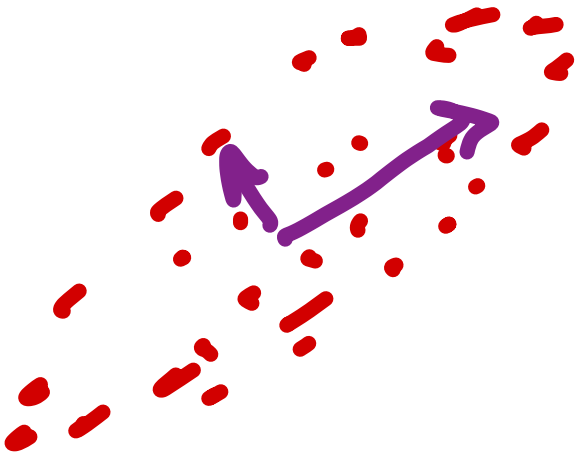
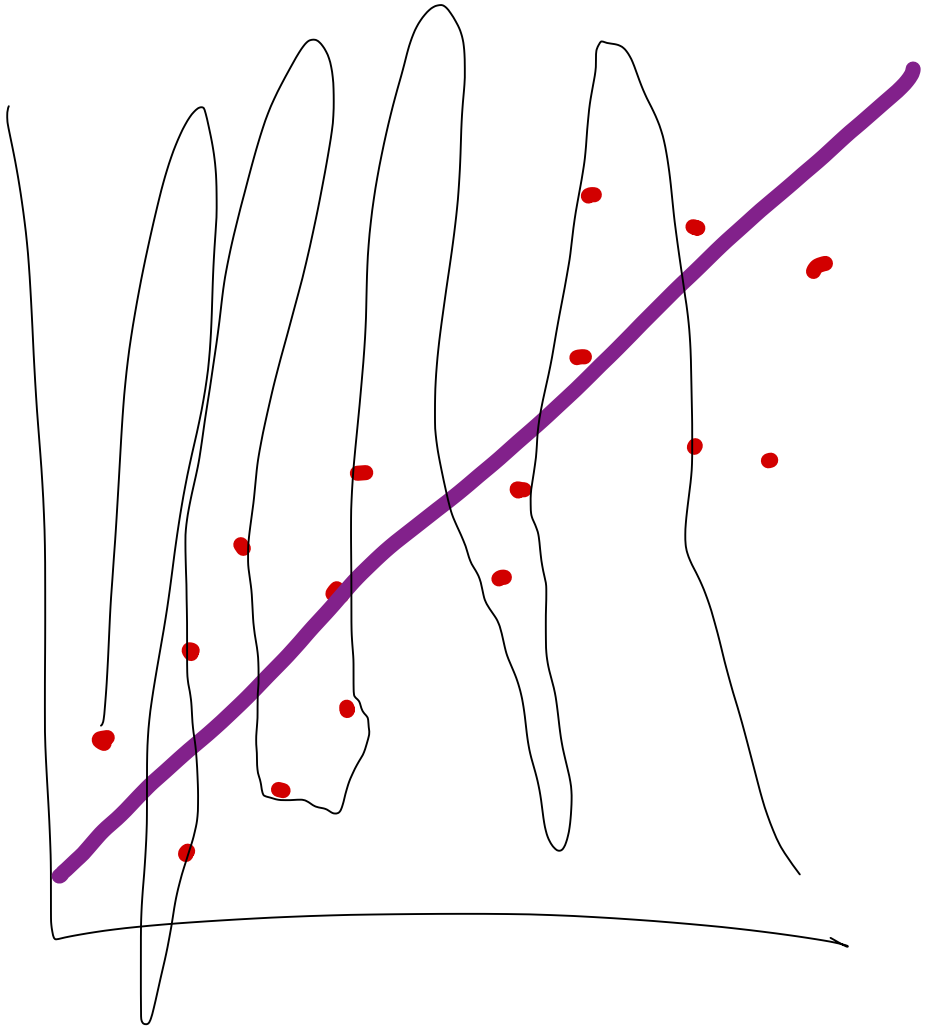
03/14/23

