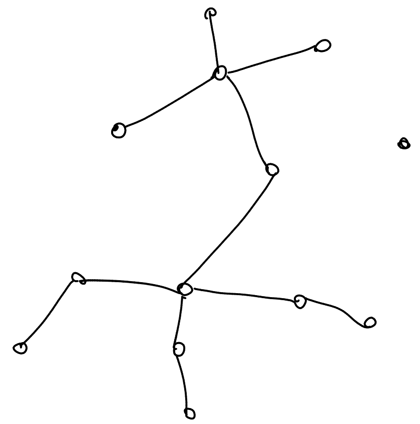


$V =$ set of all nodes

$E = \left\{ (x, n) \,\middle|\, x \in V,\ n \in \mathcal{N}(x) \right\}$

$G = (V, E)$

$\mathcal{N}(x) = \{ n_1, n_2, \dots \}$

$N = \left\{ (x, \mathcal{N}(x)) \,\middle|\, x \in V \right\}$

$S = \{ V, N \}$

If $\bigwedge_i \mathcal{N}_i \in \mathcal{N}(x)$,

$\bigcap_i \mathcal{N}_i \in \mathcal{N}(x)$, $\bigcup_i \mathcal{N}_i \in \mathcal{N}(x)$

1. $d(x, y) = d(y, x)$

2. $d(x, n_i) = d(x, n_j) \ \forall \ n_i, n_j \in \mathcal{N}(x)$

Define $\mathcal{N}_1(x) = \left\{ n_1 \,\middle|\, n_1 \in \mathcal{N}_1(x) \right\} = \mathcal{N}(x)$

$\mathcal{N}_2(x) = \left\{ n_2 \,\middle|\, n_2 \in \mathcal{N}(n_1) \ \forall \ n_1 \in \mathcal{N}_1(x) \right\}$

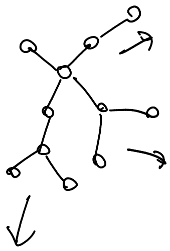
$\vdots$

$\mathcal{N}_{k+1}(x) = \left\{ n_{k+1} \,\middle|\, n_{k+1} \in \mathcal{N}(n_k) \ \forall \ n_k \in \mathcal{N}_k(x) \right\}$

Then,

3. $d(x, n_k) = d(x, n_k') \ \forall \ n_k, n_k' \in \mathcal{N}_k(x),\ x \in V$

4. $d(x, n_k) < d(x, n_{k+p})$ if $p \in \mathbb{N} \ \forall \ n_k \in \mathcal{N}_k(x),\ n_{k+p} \in \mathcal{N}_{k+p}(x),\ x \in V$



$$T = \{x_0, \mathcal{N}_1(x_0), \mathcal{N}_2(x_0), \dots\}$$

x_0 is 'origin'

$$T \equiv S \text{ iff } x \in \mathcal{N}_k(x_0) \mid k \in W, x \in T$$

Vector bundle structure

Affine space structure

Thanks, Felix Hausdorff