Riconoscimento delle piante e del loro stato di salute tramite IA e smartphone

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Esempio

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Alstonia Scholaris (P2) healthy (2)

Basil (P8) healthy (7)

Arjun (P1) healthy (1)

Pongamia Pinnata (P7) diseased (18)

Pongamia Pinnata (P7) healthy (6)

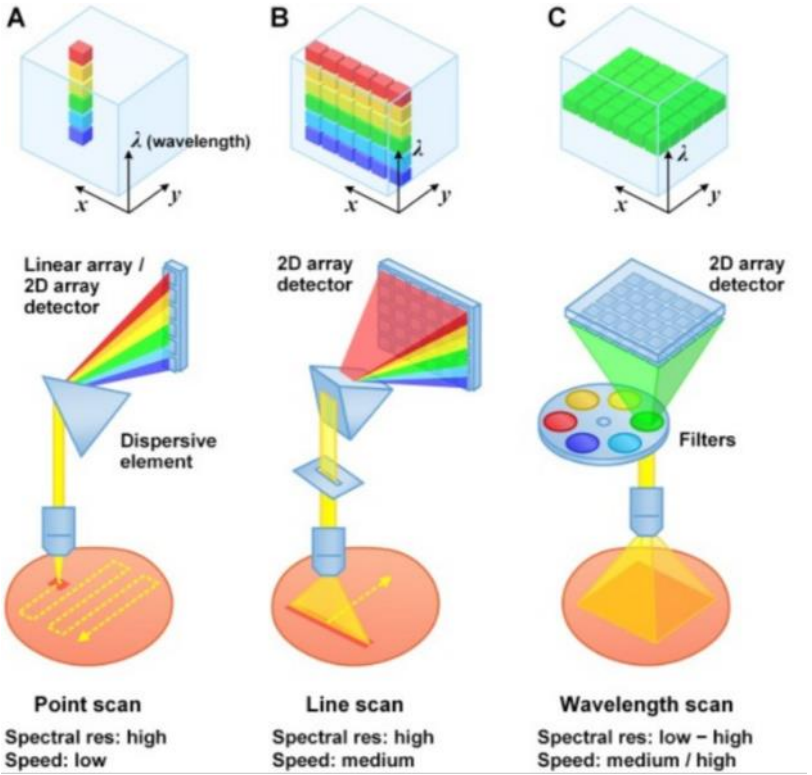
Jamun (P5) diseased (16)

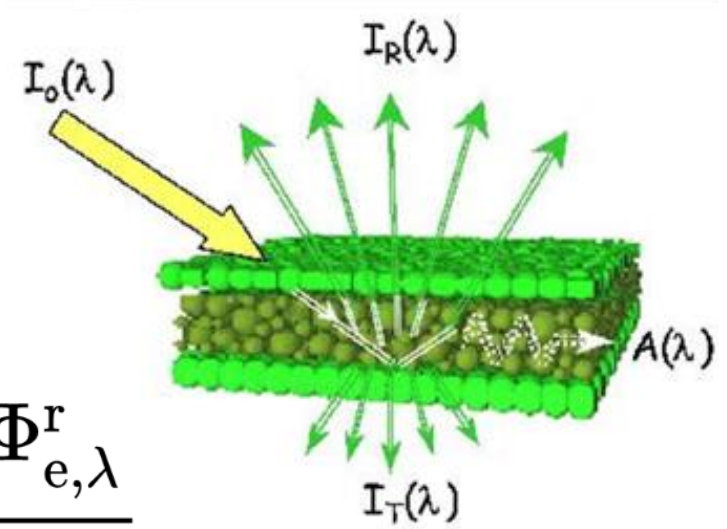
Jatropha (P6) diseased (17)

Gauva (P3) diseased (14)

Chinar (P11) healthy (10)

