Navigation Algorithm

Get the relationship between Bezier curve and the velocity of spaceship:

$$
\begin{gathered}
B(t)=t^3\overrightarrow{P_4}+3t^2(1-t)\overrightarrow{P_3}+3t(1-t)^2\overrightarrow{P_2}+(1-t)^3\overrightarrow{P_1} \\
V_X=\frac{\mathrm{d}X_{B(t)}}{\mathrm{d}t}=\ldots \\
V_Y=\frac{\mathrm{d}Y_{B(t)}}{\mathrm{d}t}=\ldots \\
V=\sqrt{V_X^2+V_Y^2}=\sqrt{\left(\frac{\mathrm{d}X_{B(t)}}{\mathrm{d}t}\right)^2+\left(\frac{\mathrm{d}Y_{B(t)}}{\mathrm{d}t}\right)^2}
\end{gathered}
$$

Get the relationship between handles and the velocity of spaceships:

$$
\begin{gathered}
|P_1-P_2|=kV_1 \\
|P_3-P_4|=kV_2
\end{gathered}
$$

Since V_2 is the velocity of spaceships when $t=1$,

$$
\begin{gathered}
\frac{\mathrm{d}X_{B(t)}}{\mathrm{d}t}\Big|_{t=1}=3t^2X_4+[6t(t-1)+3t^2]X_3+[3(t-1)^2+3t\times 2(t-1)]X_2+3(t-1)^2X1 \\
=3X_4+3X_3 \\
\frac{\mathrm{d}Y_{B(t)}}{\mathrm{d}t}\Big|_{t=1}=3Y_4+3Y_3
\end{gathered}
$$

So,

$$
\begin{gathered}
V_2=\sqrt{(3X_4+3X_3)^2+(3Y_4+3Y_3)^2} \\
=\sqrt{9(X_4+X_3)^2+9(Y_4+Y_3)^2} \\
=3\sqrt{(X_4+X_3)^2+(Y_4+Y_3)^2} \\
=3\sqrt{(X_4-(-X_3))^2+(Y_4-(-Y_3))^2} \\
=3|P_4-(-P_3)| \\
=3|P_4+P_3|
\end{gathered}
$$

therefore,

$$
k=\frac{|P_3-P_4|}{3|P_4+P_3|}
$$