Megulo Abebe
Dr. Michael Pazzani
Dec 8, 2018

Weekly Report

Work Completed:

1. I've completed the 10 bird problem. I've trained a deep learning model that can recognize the following birds:
    a. Barrows Goldeneye
    b. Blue Grosbeak
    c. Clarks Grebe
    d. Common Goldeneye
    e. Eastern Towhee
    f. Indigo Bunting
    g. Lesser Scaup
    h. Ring necked duck
    i. Spotted Towhee
    j. Western Grebe

2. The model has also been trained to recognize a shallow hierarchy. Namely, it can identify the former birds and their immediate parent family. For instance, Western Grebe and Clarks Grebe belong to the parent Grebe family. Here's a breakdown of the hierarchy that model has learned.
    a. Goldeneye
        i. Barrows Goldeneye
        ii. Common Goldeneye
    b. Grosbeak_Bunting
        i. Blue Grosbeak
        ii. Indigo Bunting
    c. Towhee
        i. Eastern Towhee
        ii. Spotted Towhee
    d. Grebe
        i. Clarks Grebe
        ii. Western Grebe
    e. Scaup_Duck
        i. Lesser Scaup
        ii. Ring necked duck
3. Based on a separate unseen test set, the model's performance is about 93%.

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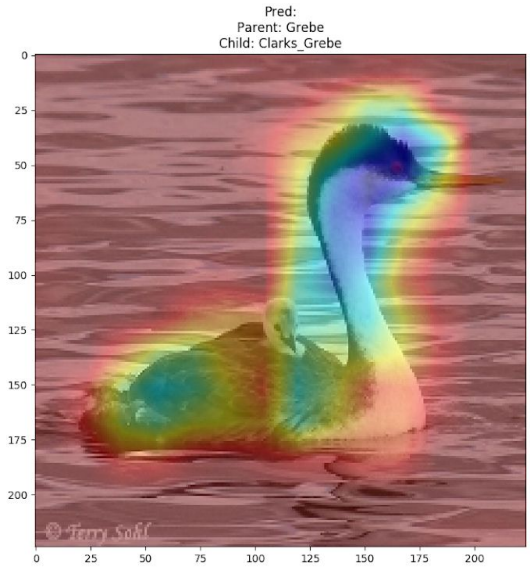
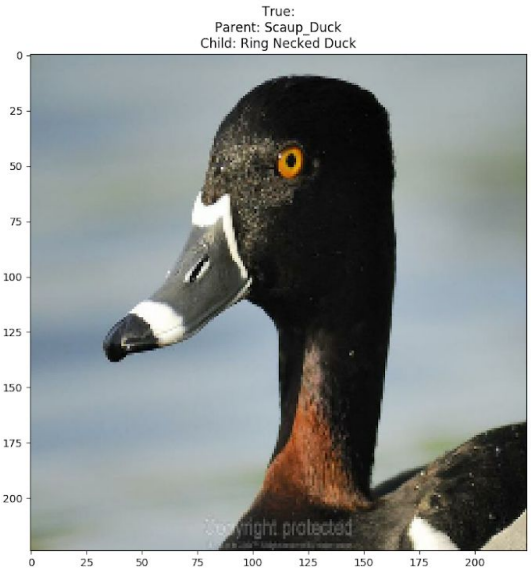
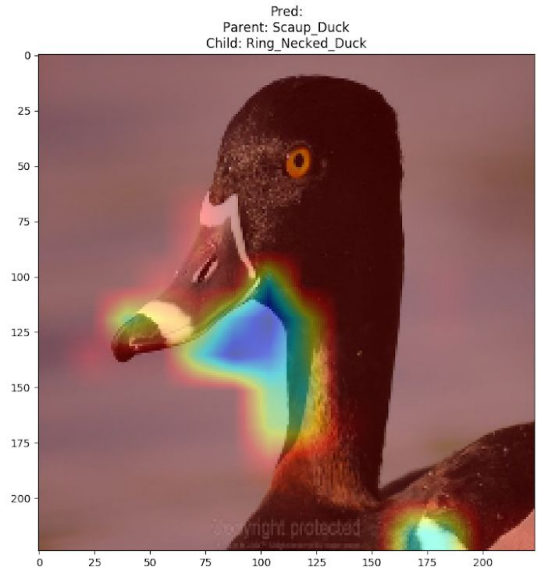
4. Additionally I've included a heatmap that highlights which region of pixels has the most influence on the model's decision. Below are a few examples. In this case the red indicate less important pixels whereas the blue represents the more import pixels.







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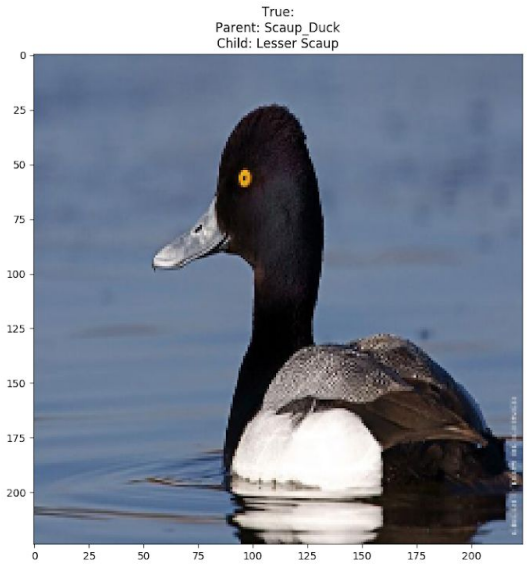