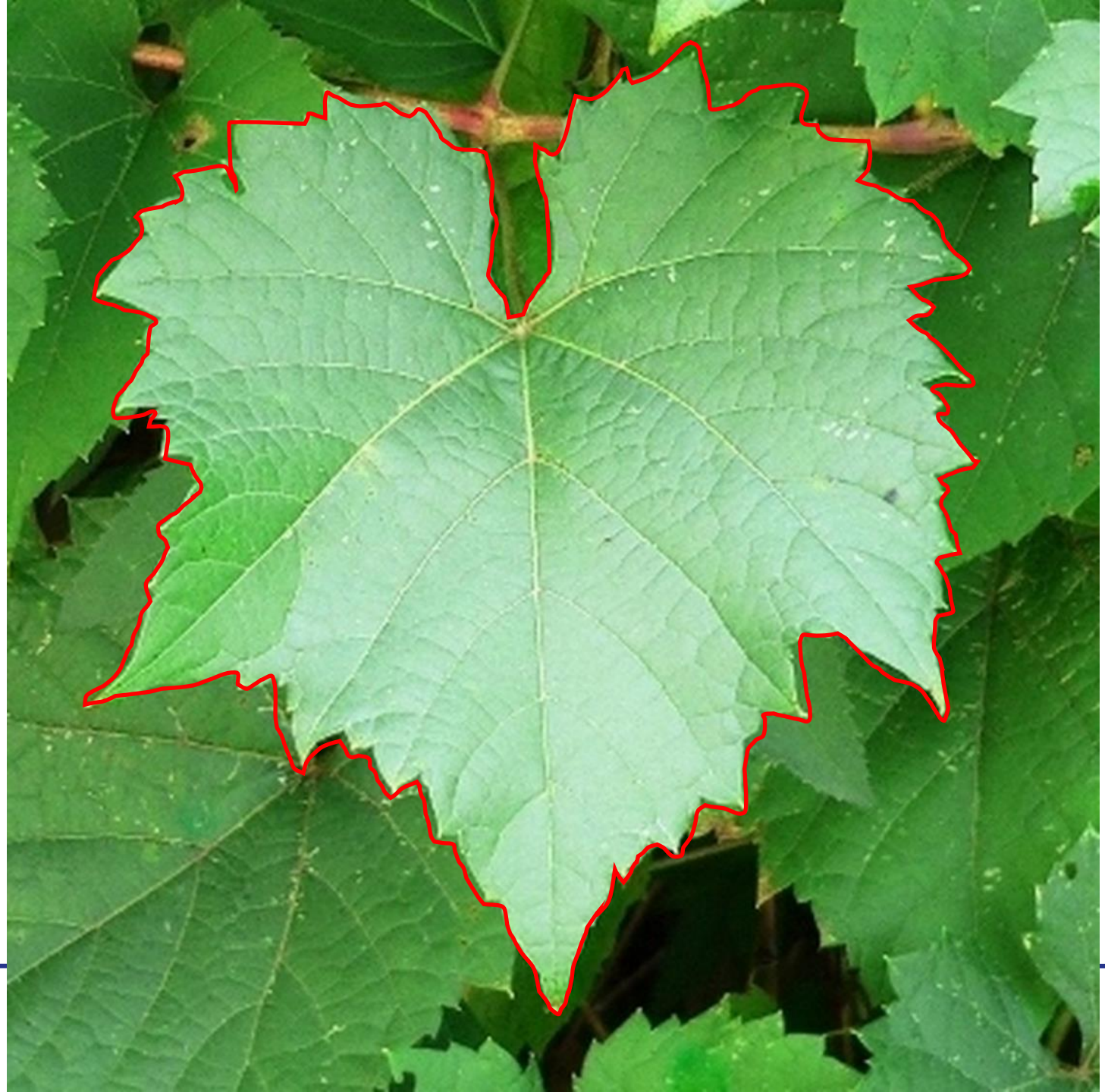
Il colore delle foglie



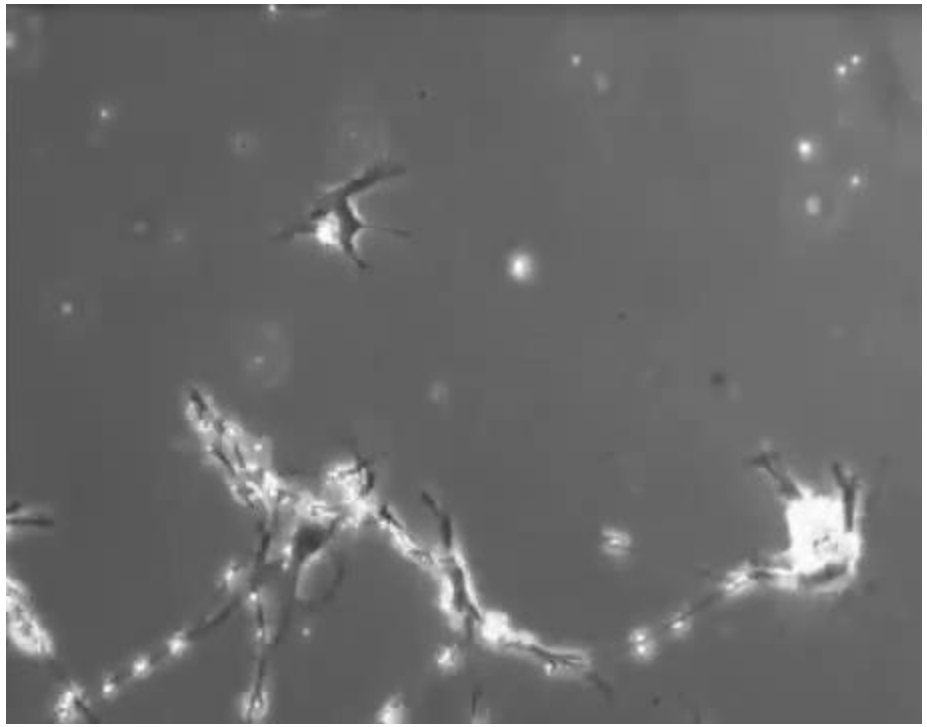


$$R_\lambda = \frac{\Phi^{\mathrm{r}}_{\mathrm{e},\lambda}}{\Phi^{\mathrm{i}}_{\mathrm{e},\lambda}}$$

