Visualising objects in the geometric algebra of projective line geometry

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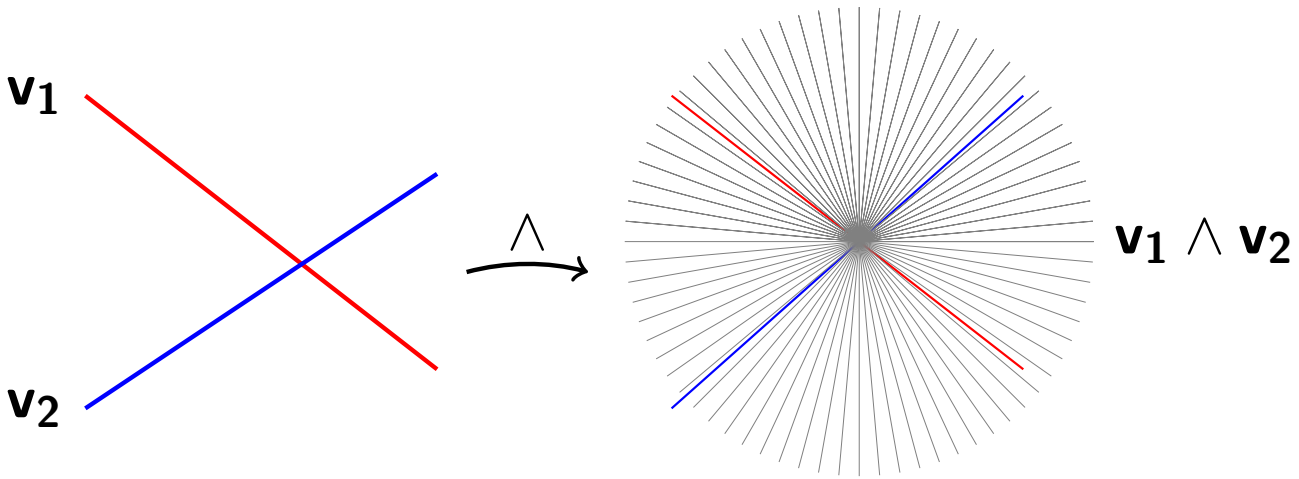
Approach

1. Explore representation space
2. Computing geometric interpretation
3. Implement drawing routines

Explore representation space

- Plücker coordinates: 3D lines are 6D null vectors
  - Representation is homogeneous
- Outer product $\wedge$ to generate subspaces

Which geometric objects are in the representation space?



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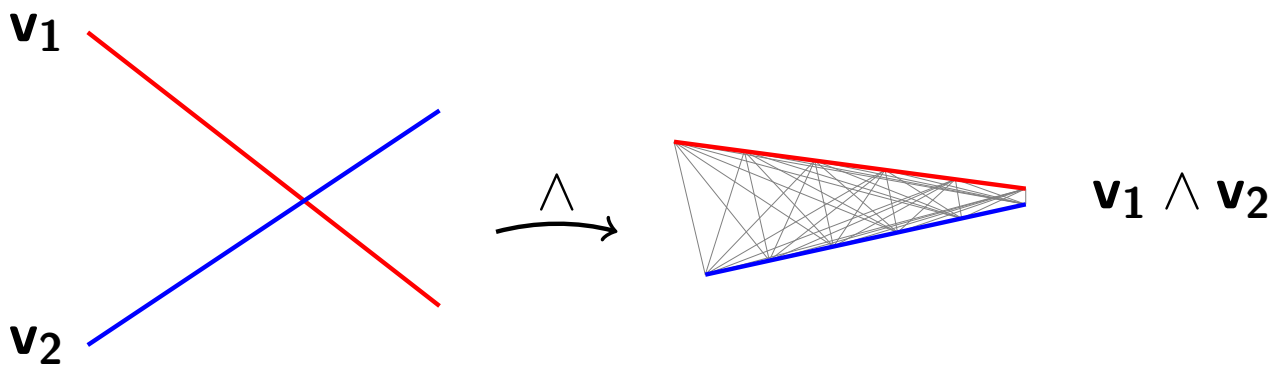

