# Retrospective Case Study and Potential Solutions in Regard to the Object Oriented Design of CharGer through Various Modeling and Analysis Techniques.

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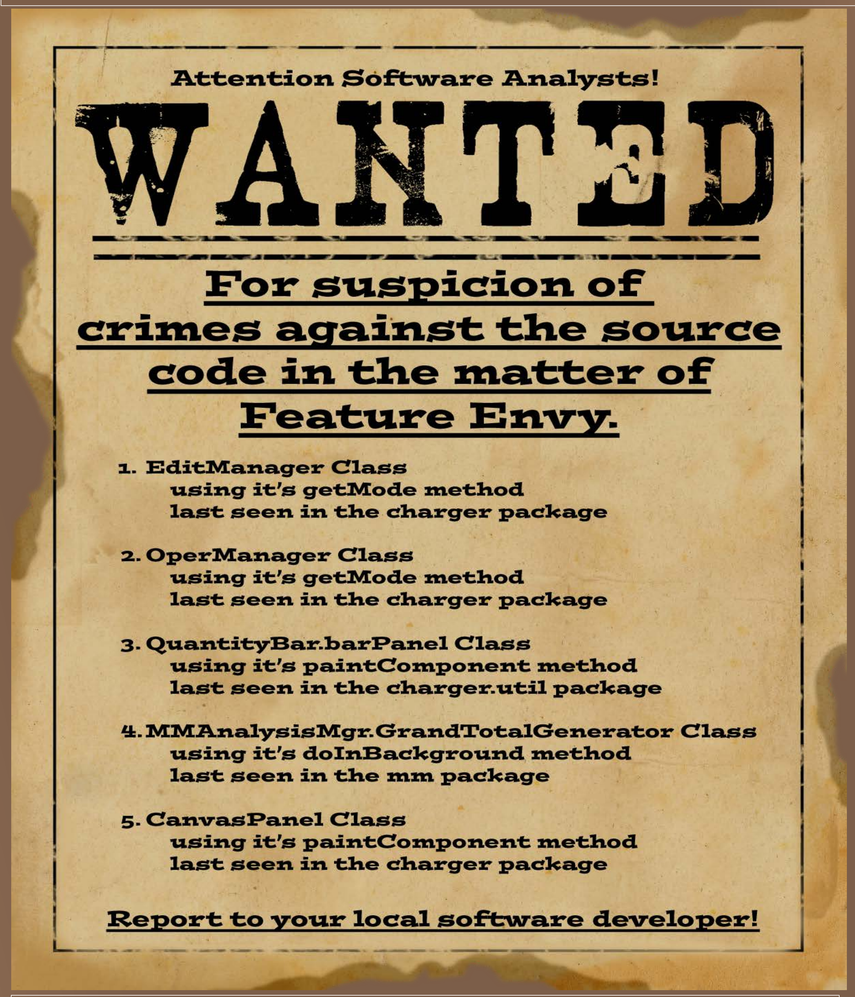
## Background Information

The goal of my work was to assess the conceptual graph editor CharGer as it relates to modern object oriented design standards and to propose viable solutions to poorly designed code if possible. There are several plugins for the Eclipse IDE that were used in this study including ObjectAid UML Explorer, State of Flow Metrics, and Eclipse Metrics. The other plugins for metrics are used to provide detailed output about certain functional aspects of the code's internal packages; these packages contain class descriptions that outline code objects important to CharGer with attributes and methods.

## What is a Software Metric?

A software metric is a quantitative measure of certain properties contained in software or its specifications. *Feature Envy* is a metric that highlights methods that call external methods from their own class, this is generally bad programming practice.




## Conclusions

Software Metrics are undoubtedly useful tools for analyzing software, but a certain level of caution and awareness must be maintained while using them. Qualitative assessment must still be performed on a code segment after being analyzed with metrics. CharGer when analyzed with the help of metrics proved to be a well designed piece of software especially for its size of 28,526 lines of code and even still this analysis helped to improve it's design.

## Worst Offenders

Five packages/classes/methods that scored the highest on each of the metrics were identified for closer analysis. This process is reminiscent of identifying perpetrators of a society in an effort to reduce crime. In this way each metric can be seen as a specific subsection of crime like vice or theft; similarly, some metrics can be seen as "more important" but that is up to the analyst.

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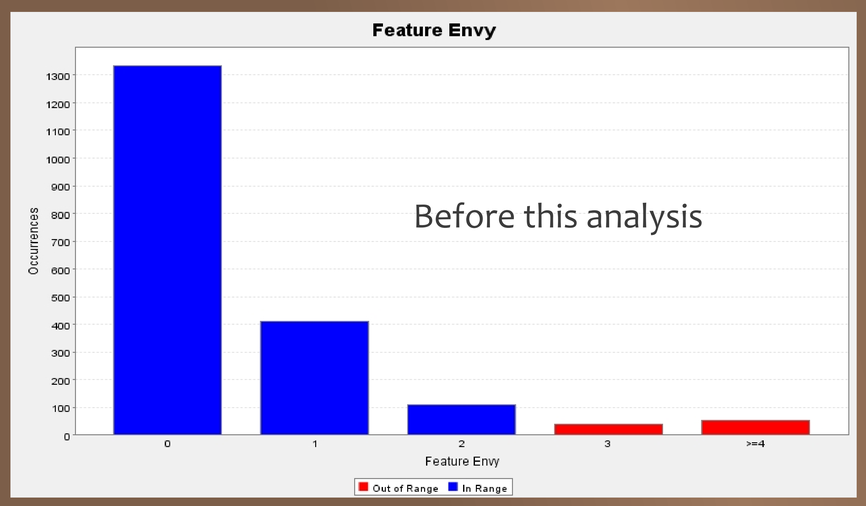


## Aggregate Metric Y

The metric Y is an attempt to consolidate metric readings to one number to compare versions of. As CharGer grows, metric Y generally grows as well; it is possible however for metric Y to shrink by identifying and removing worst offenders efficiently.

**The graphs to the left and right show the feature envy metric scores of the code before and after the recent changes to CharGer because of this analysis. Notice the occurrences drop across the board.**