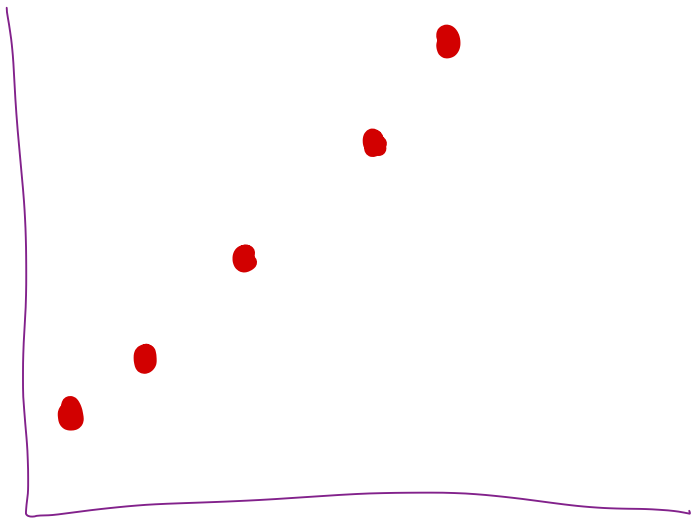
Classification

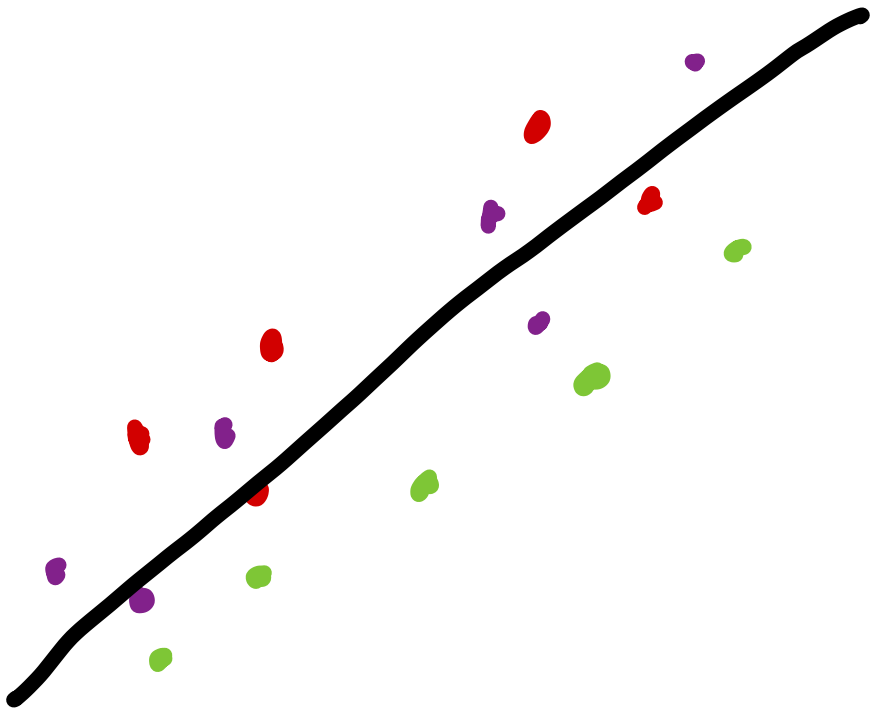
feature extraction + feature selection

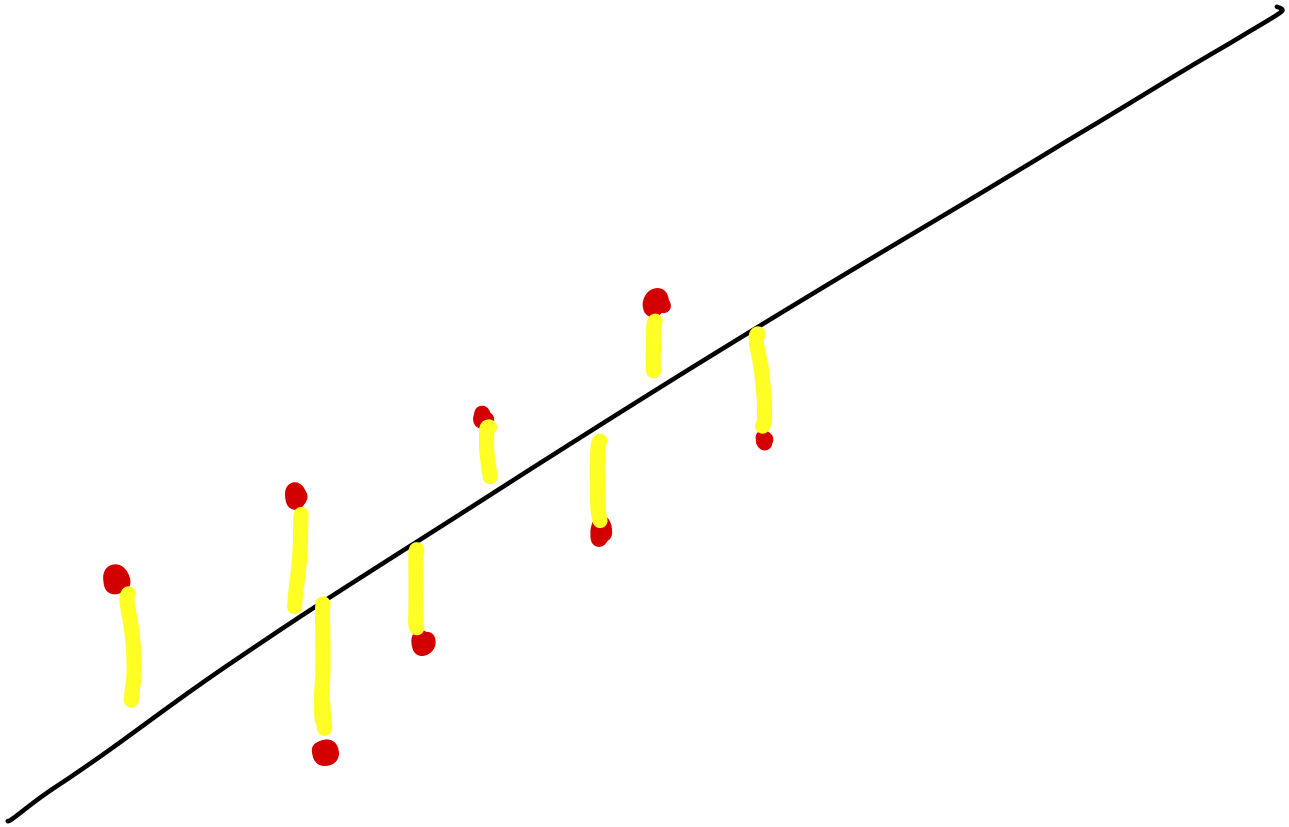


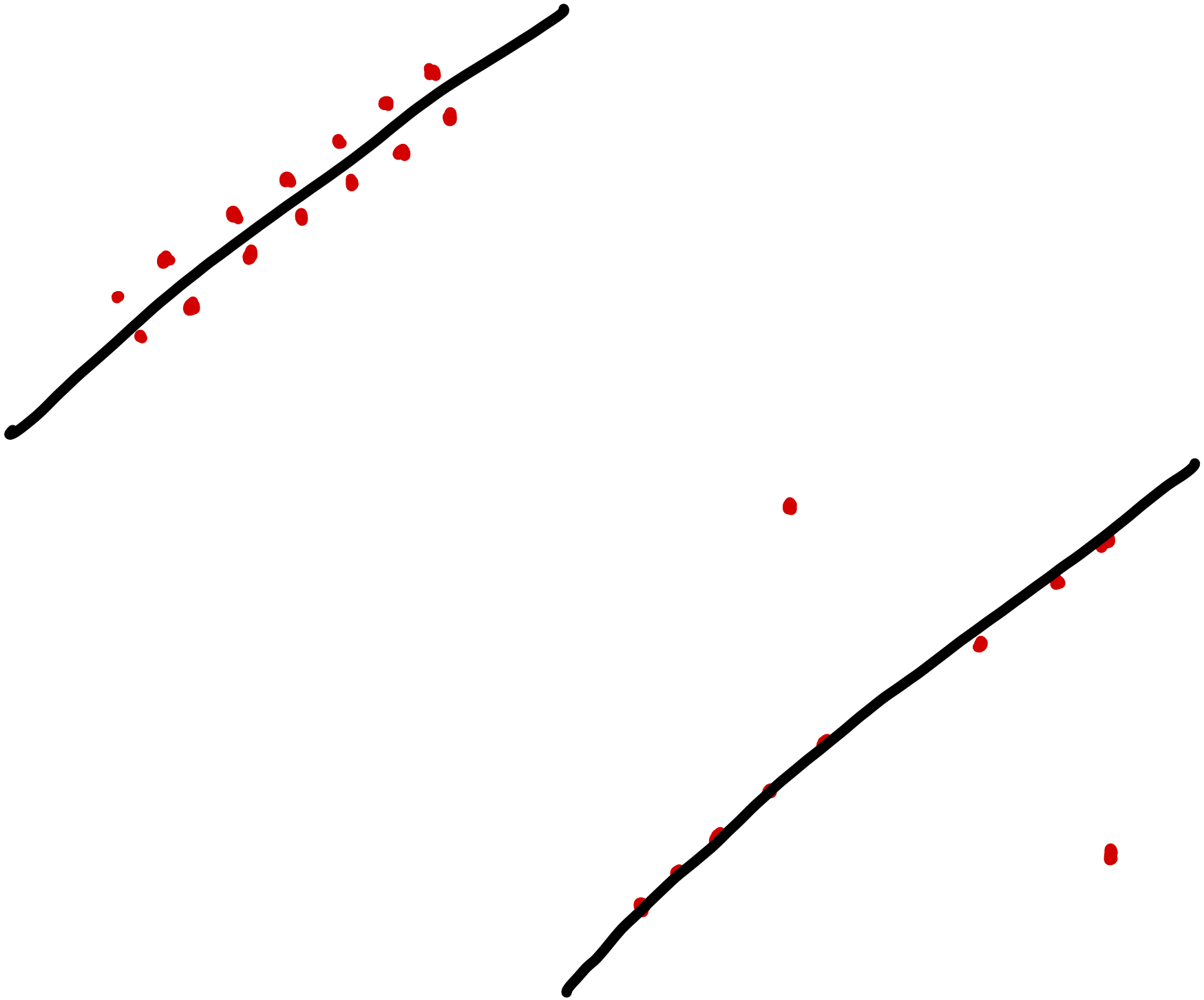
Regression: predict a value







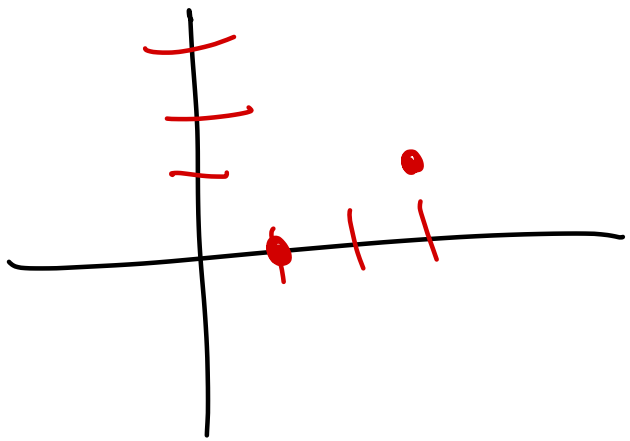




$$\|a\|_2 = \sqrt{a_1^2 + a_2^2 + \dots a_n^2}$$

$$\|a\|_1 = |a_1| + |a_2| + \dots + |a_n|$$

$$\|a\|_\infty = \max_i |a_i|$$



$$\|a\|_2^2 = \sum_i a_i^2$$

$$y = mx_1 + b \cdot 1$$