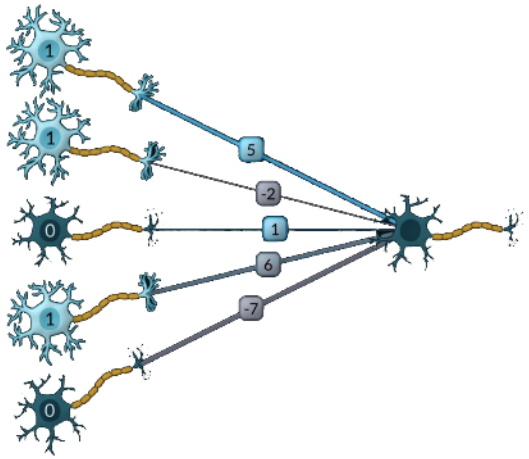
La forma delle foglie

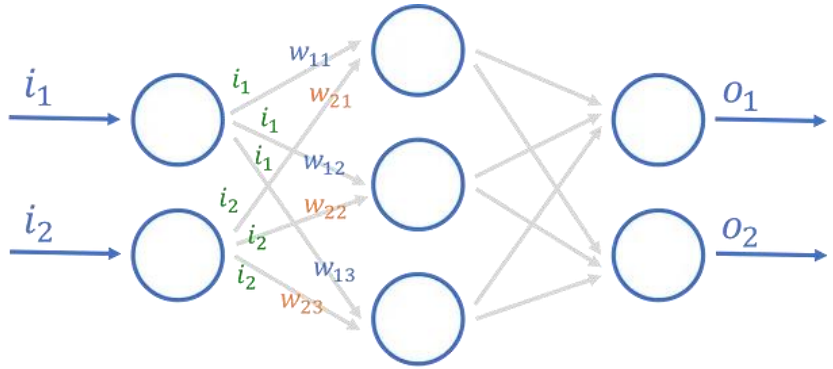


Intelligenza umana e artificiale



https://www.youtube.com/watch?v=RxBQ1ICEnKE

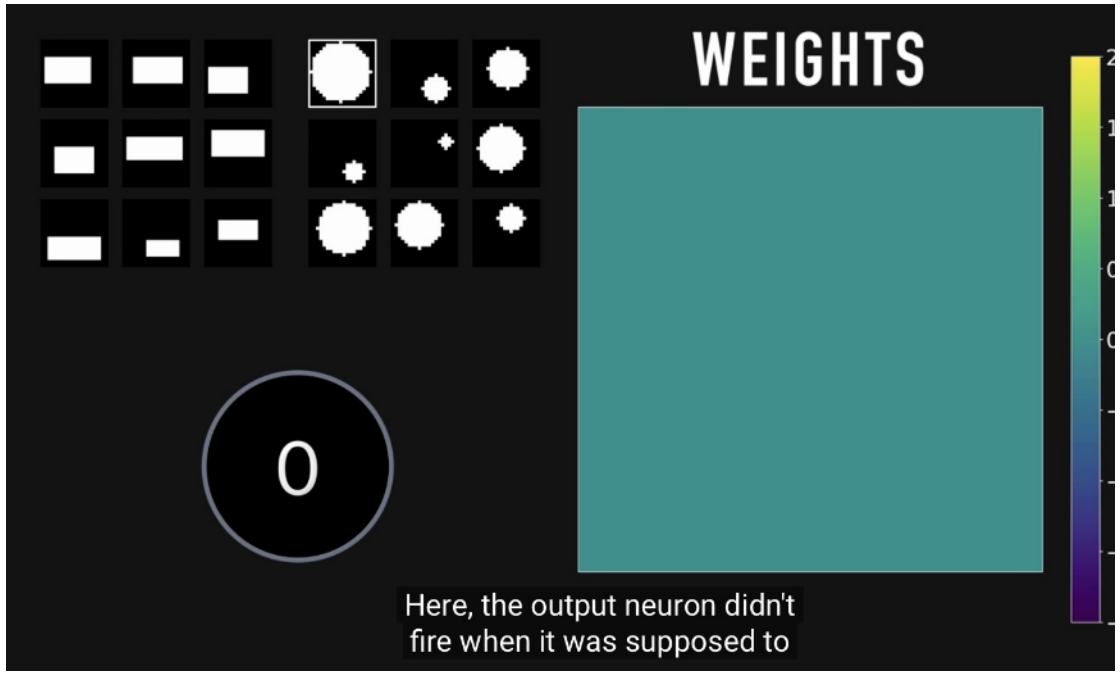


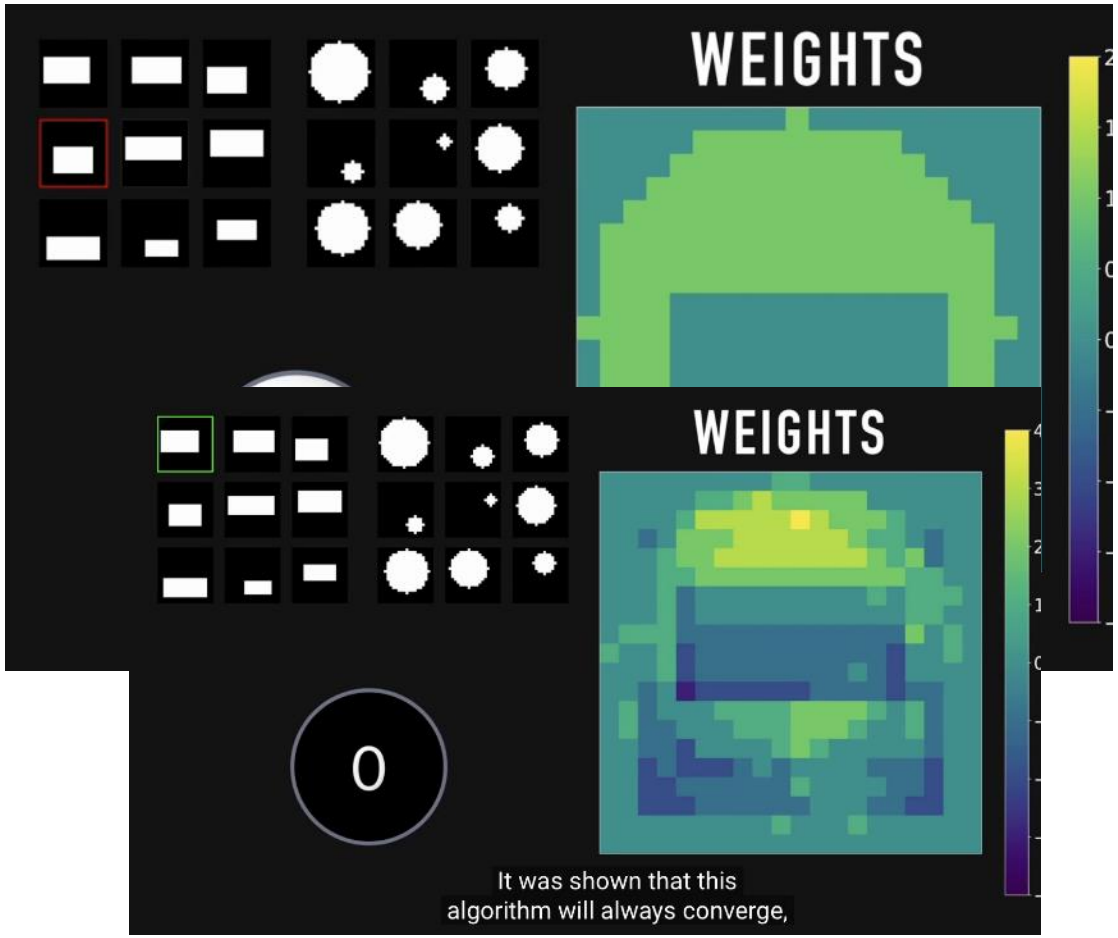


$$\begin{bmatrix} w_{11} & w_{21} \\ w_{12} & w_{22} \\ w_{13} & w_{23} \end{bmatrix} \cdot \begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} (w_{11} \times i_1) + (w_{21} \times i_2) \\ (w_{12} \times i_1) + (w_{22} \times i_2) \\ (w_{13} \times i_1) + (w_{23} \times i_2) \end{bmatrix}$$