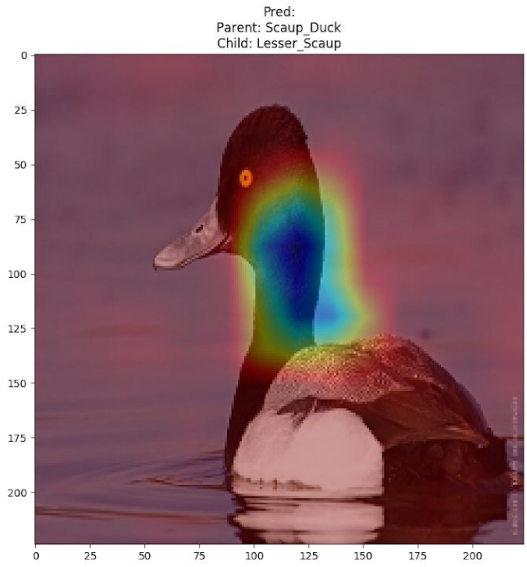

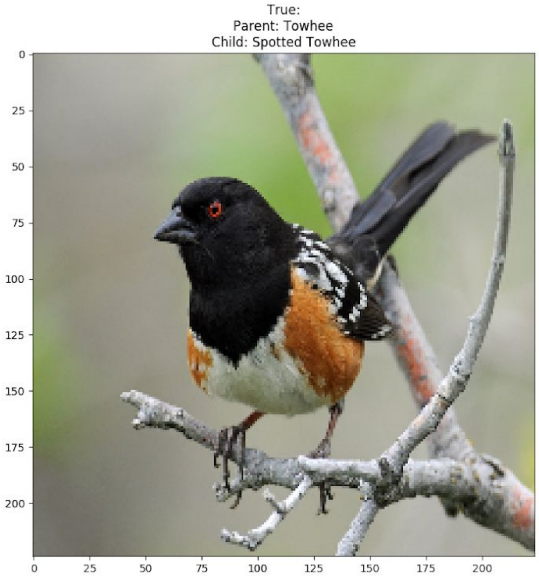

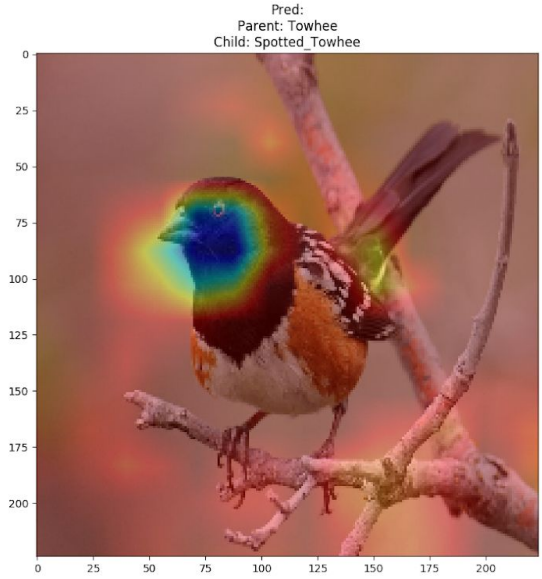

5. Here's what the model's architecture. It is a variant of VGG16 except at the end it provides two outputs as opposed to one.

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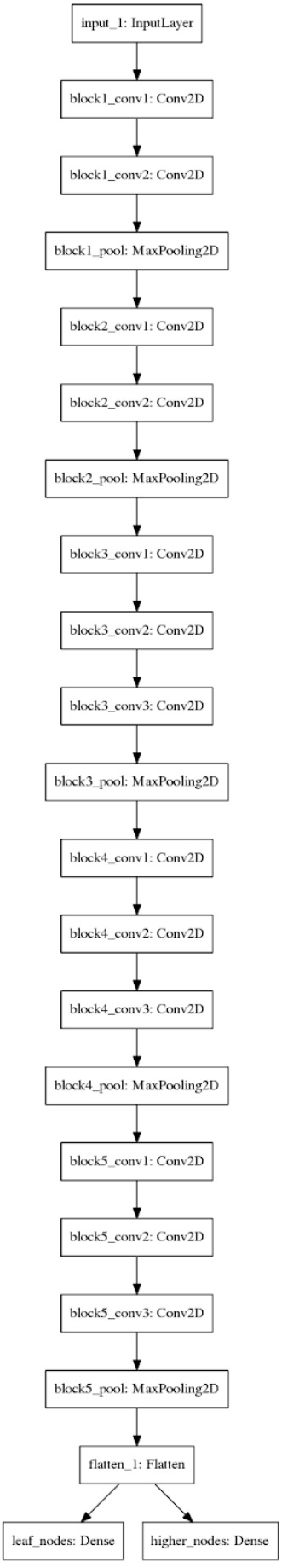

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Future Work:

1. I will upload the model and heatmap functionality to the webapp so that you could test the model yourself. I'll let you know when it is available. The link has not changed, it is still: https://sdsc-research.herokuapp.com/
2. I also want to abstract the heatmap feature. That is, I want to try to get a heatmap pertaining to a specific level in the hierarchy. For instance, I want to get the heatmap for the grebes family and then another one for western grebe and clarks grebe specifically. And then include this functionality to the webapp.

Comments/Questions:

Let me know what you think and what you would like me to work on.