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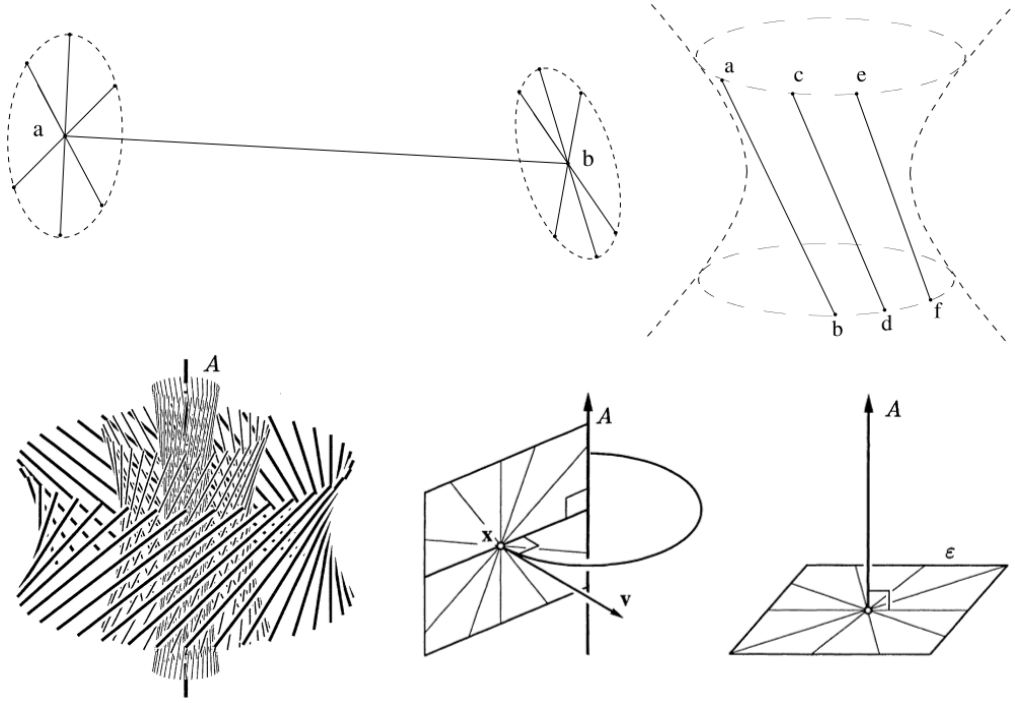
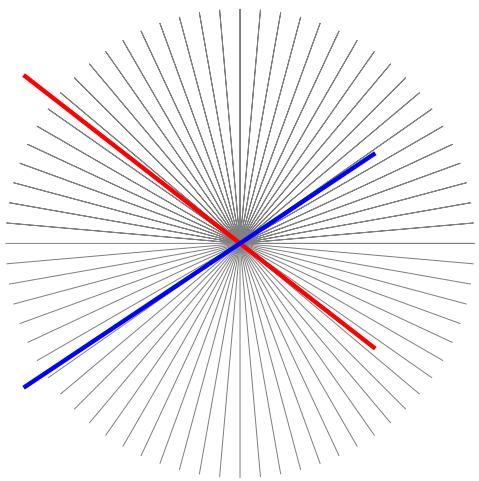
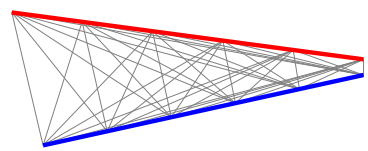


Computing geometric interpretation

How to recognize what to draw?

- Looking at basis elements is not enough
- Intersection
- Factorisation

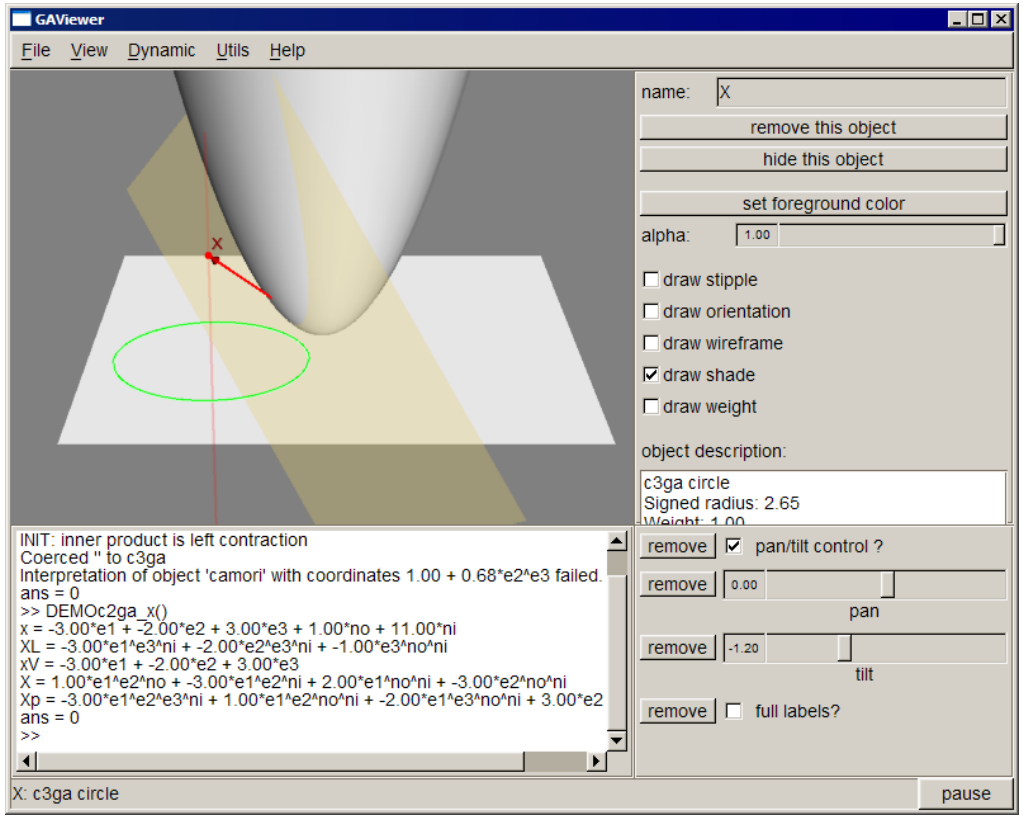




Implement drawing routines

GAViewer

- Graphing calculator for geometric algebra
- Models for Euclidean and conformal geometric algebra



Implement drawing routines

Interface challenges

- Line density
- Objects at infinity
- Translation-invariant objects
- Rotation-invariant objects
- User interaction

Questions