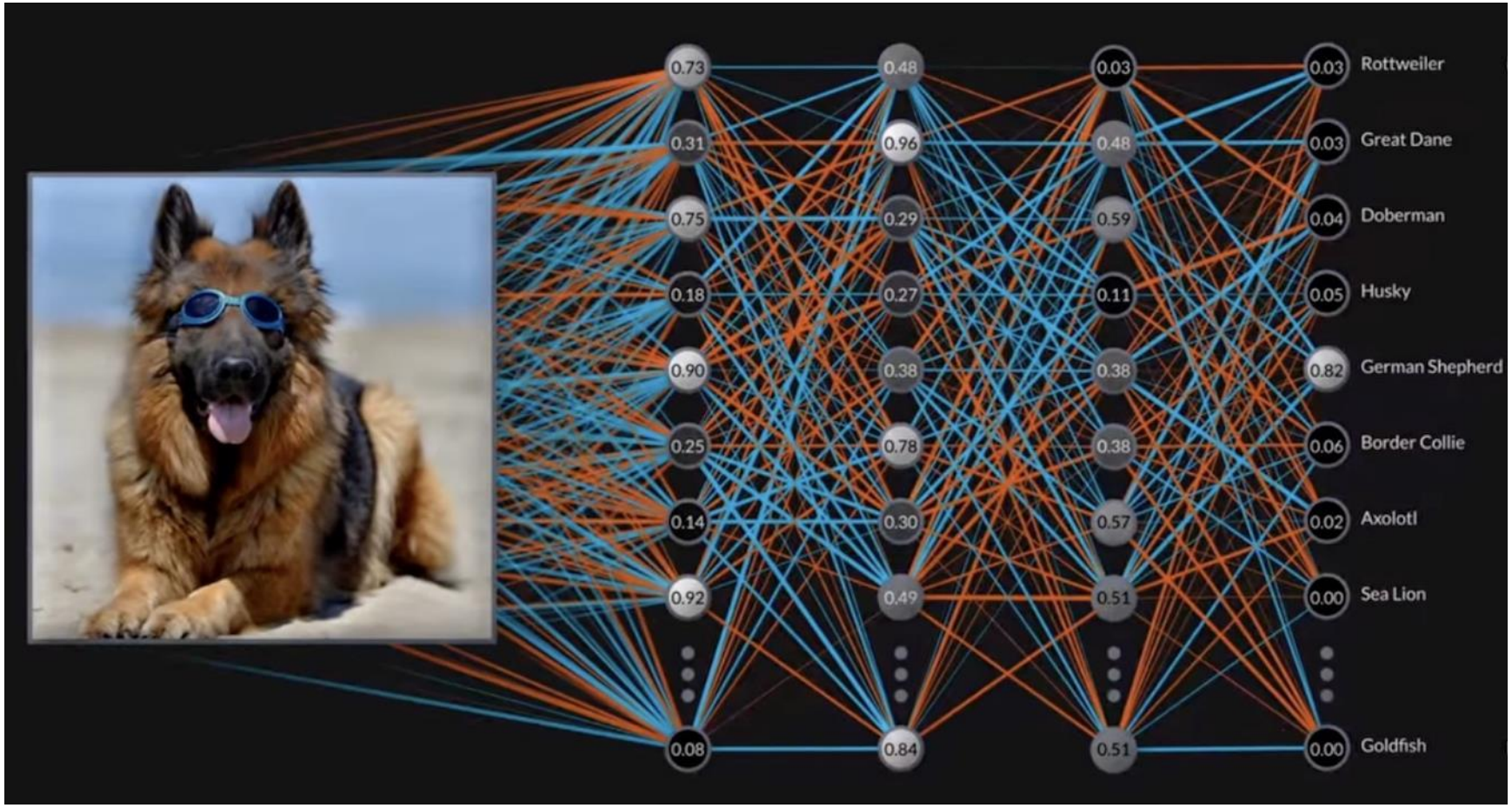
Linear Algebra for Deep Learning - Danny Denenberg

