

Investigation Into The Representation Of 4D Shapes

13/01/2022

Christmas Progress Report

- Rotors Work besides 1 thing...
- Grab ball was unsuccessful (was not intuitive) so will leave that alone
 - Although I could use it specifically for 3D and not 4D, but still may not make sense
- Recorded tutorial video and built in-game video player
 - needs minor improvements
- Reorganised project alot (refactoring and directory structure)
- Created controllers
 - Load the different scenes
 - Setup random tests
 - Record data from test
 - Time, selected/loaded shape, texture, selected/loaded rotation etc.
 - Record survey data between tests
 - Confidence and understanding
- Attempted but failed to obtain angle between rotors
 - unsure why what i have tried didn't work

Questions

- Ideas of what could be wrong with Rotors (again)
- Opinion on graphs in between each representation
- Angle between Bivectors?
 - `Rotor.Scalar = Cos(theta/2)`
 - To “Add” rotations -> `Rotor4 total *= r`
 - To “subtract” rotations -> `Rotor division = Rotor4 total = total * r.Reverse()`
 - Taking the `Acos()` of the scalar of this does not yield the correct value...
 - Tried obtaining the *Dual* of a bivector (its normal vector), but cannot get that using `GAlgebra` in Vector form
 - With the normal Vectors I could use the dot product to get the angle between them
- Organising Experiments?

Plan Ahead

Week 1 & Week 2

- Finish implementing test system
 - graphs between representations
 - fix rotor rotation
 - add time limit

Week 3

- Begin developing data analysis tools, most likely with a jupyter notebook
- run some preliminary tests to decide if there is any data or visualisations I want to cut

Week 4 & Week 5 & Week 6

- Run experiments
- Begin dissertation
- Further develop data analysis tools

Week 7

- Evaluation of experiments

Week 8 & Week 9 & Week 10

- Write up draft dissertation

Am I on schedule

- Problem with Rotor may interrupt things
- Problem with angle between rotors may slow down things, but it is something that is not required for experiments
- Look to be on schedule