APPLICATION OF SIGNATURES FOR FORECASTING

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PURPOSE OF PROJECT

- ➔ UNDERSTANDING SIGNATURE AND TO USE IT ON SIMPLE SMOOTH DETERMINISTIC FUNCTIONS
- ➔ TRY TO USE IT FOR FORECASTING A CHOSEN TIME SERIES

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FIRST SEMESTER

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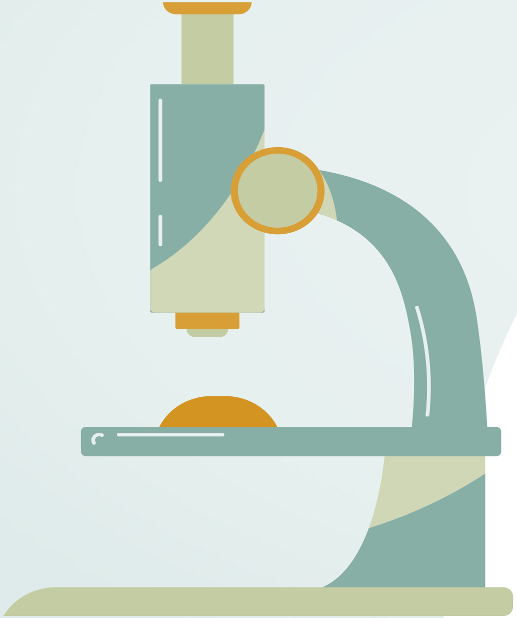
PATH

We denote a path ($[a,b] \Rightarrow R^m$) by $\boldsymbol{X}$ or $\boldsymbol{X_t}$ parameterized by t, which belongs to [a,b] coordinate paths :

$$\mathbf{X_t = (X_t^1,\ X_t^2,\ X_t^3,\ \ldots X_t^m)}$$

X_t^i are coordinate paths.

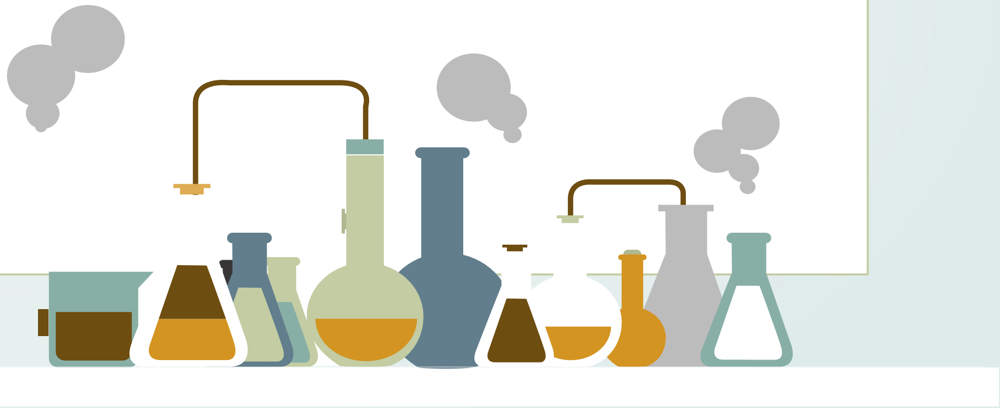
SIGNATURE OF A PATH



$$S(X)_{a,b}=(1\ ,\ S(X)^{1}_{a,b},\ S(X)^{2}_{a,b}, \dots , S(X)^{1,1}_{a,b},\ \dots)$$

1 multi index

$$S(X)^i_{a,t} = \int_{a<s<b} dX^i_s = X^i_t - X^i_0$$



$$S(X)^{i,j}_{a,t} = \int_{a<s<b} S(X)^{i}_{a,s}\, dX^{j}_{s} = \int_{a<r<s<t} dX^{i}_{r} dX^{j}_{s}$$

