AI That Benefits Humanity Is All You Need

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Abstract

Ever since I was young, I have been dreaming of building a platform that allows more people to access useful information and knowledge they need, breaking down information barriers. I was greatly inspired when I saw the mission Elon Musk assigned to xAI. On March 17, 2024, xAI was open-sourced. [2] I think it's time for me to take the first step and delve deep into the AI industry, and make my dream come true. And now, it's time to go!

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*Thanks for *Mao Tse-Tung*, Elon Musk and Eminem. You guys gave me the drive to move forward.

[2] xAI is a new company working on building artificial intelligence to accelerate human scientific discovery.

We are guided by our mission to advance our collective understanding of the universe.

Part I

Paper Reading

1 ImageNet Classification with Deep Convolutional Neural Networks (AlexNet)

2 Deep Residual Learning for Image Recognition (ResNet)

Part II

Mathematical Principles

3 Support Vector Machine

4 Normal Equation

To minimize $||\beta - Ax||$ is to get the distance of β to W.

5 Why Gradient

If f is differentiable at (x_0, y_0), then the directional derivative exists for any direction $\vec{v} = (\cos\alpha, \sin\alpha)$, and is given by:

$$\frac{\partial f}{\partial v}(x_0, y_0) = \frac{\partial f}{\partial x}(x_0, y_0)\cos\alpha + \frac{\partial f}{\partial y}(x_0, y_0)\sin\alpha$$

The derivation is:

$$\begin{aligned}\frac{\partial f}{\partial v}(x_0, y_0) &= \lim_{t\to 0^+} \frac{f(x_0 + t\cos\alpha, y_0 + t\sin\alpha) - f(x_0, y_0)}{t} \\ &= \lim_{t\to 0^+} \frac{\frac{\partial f}{\partial x}(x_0, y_0)\cos\alpha + \frac{\partial f}{\partial y}(x_0, y_0)\sin\alpha + o(t)}{t} \\ &= \frac{\partial f}{\partial x}(x_0, y_0)\cos\alpha + \frac{\partial f}{\partial y}(x_0, y_0)\sin\alpha\end{aligned}$$

The definition of gradient is $\mathbf{grad} f(x_0, y_0) = f_x(x_0, y_0)\mathbf{i} + f_y(x_0, y_0)\mathbf{j}$

References

References follow the acknowledgments.

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[2] Bower, J.M. & Beeman, D. (1995) *The Book of GENESIS: Exploring Realistic Neural Models with the GEneral NEural SImulation System.* New York: TELOS/Springer–Verlag.

[3] Hasselmo, M.E., Schnell, E. & Barkai, E. (1995) Dynamics of learning and recall at excitatory recurrent synapses and cholinergic modulation in rat hippocampal region CA3. *Journal of Neuroscience* **15**(7):5249-5262.