BeeML: BAN MachLA Bee Annotation Machine Learning Algorithm

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Relevant papers

- De Nart, D., Costa, C., Di Prisco, G. et al. Image recognition using convolutional neural networks for classification of honey bee subspecies. Apidologie 53, 5 (2022). https://doi.org/10.1007/s13592-022-00918-5

- Kelley, W., Valova, I., Bell, D. H., Ameh, O., & Bader, J. (2021). Honey sources: neural network approach to bee species classification. Procedia Computer Science, 192, 650–657. https://doi.org/10.1016/j.procs.2021.08.067

- Spiesman, BJ, C Gratton. RG Hatfield, WH Hsu, S Jepsen, B McCornack, K Patel, G Wang. 2021. Assessing the potential for deep learning and computer vision to identify bumble bee species from images. Scientific Reports 11:7580.

K-NN

```
euclidean distance, 10% test, greyscale:
    for k= 1   Accuracy: 75.82%
    for k= 2   Accuracy: 76.60%
    for k= 3   Accuracy: 74.85%
    for k= 4   Accuracy: 73.11%
    for k= 5   Accuracy: 71.76%
    for k= 6   Accuracy: 71.57%
    for k= 7   Accuracy: 71.57%
    for k= 8   Accuracy: 69.63%
    for k= 9   Accuracy: 69.63%
    for k= 10  Accuracy: 69.25%

euclidean distance, 10% test, colour:
    for k= 1.00  Accuracy: 72.15%
    for k= 2.00  Accuracy: 70.79%
    for k= 3.00  Accuracy: 71.37%
    for k= 4.00  Accuracy: 70.41%
    for k= 5.00  Accuracy: 70.21%
    for k= 6.00  Accuracy: 69.44%
    for k= 7.00  Accuracy: 68.09%
    for k= 8.00  Accuracy: 67.89%
    for k= 9.00  Accuracy: 67.89%
    for k= 10.00  Accuracy: 68.09%
```
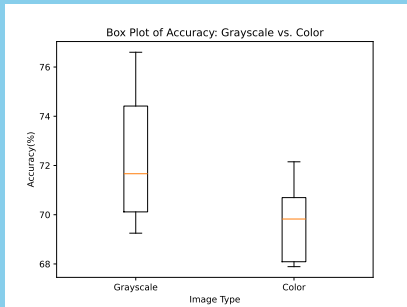
Bee Images

Figure: Camera trap photographs and a sample Kaggle dataset image

*PROJECT PROPOSAL

*ACTUAL PROJECT

dhan'yabāda