EXAMPLE

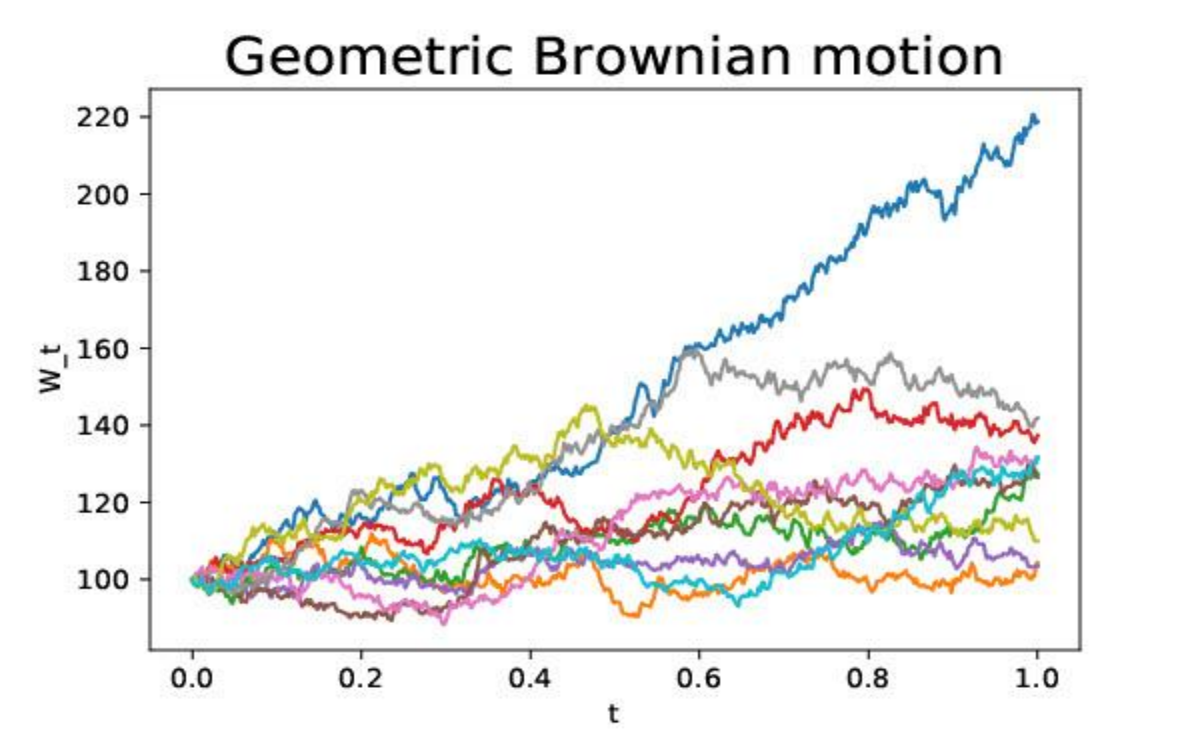
$X_t=\{X_t^1, X_t^2\}=\{5+t^2, (t^2+1)^2\},$

$a=1, b=5$

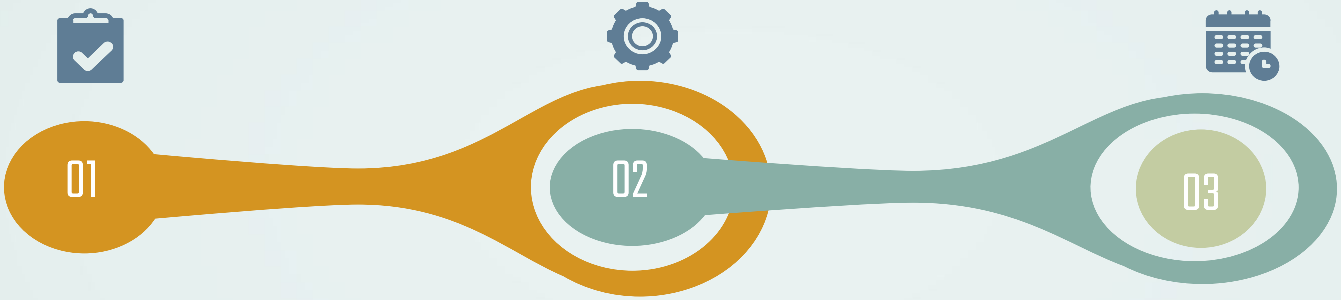
so the derivatives are

$dX_t=\{dX_t^1, dX_t^2\}=\{2t\,dt, 2(t^2+1)*2t\,dt\},$

PICTURE OF A ROUGH PATH



PLAN



Understand and use signatures on rough non-smooth paths

THANK YOU