09-05-18-1-GeometryConstraintSolver

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4.1 Defination

a geometry is a vector in d-dimention $\boldsymbol{v}$,

a dimension is a system of equations inequations $\boldsymbol{F}(\boldsymbol{v}) = \boldsymbol{0}, \boldsymbol{N}(\boldsymbol{v}) \leqslant \boldsymbol{0}$.

4.1.1 Problem

Given the state parameters $P^{(0)}$ and the final state value $S^{(*)}$, calculate the final state parameters $P^{(n)}$.

4.1.2 Solution

4.1.3 Charity

For the outerProduct of 2 2d vectors, we define the result is negative for the result vector into the screen. For example, if $\boldsymbol{u}$ is on the left side of $\boldsymbol{v}$, $\boldsymbol{u} \times \boldsymbol{v} < 0$.

If before applying the constraints, point is on the left side of a line, we want the positive distance makes the point still be on the left side of a line. Therefore, we need to mark the original charity, and makes it as the input sign of the equations.

4.1.3.0.1 PL

4.1.4 Geometry

4.1.4.0.1 Point $\boldsymbol{v} = \{p_x, p_y\}, p_x, p_y \in \mathbb{R}$

4.1.4.0.2 Line $\boldsymbol{v} = \{r, \theta\}, r \geqslant 0, \theta \in [0, 2\pi)$, r is the distance between the origin and the line, the x+ axis rotates θ anticlockwise can get the direction of the line. the direction of the line is $[\cos\theta, \sin\theta]^T$.

4.1.4.0.3 Circle $\boldsymbol{v} = \{p_x, p_y, r\}, p_x, p_y \in \mathbb{R}, r \in [0, +\infty)$, the center of the cirsle is $[p_x, p_y]^T$.

4.1.5 Constriant

there some type of constriants, distance, angle, others.

4.1.5.0.1 D-PP

$$F(x_1, x_2, y_1, y_2) = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

noticed that the curve $F = a \in \mathbb{R}$ is irregular $(x_1 - x_2 = 0)\&(y_1 - y_2 = 0)$, other than this line, we have

$$\frac{\partial F}{x_1} = F^{-1} \cdot 2(x_1 - x_2)$$
$$\frac{\partial F}{y_1} = F^{-1} \cdot 2(y_1 - y_2)$$
$$\frac{\partial F}{x_2} = -F^{-1} \cdot 2(x_1 - x_2)$$
$$\frac{\partial F}{y_2} = -F^{-1} \cdot 2(y_1 - y_2)$$

4.1.5.0.2 D-PPL

4.1.5.0.3 D-PL

4.1.5.0.4 D-LL

Chapter 5 Else