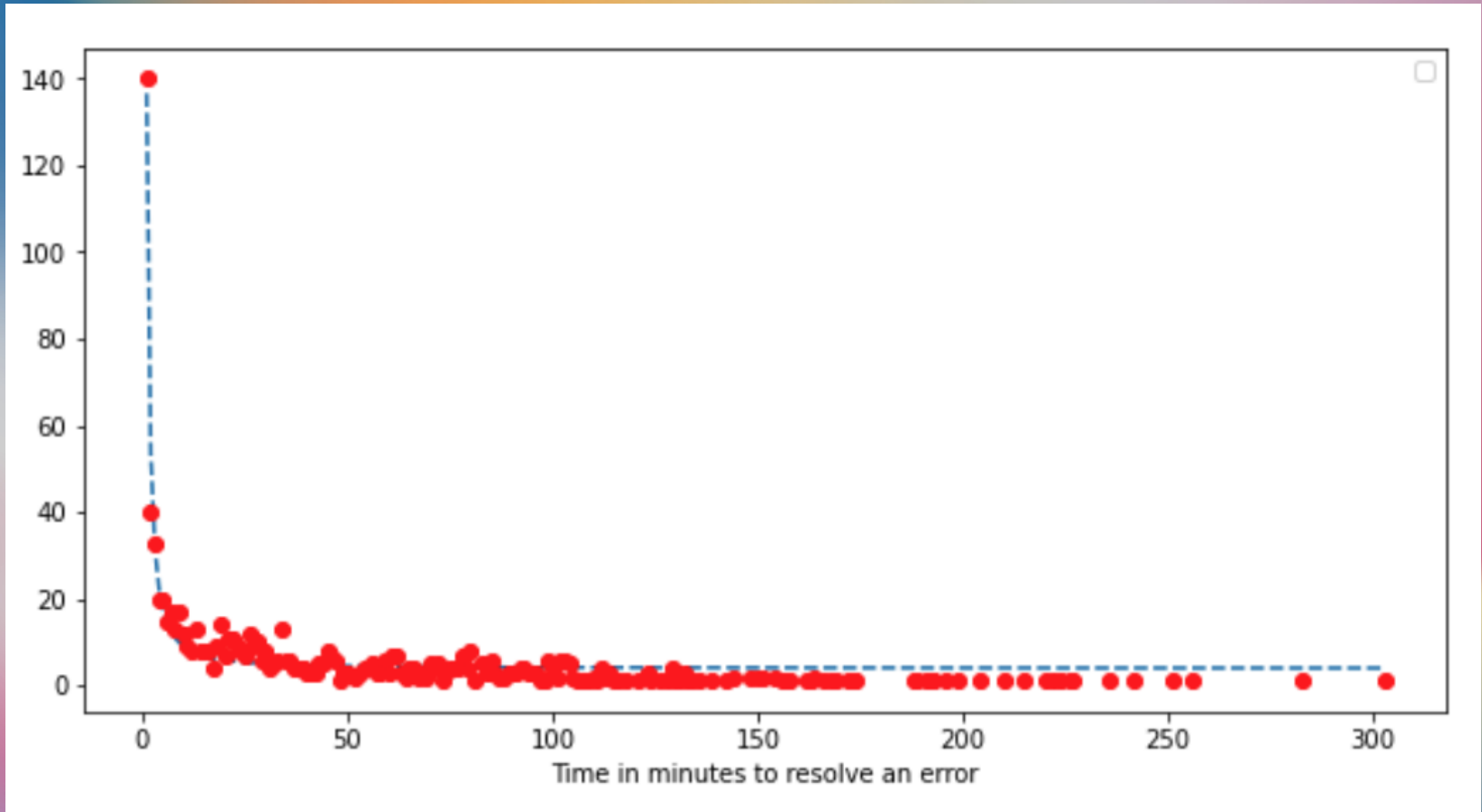
Number of Compiles Per Slot



Most Common Errors

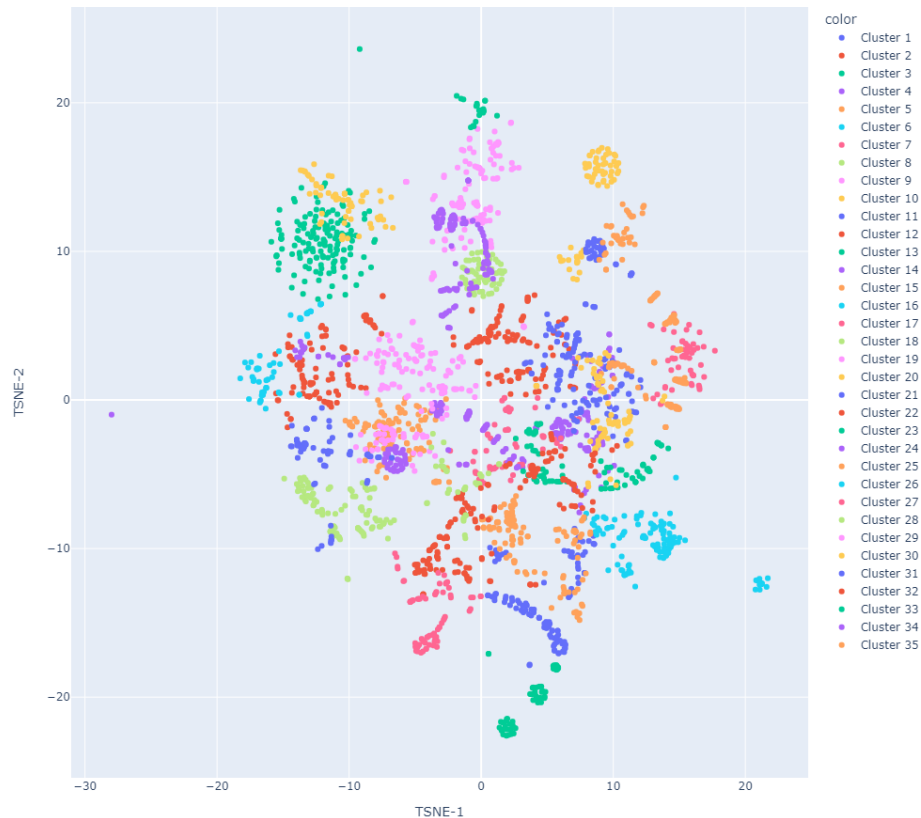


Predicting Time to Resolve Errors

