Domain Research

The information below is taken from the Project Description Document [1].

In automotive manufacturing, the exterior of a vehicle must not contain flaws or imperfections in the paint and finish (consumers purchasing a new vehicle expect a flawless finish). When defects are detected, they are corrected on the assembly line. Analysis of the types and number of defects can lead to a discovery of the cause of the defects, which can then be addressed and prevented. For example, small weld balls sometimes remain on the surface from the body shop; when these are painted over they result in bumps in the surface. These are sanded down and repainted. An increase over time of this type of defect may indicate a problem with the body shop, which can then be investigated and corrected. Likewise, in one case, an increase in yellow fibers on the paint was observed on only one side of the vehicles; this analysis led to the discovery of a cloth placed over an air vent which blew fibers onto the vehicles.

Currently, the analysis of paint defects occurs in the following way. The client analyst has paper diagrams of the outline of the vehicle models being manufactured at a given plant (e.g., GMC Acadia, Chevrolet Traverse, and Buick Enclave are manufactured at the Lansing Delta Township plant). As vehicles come down the assembly line, at certain checkpoints, the client analyst examines the vehicle for flaws in the paint and finish and marks on the paper model the location, type, and severity of the flaw. Once a sufficient sampling of vehicles is done, the analyst then collates the collected data and produces a daily report on the nature of the flaws found.

The remainder is analysis performed by Team 6.

From the sample reports we were given we know there are different reporting points in the line such as Polish Deck, E-coat, and Prime Review.

As seen on the Polish Deck Quality Analysis Report [2], some reports contain summaries of defects and their severities by the section of the vehicle they were located on as well as a pie chart displaying the relative frequencies of the types of defects.

According to the Questions and Answers document [3], there are three main types of reports to be generated. They are daily reports that summarize how many defects per unit were present, weekly reports that describe how many defects were on each surface, and monthly reports that focus on trends in defects.

Due to the environment the system will be used in, the recording of defects must be done on a portable device and the system for reporting must be efficient and easy to use.

References:

[1] James Daly, “Automotive Paint Defect Analysis,” November 2017, http://www.cse.msu.edu/~cse435/Projects/F2017/Project-Description.pdf.

[2] Gavin Sanders, “Quality Analysis Report,” February 2011, https://cse.msu.edu/~cse435/Projects/F2017/Resources/QualityAnalysisReport.pdf.

[3] James Daly, “Questions and Answers,” November 2017, http://www.cse.msu.edu/~cse435/Projects/F2017/IntermediateAssignments/Questions%20and%20Answers.pdf.