Artifical Intelligence

EC0332

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1) Convolution Neural Network is used for feature detector/extractor and for sparse data set.

Reason: Neural network handling large input vectors will result exponential explotion of computation (Back propagation & weight update).

Advantage: By convolutional neural network the behaviour of information is retained but size is reduced. Because of kernel (filters) and pooling operation.

2) Genetic Algorithm: The Algorithm is crafted with scope of finding solutions with the factor of fitness of particular solutions and improvising it by cross over, which generates lots of state space (solutions) in solution rich space.

⇒ The available solutions find the fitness

⇒ Selection of available choices $\left[P_i = \frac{f_i}{\Sigma f_i}\right]$

⇒ Selected solution [S] → Mutation → Crossover → fitness → P(F) → Next Gen Solution

(Self change) (Mix)

P(F) → probability of rank

Example: Biomimic (Virtual Environment)

⇒ Training a (Human structured object to walk)

→ Initial solution walking with four legs

→ (Mutation): Undergo [Flat] feet change

^ (wider)

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② → → (Crossover): With two sol^n, wherein one has developed stronger rear limbs

→ (Rank): Current offspring has better ability to walk
└ high rank

(Next gen: May develop knee movement)

3)

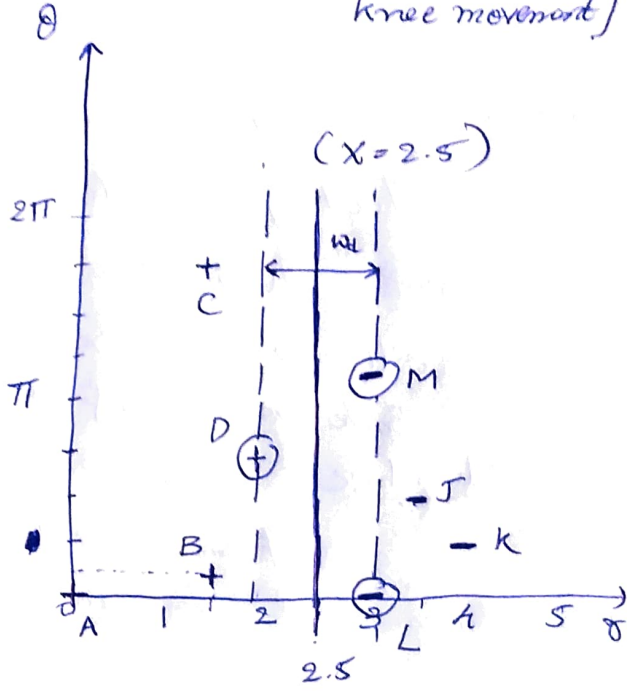
i) SVM decision boundary line

(X = 2.5)

ii) Gutter lines

@ D (X = 2) ... ①

@ M & L (X = 3) .... ②



iii) Support Vector points

$X_+ = \{D\}$

$X_- = \{M, L\}$

iv) Calculate w and b

The boundary eq^n given by: $\bar{w} \cdot \bar{x} + b = 0$

⇒ (X = 2.5) $x - 2.5 = 0$

Rewriting :- $[1\ 0]\begin{bmatrix} x \\ \theta \end{bmatrix} + -(2.5) = 0$ $\left[\begin{matrix}\bar{w} = (1\ 0) \\ b = -2.5\end{matrix}\right]$

Marginal width = $\frac{2}{\|w\|} = \frac{2}{1} = 2$

$\left[\begin{matrix}\text{Actual} = 1 \\ \|① - ②\| = 1\end{matrix}\right]$

Scaling @ point L

$c[1\ 0]\begin{bmatrix} 3 \\ 0 \end{bmatrix} - (2.5)c = -1$

$3c - 2.5c = -1 \quad c = -2$

FINAL

$\bar{w} = [-2\ 0]$

$b = +5$

(holds good)

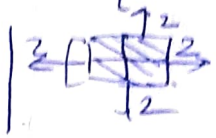
⇒ $\boxed{[-2\ 0]\begin{bmatrix} x \\ \theta \end{bmatrix} + (+5) = 0}$

width = $\frac{2}{\|w\|} = 1$ //

4) input volume = 63×63×16 filter = 7×7 (32) S = 2

i) 29×29×16

$$n^{(l)} = \left[\frac{n^{(l-1)} + 2p^{[l]} - f}{s^{[l]}} + 1 \right]$$



5) (i) 19×19×8

6) (iv) 7

7) (i) 16×16×16

8) b) Backward from sink to source

9) d) $\Sigma w_i * x_i$

10) c) Cross over

11) d) Mutation

12) b) Support Vector Machine

② → Mutation - Arbitary change within itself to improve its fitness

Crossover - mix of two chromosomes to produce better offspring for next Generation

Genetic Algorithm is trying to simulate the characteristic of biological process.