$$\vec{X} = [x_1 \quad 1] \qquad \left(y_i - \langle \vec{X}_i, w \rangle\right)^2$$

$$w = \begin{bmatrix} m \\ b \end{bmatrix}$$

$$X = \begin{bmatrix} \text{---} \; \vec{x}_1 \; \text{---} \\ \text{---} \; \vec{x}_2 \; \text{---} \end{bmatrix} \begin{bmatrix} | \\ w \\ | \end{bmatrix}$$

$$\| y - Xw \|_2^2$$

$$Xw = y$$

$$[\,][\,] = [\,]$$

$$\|y - X\omega\|_2^2 = (y - X\omega)^T (y - X\omega)$$

$$\phi(\vec{\omega}) = y^T y - 2\omega^T X^T y + \omega^T X^T X \omega$$

$X : n \times m$

$$\nabla \phi(\vec{\omega}) = -2 X^T y + 2 X^T X \omega$$

$m \times n$ n → m

$m \times n$ $n \times m$ m → n → m

$$0 = -2 X^T y + 2 X^T X \omega$$

$$X^T X \omega = X^T y$$

$$y = mx + b$$

$$y = w_0 \cdot \underline{1} + w_1 x_1$$

$$y = w_0 \cdot \underline{1} + w_1 x_1 + w_2 x_1^2$$

$$\begin{bmatrix} 1 & \vec{x}_1[1] & \vec{x}_1[1]^2 & \vec{x}_1[2] \\ 1 & \vec{x}_2[1] & \vec{x}_2[1]^2 & \vec{x}_2[1] \\ 1 & & & \\ 1 & & & \\ 1 & & & \end{bmatrix}$$

transformation of variables

if behavior follows power law transform with log