Measuring Curriculum Rigor

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Flatiron School, Phase 5 Project

Background

- College Board offers a thorough framework of skills and knowledge for AP subject areas.
- For Example: AP Computer Science A – **Skills:**
  - **1. Program Design and Algorithm Development**
  - **2. Code Logic**
  - **3. Code Implementation**
  - **4. Code Testing**
  - **5. Documentation**

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- For Example: AP Computer Science A – **Skills:**
  - **2 Code Logic:**
    - **2.A: Apply the meaning of specific operators**
    - **2.B: Determine the result or output based on statement execution order in a code segment without method calls.**

Example Question

Consider the following code segment. Assume num is a properly declared and initialized int variable.

```
if (num > 0) {
    if (num % 2 == 0) {
        System.out.println(num/5);
    }
    else  {
        System.out.println(num/5.0);
    }
}
```

Which of the following best describes the result of executing the code segment?

Example Question

1.C: Determine code to interact with completed code.
2.A: Predict the output of code with operators.
4.A: Use test cases to identify errors in code.

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Example Question 2

Consider the following class:

```
class Student {
    private String name;

    public Student(name) {
      this.name = name;
    }

    public void setName(name) {
      this.name=name;
   }
}
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Suppose an object of class Student name student1 has been instantiated. What method call could be used to change the student1 instance variable name to “Alex”

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Suppose an object of class Student name