**Competitive Analysis**

**Compelling Features**

* ZipGrade
  + Answer sheets have set template with dots on the corners of the answer sheets to allow scanner to easily calibrate
  + App can scan multiple tests and has item analysis feature which displays which answers were selected for each answer and what percentage of students correctly answered that question correctly.
    - For example for question 1 it may show 25% out of 12 students who took the test correctly answered question #1. Then it shows that 3 people chose the correct answer A, 1 student selected B, 6 students selected C and 2 students selected D.
  + Has student ID number section for students to bubble in so each answer sheet can be paired with the actual student
* Grade Cam 3
  + Shows item analysis in form of Bar graph
  + Instead of taking picture of correct answer key, answer key is manually inputted into virtual bubble sheet on app
  + App not only grades simple multiple choice questions with 5 choices but also questions where student has to manually write answers along with bubbling in corresponding bubbles which match what he wrote (this is common with open ended math questions)
* MultipleChoiceScanner.com
  + Have special forms which must be downloaded and printed which allows scanner to be more accurate
  + Correct answers are manually filled in online along with number of questions to grade
* QuickGrader
  + Offers ability to assign ranges for each letter grade
  + Also option to assign Pass/Fail instead of a letter grade
* Mytutor.com
  + after scoring SAT test, creates Score Summary pdf available for download which nicely presents answer breakdown (color-coded)

**Anti-Features**

* MultipleChoiceScanner.com
  + Use squares instead of circles as answer choices to fill in
    - This is not the traditional way multiple choice answer sheets are made. I would like to make my program as applicable for other uses as much as possible.
* QuickGrader
  + Allows options to assign half point values to questions- I don’t think this is necessary because most tests are graded in a way that either the correct answer was selected and full credit is awarded or the wrong answer was selected and no credit is awarded
* Mytutor.com
  + Report after grading also presents the difficulty of each question- this is not a feature I would have in my project because I feel that most people will not have a good enough sense to rate how difficult each question is before actually grading the tests and viewing the results

**Final Observations**

After completing the project and looking back, I realized my project showed some of the characteristics presented in some of these competitors’ products. For example, just as ZipGrade had answer sheets with a set template with dots on the corners of the answer sheets to allow scanner to easily calibrate, I followed a similar strategy using a box outside the multiple choice questions ,making it easier for my program to know where to look for the questions. There were also some features which I chose not to include such as requiring users to manually input answers to the test. Instead I allowed users to input answers by taking a picture of the answer sheet through the webcam.