1 | Background

1.1 Performance measures

In aiding the quantification of the two proposed control measures, a Fitts' law test will be used. A general Fitts' law test incorporates five different performance metrics in the evaluation of movement.[**Kamavuako2014**, **Scheme2013**] The five metrics and their description can be found in table 1.1

Metric	*Description*
Throughput	Time-based metric that summarizes usability through the tradeoff of speed and accuracy
Efficiency	Distance-based metric that describes the path taken; a ratio of the optimal path to the target to the actual path taken
Overshoot	Fine control metric that describes the ability to stop on a target; the average number of times the target was exited after being acquired
Stopping Distance	Stopping metric that describes the ability to elicit and hold no motion; the total distance travelled during the 1 second dwell time
Completion Rate	Describes overall success; the percentage of tests completed within the allowed time

Figure 1.1: The table shows the metrics used in a generel Fitts' law test, and a description of these.[**Scheme2013**]

2 | Methods

2.0.1 System Design

The feedback of the test part of the system will consist of a compass plot, where the output will be based on either the regression based control scheme alone or a combined model with classification included as well.

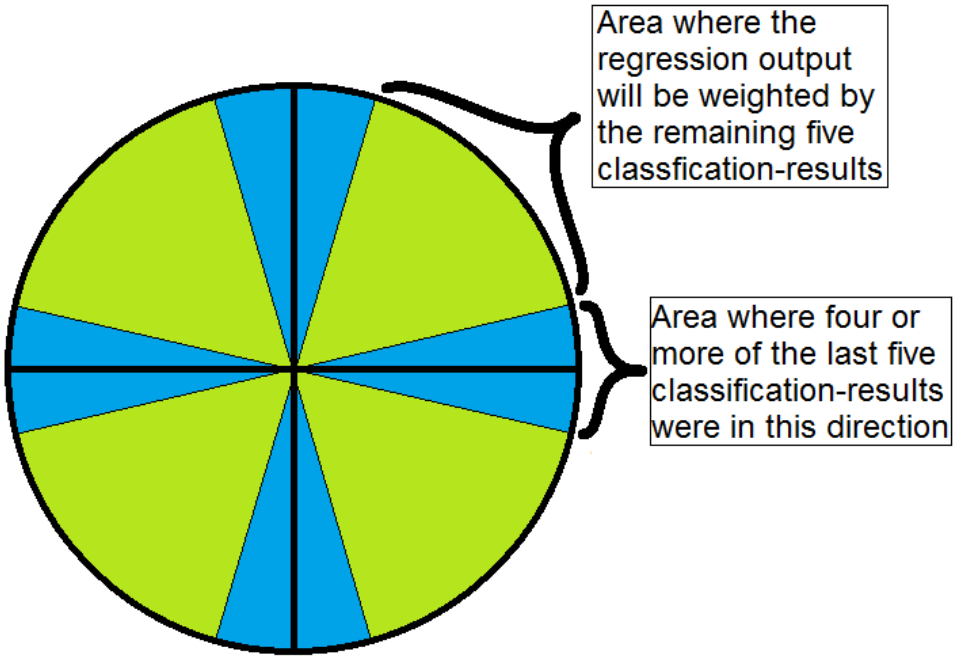

Figure 2.1: Suggestion on the areas where multiple DOF's (green) and a single DOF (blue) will be activated in the compass plot inside the GUI with a control scheme based on both classification and regression

When testing the combination of regression and classification, the system will be designed with the regression result as the main output while the classification results will be used as weights to determine if the subject intends to perform a single movement or a combination of multiple movements. The system will perform a single movement if four of the previous five classification outputs were the same movement. This means that there will be a certain area where the output will be in a single direction, as shown with blue on figure 2.1. Combining the two types of control should give the user a possibility to activate a single DOF proportional movement without being extremely precise.

In cases where the subject intends to activate multiple DOF's at the same time in the green areas of figure 2.1, the previous five classification results will be used to weight the regression outputs. An example of this could be three extensions and two radial deviations within the five most recent classifier results, where the extension regression output will be weighted with $\frac{3}{5}$ and the radial deviation will have a weight of $\frac{2}{5}$. This implementation should give the subject a possibility of activating multiple DOF's proportionally at the same time.

The output of the regression based control scheme will be translated directly to the compass plot, where it will be used to reach targets in the test. This means that the subjects will have to be more precise

when trying to activate a single DOF, as there are no areas where the classifier will force the output to be a single DOF.