Allenare una rete neurale



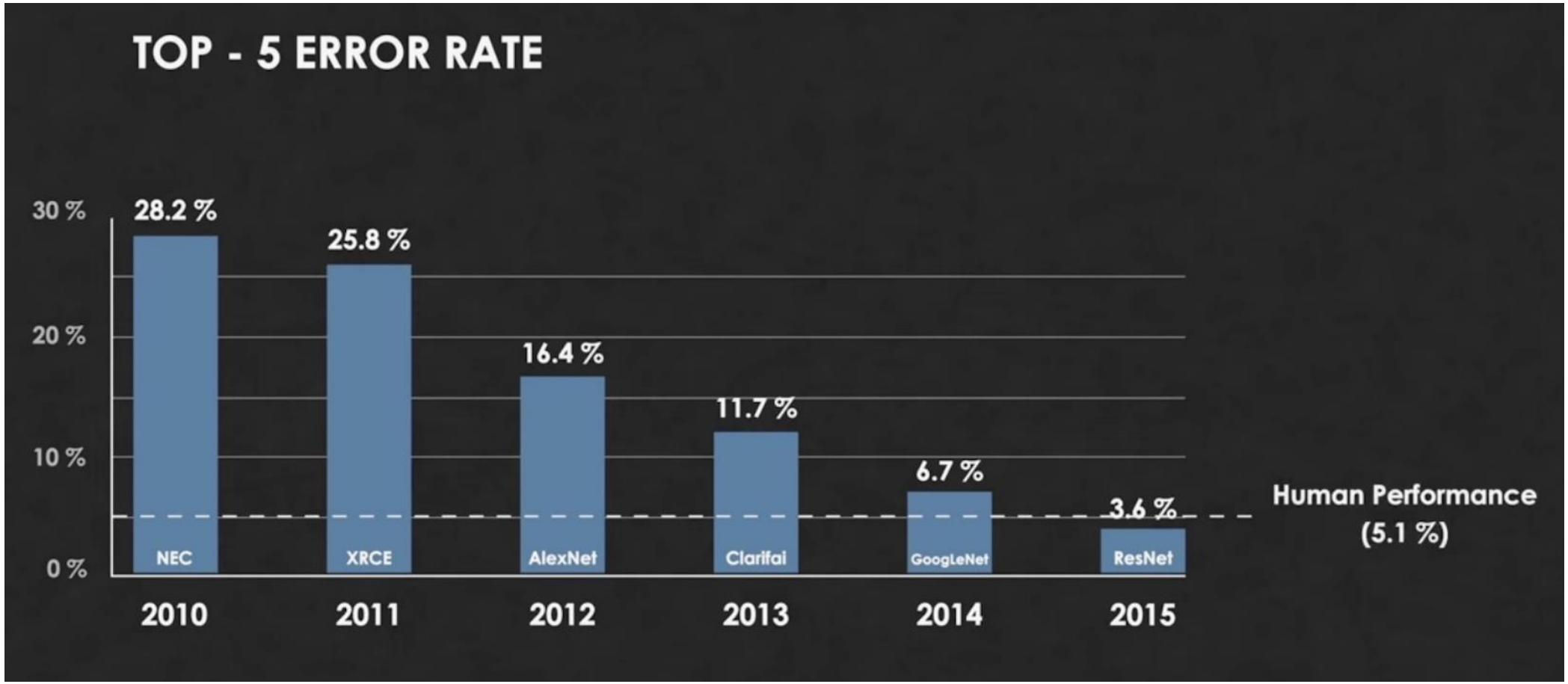


Migliorare le performances



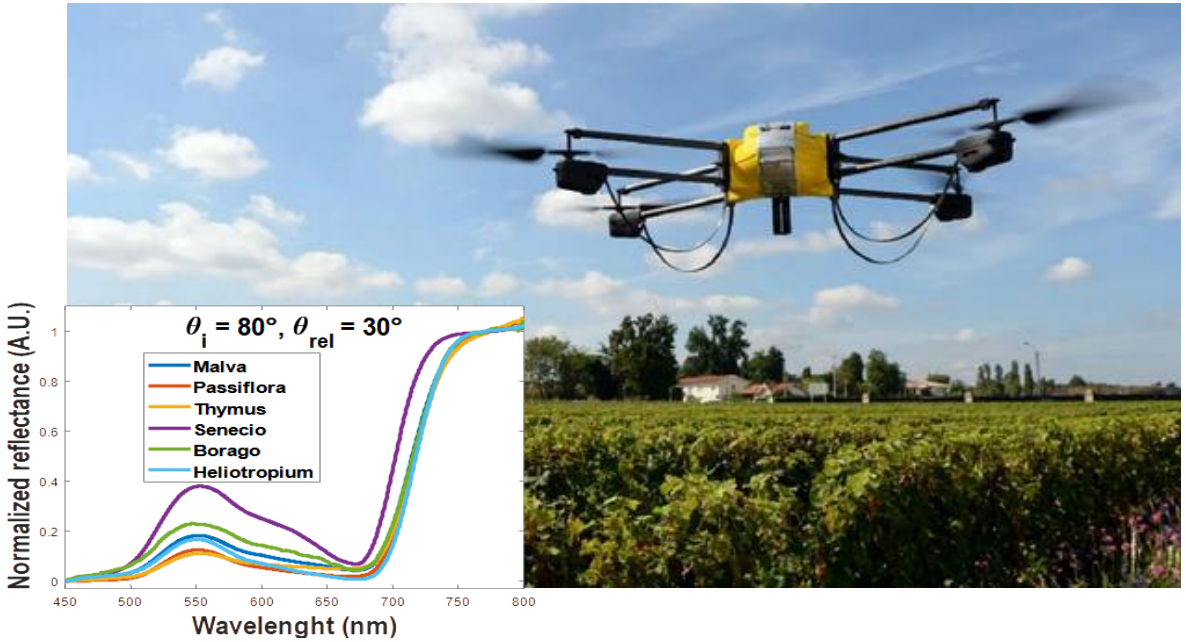
Aumenta notevolmente il numero dei pesi da aggiustare