student1 has been instantiated. What method call could be used to change the student1 instance variable name to “Alex”

Goal

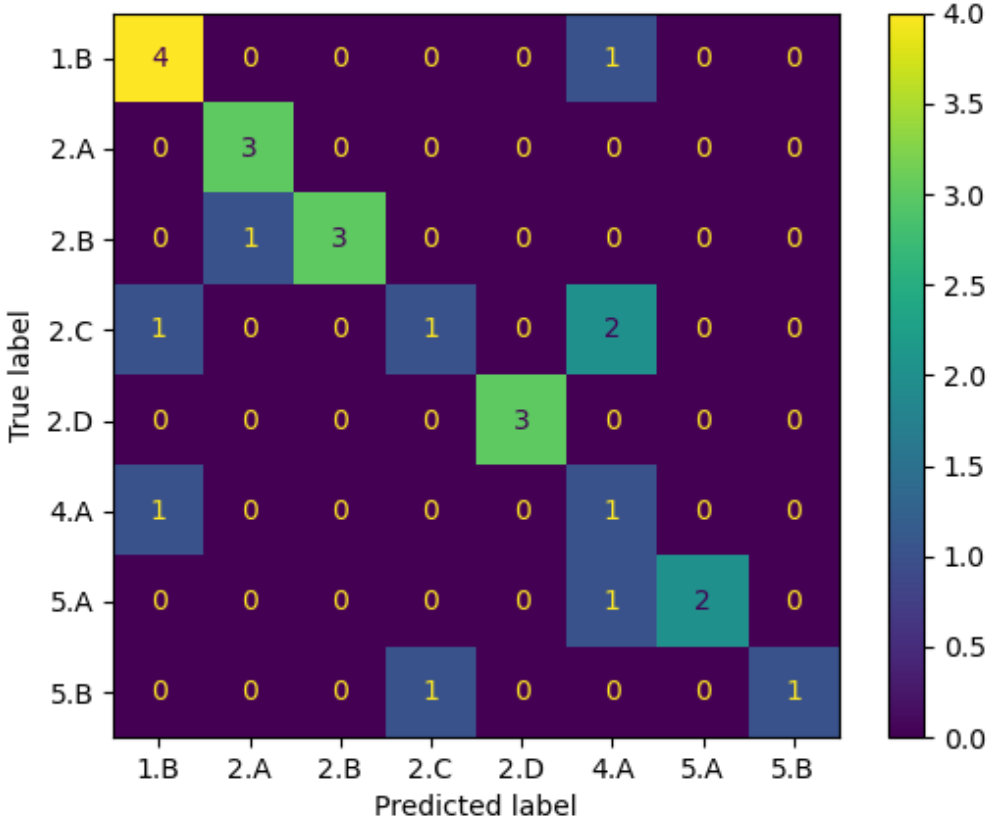
- Given an assessment question, classify it by skill.
- Compare the accuracy of different methods:
  - TF-IDF + Logistic Regression,
  - Sentence Transformer + Logistic Regression
  - ChatGPT

Results

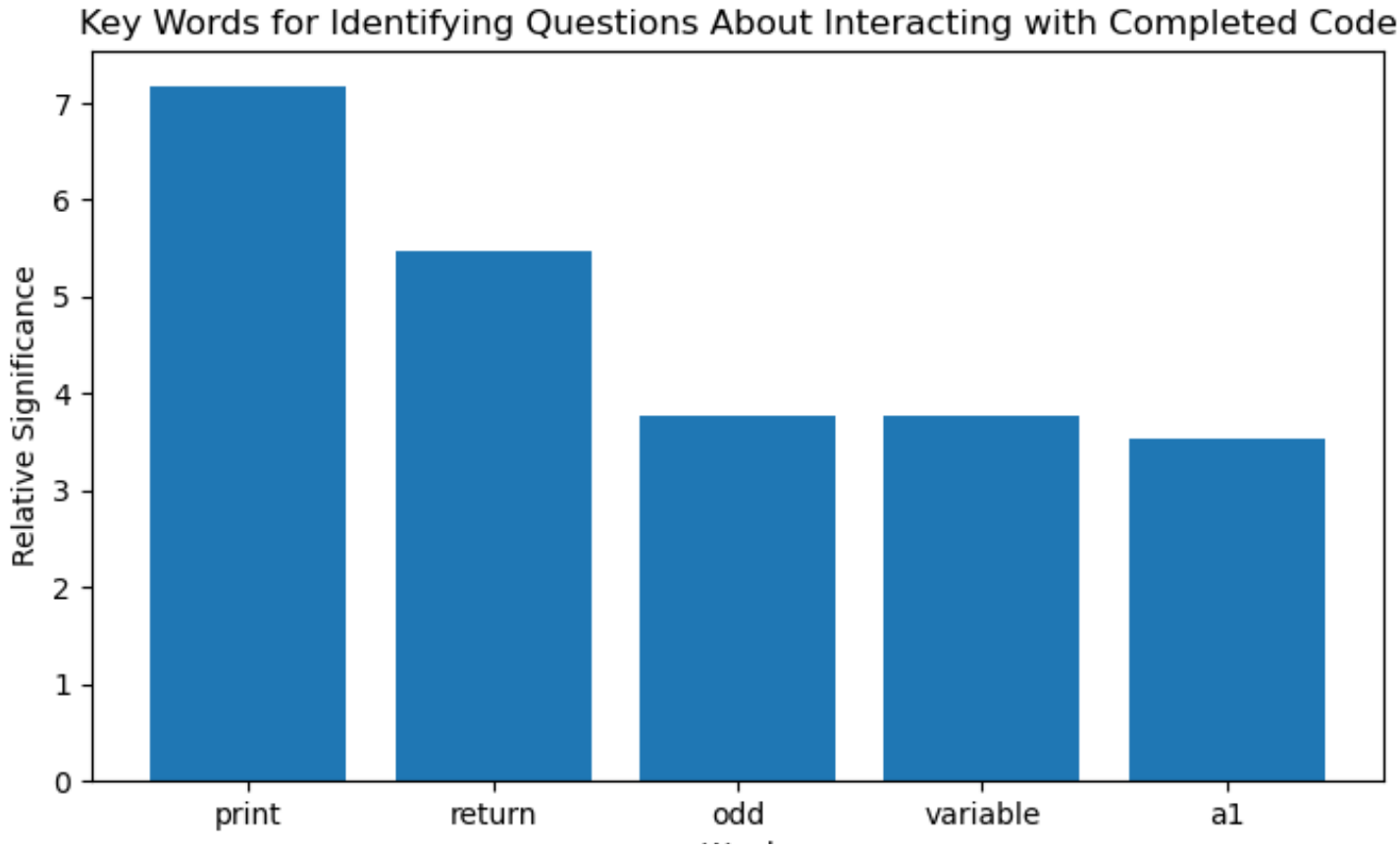
TF-IDF + Logistic Regression: 70% accuracy
Sentence Transformer + Logistic Regression: 80% accuracy
ChatGPT Classifier: 48% accuracy

TF-IDF + Logistic Approach

- Vectorize questions and train Logistic Regressor to classify by skill.



