Jacobian

Sai Ashirwad R

intro

- matrix of first order partial derivatives

$$f : \mathbf{R}^n -> R^m$$

- each of its first order partial derivaties $\in \mathbf{R^n}$
- input $x \in \mathbf{R^n}$
- output $f(x) \in \mathbf{R^m}$
- Jacobian matrix of f defined as mxn matrix and

$$J_{ij} = \frac{\partial f_i}{\partial x_i}$$

Jacobian Matrix

- generalizes gradient of scalar valued fn in several variables - generalizes derivative of a scalar valued function of a single variable
- at each differentiable point - jacobian matrix
  - describes amount of stretching, rotating, transforming imposed by function locally at point
  - if function differentiable at a point - differential given in coordinates by Jacobian