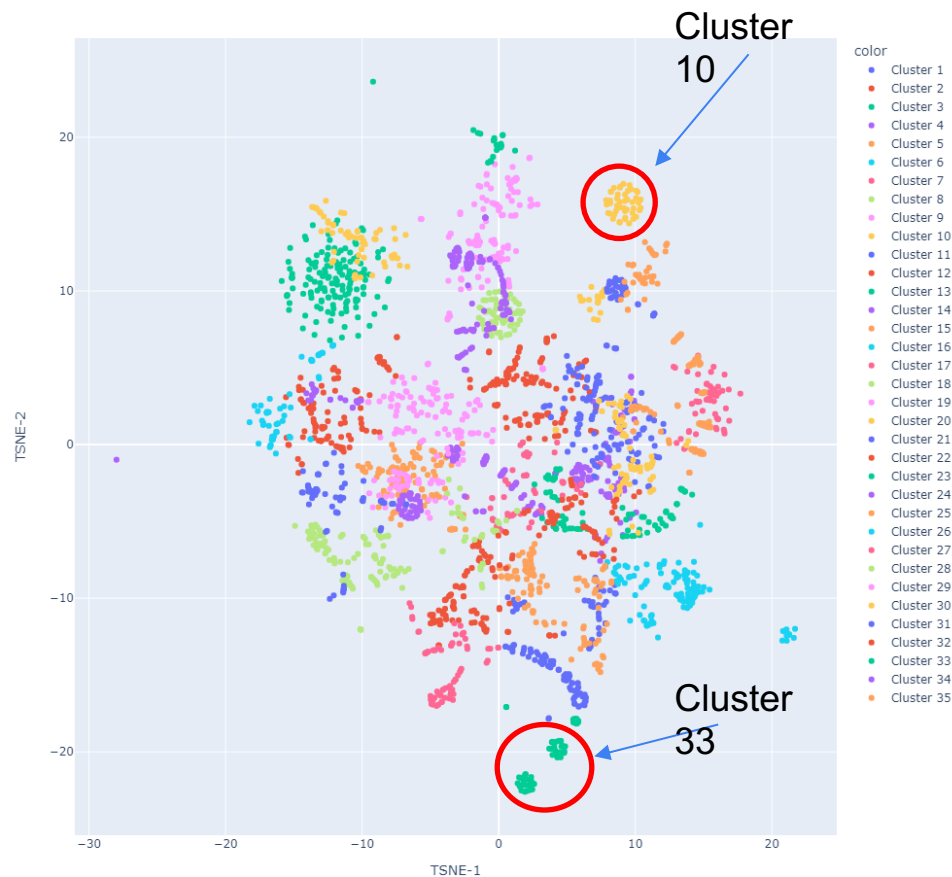


TSNE + K-Means Clusters

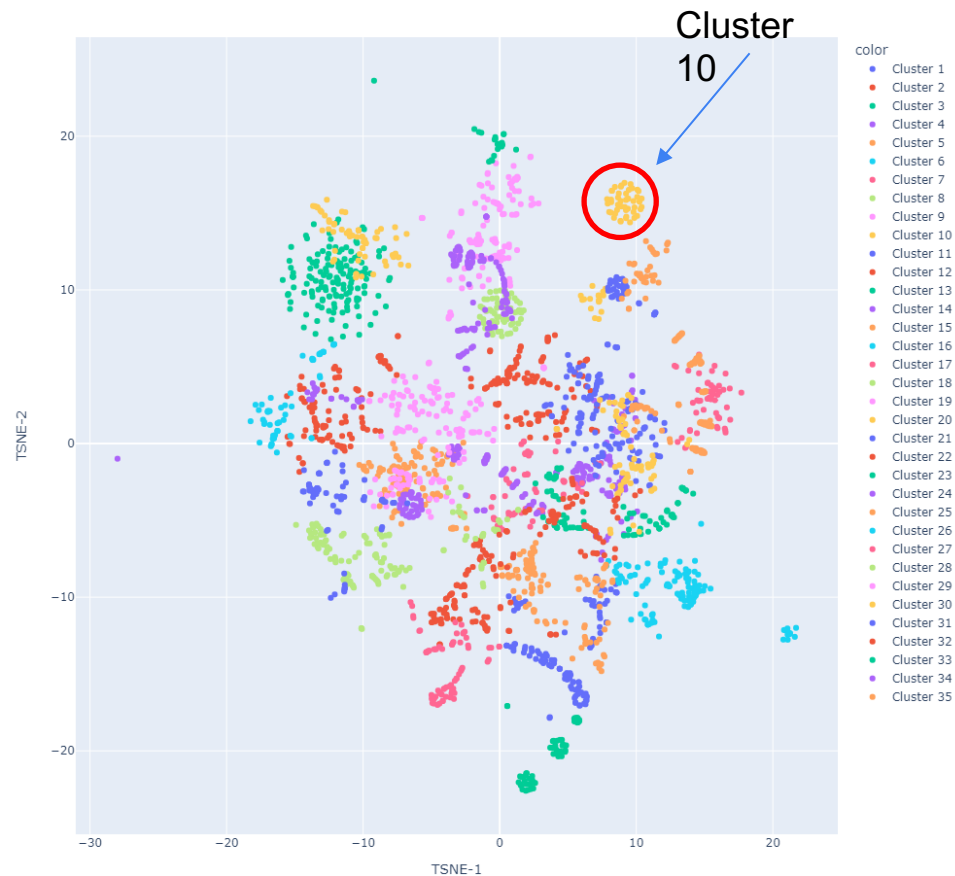
TSNE-1 vs TSNE-2 KMeans Clusters