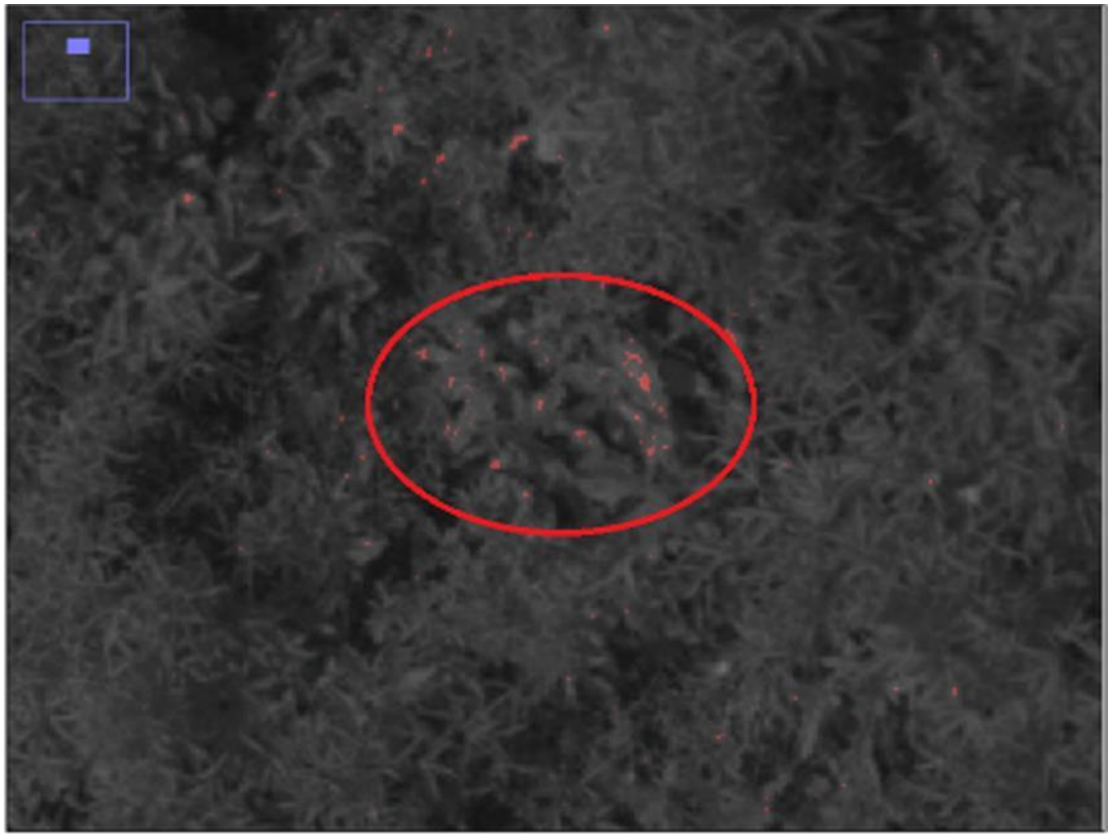
Inserire strati intermedi migliora le performances



The “deep learning” approach

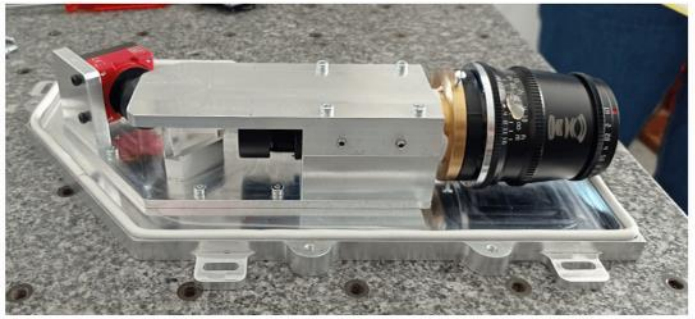
Agricoltura di precisione e IA: individuazione in tempo reale di infestanti da drone aereo