TF-IDF: Interpretation



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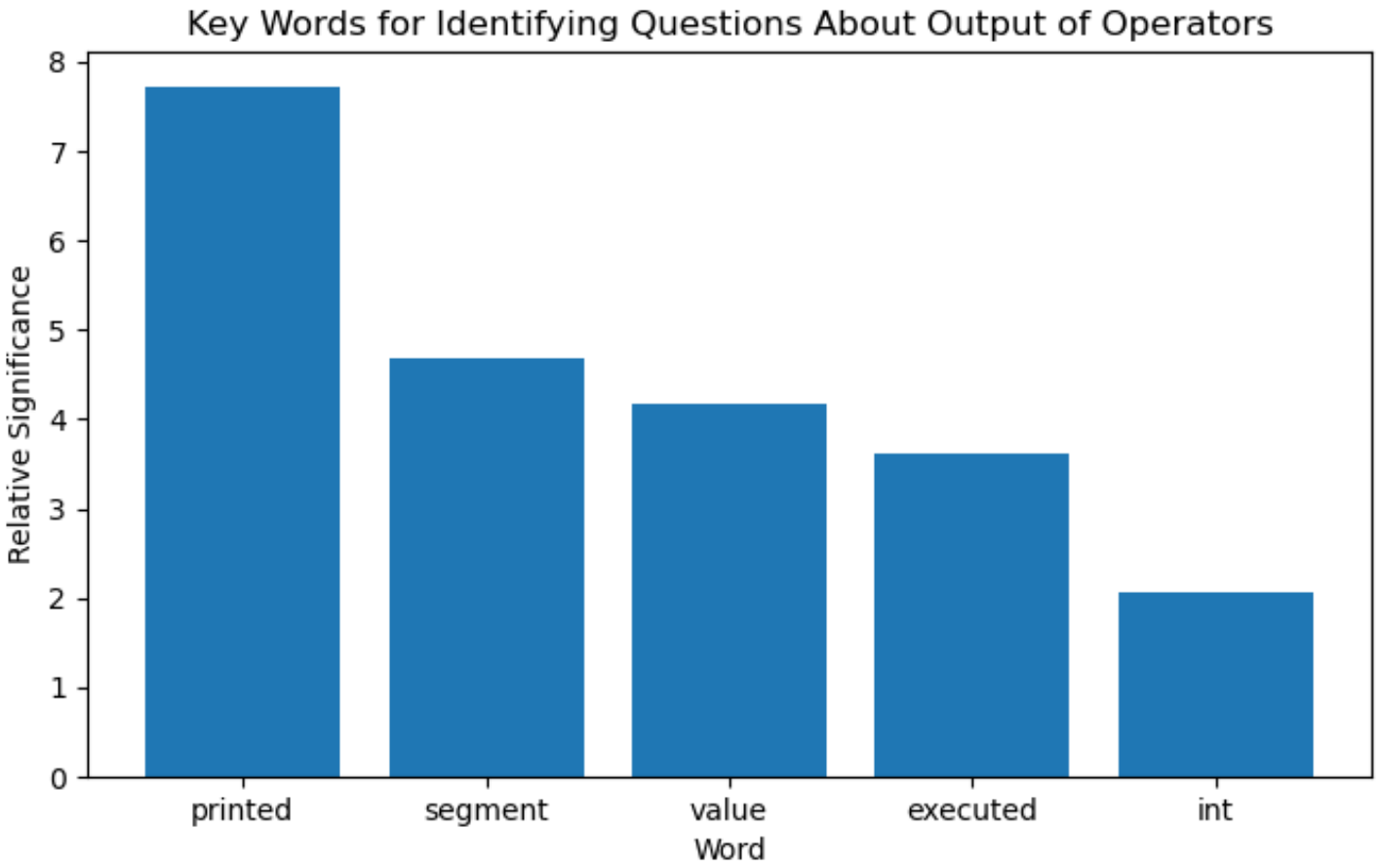
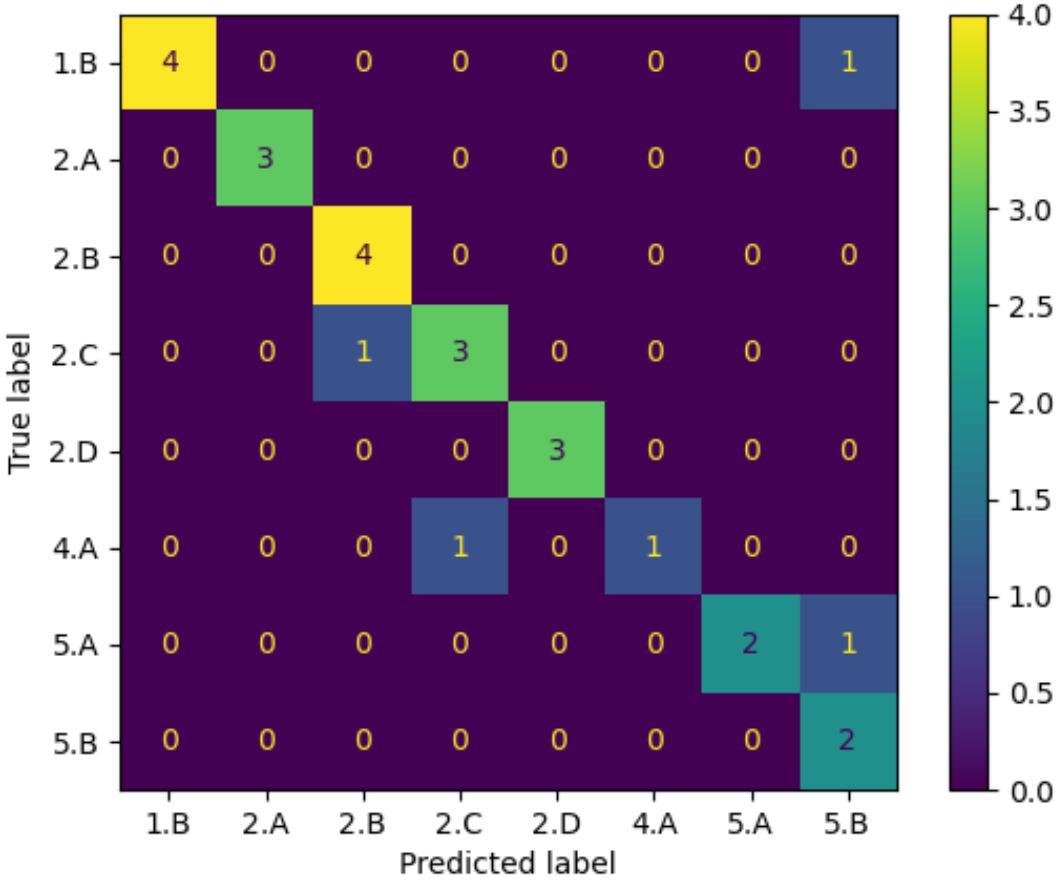


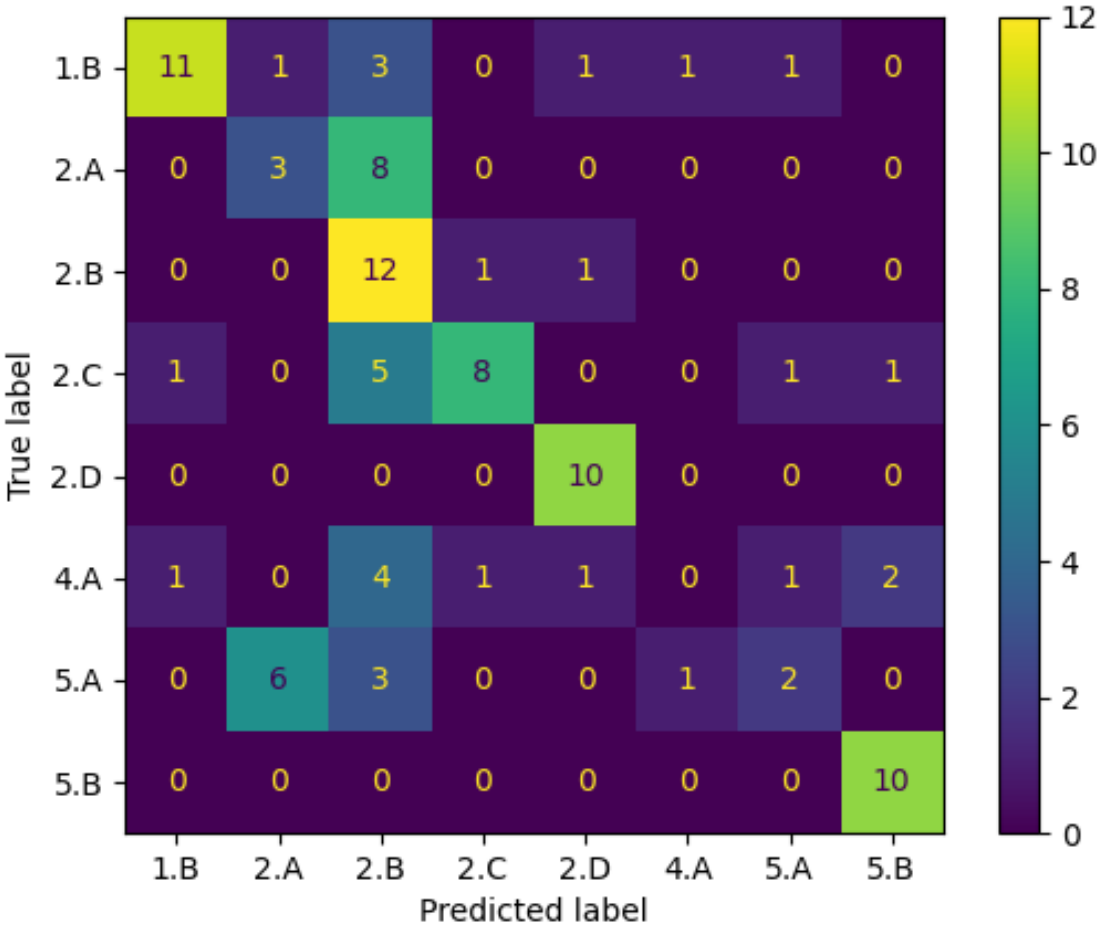
Sentence Transformer + Logistic Regression



ChatGPT Approach

- API call + prompt:
- ”Given these definitions for skills … and these examples, classify the skill assessed”

ChatGPT Results



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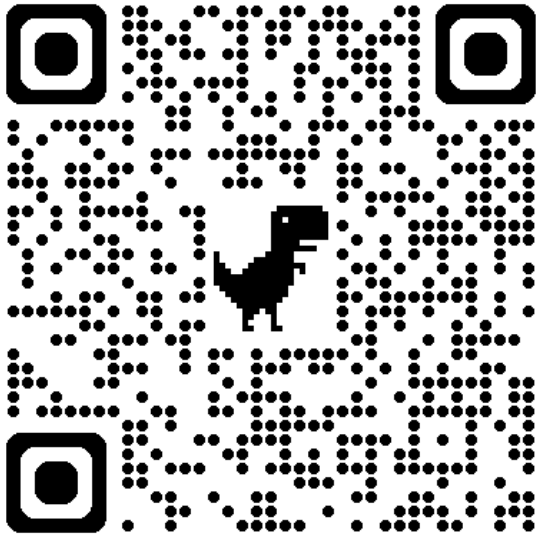
Questions

Thank You!



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