TSNE-1 vs TSNE-2 KMeans Clusters



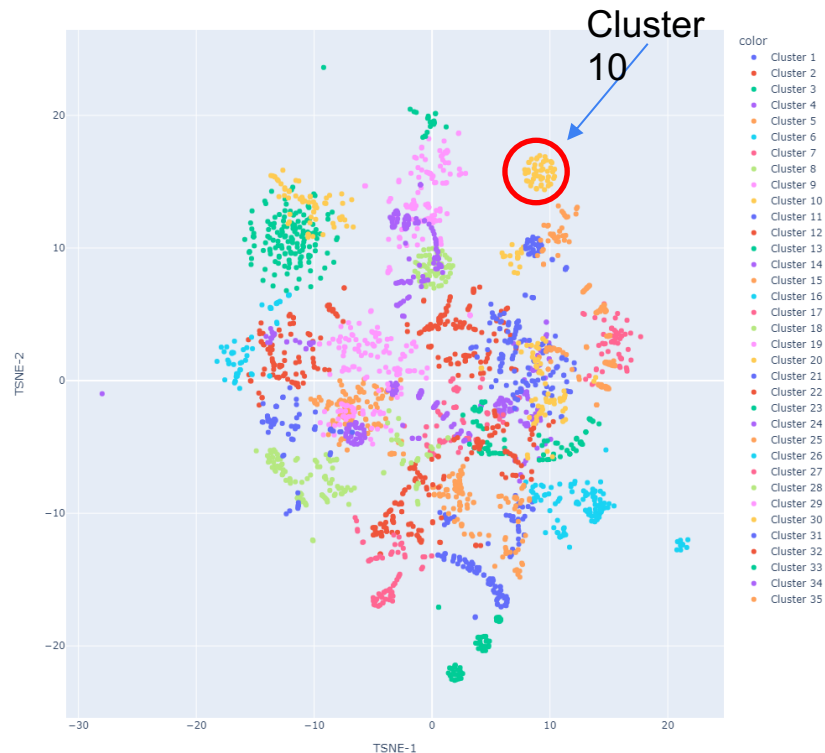
TSNE-1 vs TSNE-2 KMeans Clusters



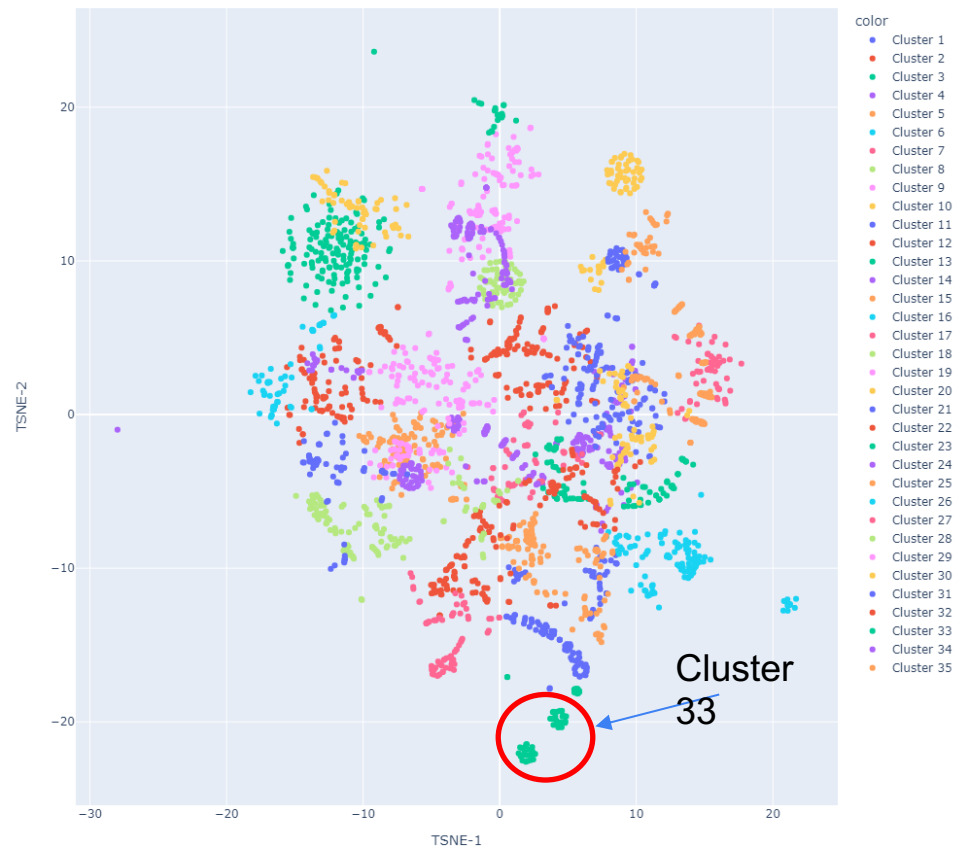
Cluster 10 Characteristics

- 37 students
- 100% successful final compiles
- 99% successful compile rate
- Common errors: missing single quote, type mismatch, unfinished list

