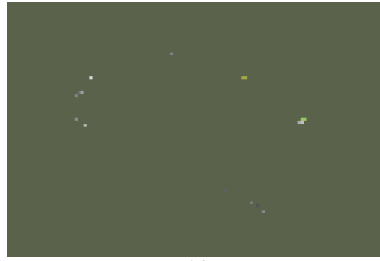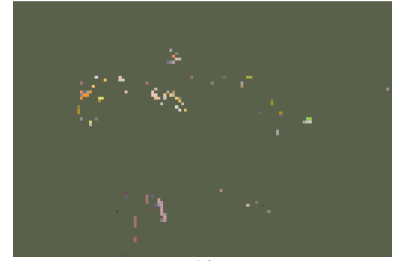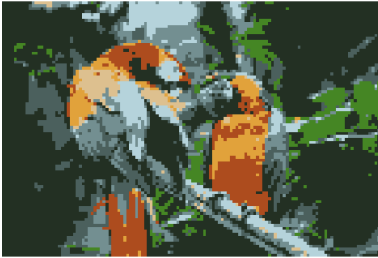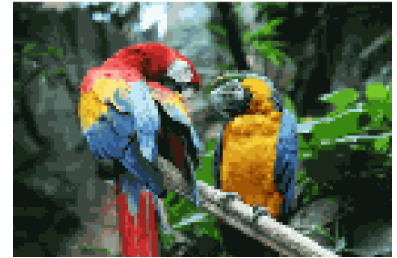sing8.png

sing16.png

sing64.png

comp8.png

comp16.png
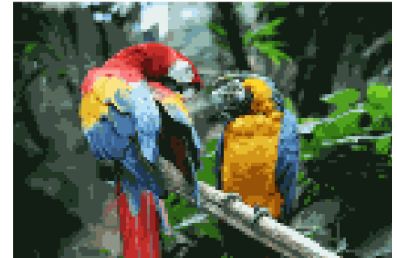
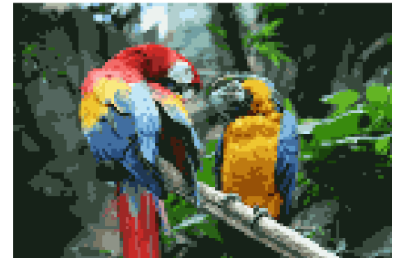comp64.png

avrg8.png

avrg16.png
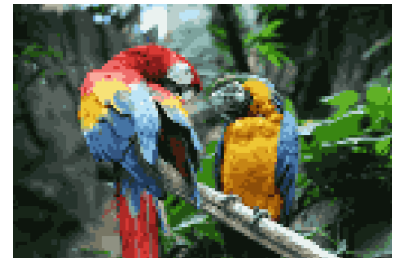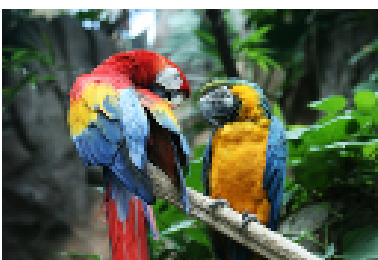
avrg64.png

centr8.png

centr16.png

centr64.png

kmeans8.png

kmeans16.png

kmeans64.png

parrot.jpg

parrot_med.png

parrot_big.png

# 1   Exercise

- *Compare and discuss the results obtained from the four different methods. Are there methods that give perceptively better or worse results? If so, what could be the reason?*

- We have displayed our results for this exercise in the first 4 rows. Even though our algorithm also works for the higher resolutions, we chose the output for the smallest picture since that makes the comparison in exercise 2 easier.

  Most of the methods worked quite well and even though differing degrees of quality loss are recognizable we couldn't pick a single best option from the first 4 rows. An obvious outlier is of course the *single-linkage clustering* where almost nothing of the original picture remains. This is probably because of the *inductive bias* of the *single-linkage clustering* algorithm which prefers long chains over compact clusters. Long chains however are completely unsuited for the given problem since the color vectors are all relatively close to one another and thus we end up with one big cluster that contains almost all vectors. The other clustering algorithms whose *inductive bias* prefers round compact clusters are obviously the better choice here.

  In the 64-bit category *centroid clustering* algorithm produces the best result but in exchange it produces the worst result in the 8 bit category. The *complete linkage* algorithm is the best in the 8 bit category.

# 2   Exercise

- *Compare and discuss the results obtained from k-means with your results above. Is the result from k-means perceptively better or worse? If so, what could be the reason?*

- At least in the 64 bit category the *k-means algorithm* is perceptively better than the other algorithms, it is the only algorithm that actually displays some details from the background of the picture. In exchange the result for the 8 bit category is perceptively worse than the other algorithms. We suppose that this is due to *empty clusters (idle nodes)* which occur quite frequently in the *k-means algorithm*. Because of those the already quite small number of colors available is reduced even further and thus the quality of the image suffers.