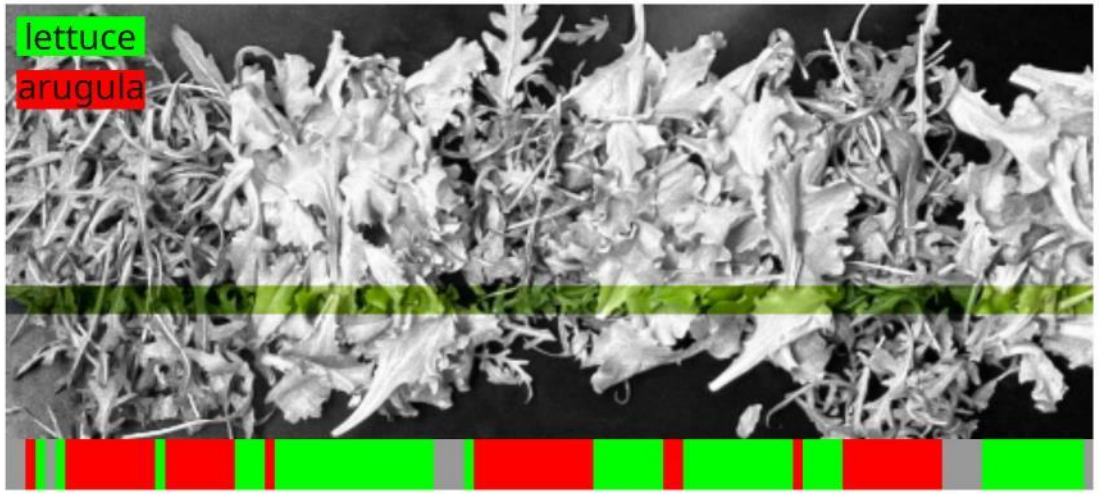


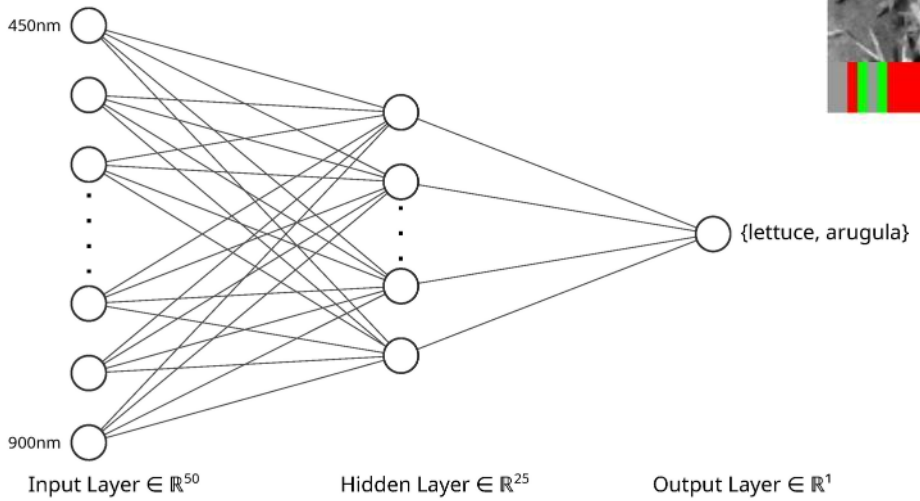


Agriculture 4.0: From Precision Agriculture to Smart Farming - Topical collection in Applied Sciences (ISSN 2076-3417)

Agricoltura di precisione e IA: individuazione in tempo reale malattie e infestanti da drone terrestre







		Prediction Outcome: Lettuce	Prediction Outcome: Arugula	Total
Actual Value	Lettuce	67,290	203	67,493
	Arugula	120	21,446	21,566
	Total	67,410	21,649	

Neri, Igor, et al. "Real-Time AI-Assisted Push-Broom Hyperspectral System for Precision Agriculture." Sensors 24.2 (2024): 344.

Possibile attività

Realizzare un sistema di intelligenza artificiale (reti neurali) in grado di riconoscere a partire da **forma** e **colore**:

- **Specie** della pianta
- **Stato di salute** della pianta

Prerequisiti:

- Basi di programmazione
- Voglia di imparare ☺

Come:

- Utilizzare un dataset contenente 4500 immagini di piante sane e malate
- Programmare in un sistema di apprendimento automatico (e.g. python + tensorflow)

Grazie per l’attenzione

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