TSNE-1 vs TSNE-2 KMeans Clusters

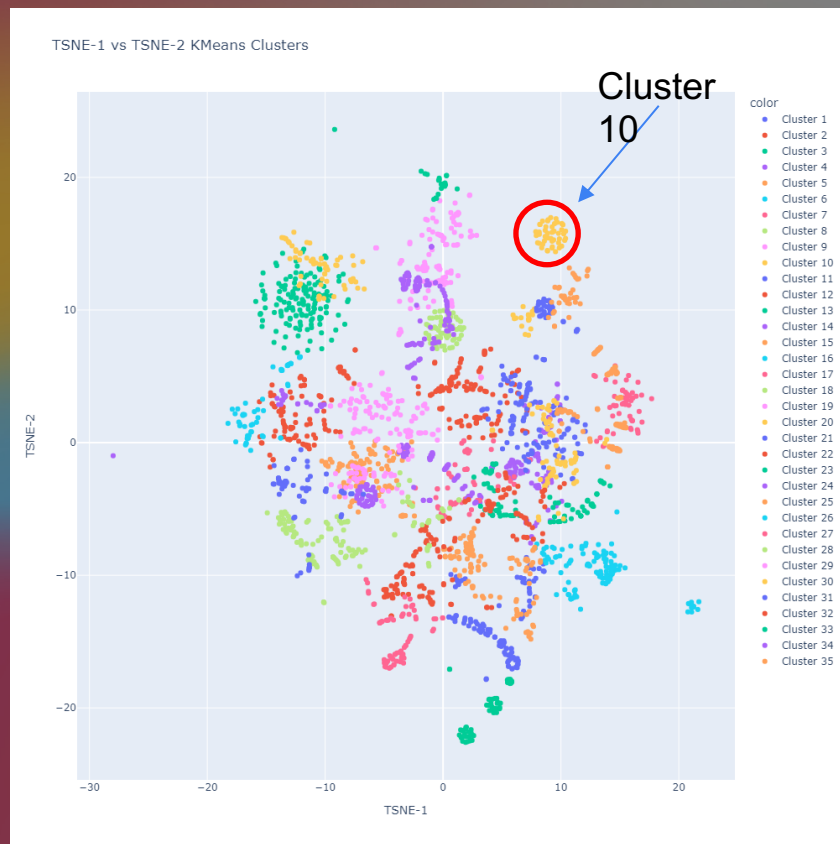


TSNE-1 vs TSNE-2 KMeans Clusters



Cluster 33 Characteristics

- 26 students
- 57% successful final compiles
- 97% successful compile rate
- Common errors: naming error, missing single quote, naming error, type mismatch, unfinished list



Deep Dive of Cluster 33 Example

```
-- NAMING ERROR ----- Q1100_16085_160331896651.elm
```

```
I cannot find a `spot` variable:
```

```
22|   , spot  |>clip (moon)
   |      ^^^^^
```

```
These names seem close though:
```

```
spots
not
sqrt
stop
```

Hint: Read <<https://elm-lang.org/0.19.1/imports>> to see how `import` declarations work in Elm.

```
myShapes model =
[
  square 1000
  |> filled black
  , spot  |>clip [moon]
]

spots = group [
  circle 10
  |> filled darkGray
  |>move (-35, 10)
,
  circle 10
  |> filled darkGray
  |>move (-10, -20)
,
  circle 10
  |> filled darkGray
  |>move (15, 0)
,
  circle 10
  |> filled darkGray
  |>move (0, 30)
]
```

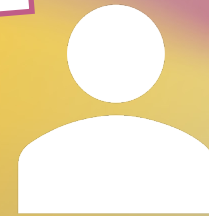

Students
use MOR



Mentor
analyzes
insights



Mentor helps
struggling students



Desired Outcomes



Mentors would analyze clusters and help students ad-hoc



Quickly identify whether new students are struggling or not



Develop preventative measures to ensure student success



Identify root cause of problems in clusters of students

Thank you!

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