BBC London Assessment Centre – Technical Questions

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We're looking for people with a real passion for collaboratively creating great software. Please give an example of a software component you have designed and written from Concept to deployment, outlining the steps you took. (1000 character limit)

2D mapping reconstruction software using UAVs with OpenCV
The concept was to build a software to improve the production of coffee and cacao farms using computer vision techniques to analyze the beans. The first challenge was to establish the best season to get the data, weather conditions are considered.

1) Data collection: camera is calibration, then video data was taken from the area
2) Once the data was collected, the videos were transformed into frames of images.
3) Image analysis: Keypoints of images were found using SIFT (image algorithm for features extraction), these keypoints are stored and then homography of images are calculated
4) A random selection algorithm is implemented to extract the best features found in the images
5) Using the geometry returned from the homopraphy calculations, the application start making matches and stitching the images within a 2D plane.

Final result is a scalable image of a coffee/cacao production area showing condition crops to schedule harvesting

Using the example that you provided above, tell us about a significant decision you made to solve a technical challenge. Give details of technologies that you chose and why you chose them. (1000 character limit)

Challenge:The Software was not able to make a difference between some green beans and leaves.
To overcome this problem, it was needed to make the feature extraction more robust and make the random selection more accurate.
To solve this problem, I started by increasing the number of features found when using SIFT. Now with a bigger data set, the following step was to provide the software with information regarding faulty or not ready beans. With this information, we can now discard those beans which were not in our desired data set. I also implemented Flann(algorithm for data extraction), now combining this algorithms, I was able to reject all those beans which were not fit to analyse and at the same time detect how many beans could probably go to wasted if harvesting was made too soon.

Using the example that you provided above, tell us about how you ensured your software was fit for purpose and of high quality. What did you learn and what would you do

differently next time to do a better job? (1000 character limit)

The first step once the software was running was to constantly test the application with different data sets, it meant that the predictions returned by the software regarding harvesting times were within the traditional ranges set by the farmers.
I would have done different the following:
Train the final users to implement the software locally.
Build the application to run in linux and window machines, once the users were trained to implement the software by themselves a licensing process could have followed.
I would have written the search algorithm for keypoint localization from scratched. Making changes to the already written algorithm was a very complex process and the performance of the application decreased after this changes were made.
I would have used machine learning algorithms to improve the detection of bad keypoins, which in my case were green beans and leaves

Please tell us about the ideal position you are looking for and also confirm your key technical skills? Please use this opportunity to tell us about a positon you most prefer so we can ensure you are matched into the right position should you be successful (500 character limit)

I am more suited for a position where visual data is analysed.
Roles involving data analytics are more suited to my skills. However, I have industrial experience in other areas such as database administration(sql, plsql), front-end development (html, css, javascript)
My main programming language is C++, but I also have made anl application where I used java for back-end.
These being said, I am a developer who truly enjoy learning new technologies and improving my current skills