Practice 3: Pokemon classification

Image Understanding

Academic year: 2021/22

GROUP 13:

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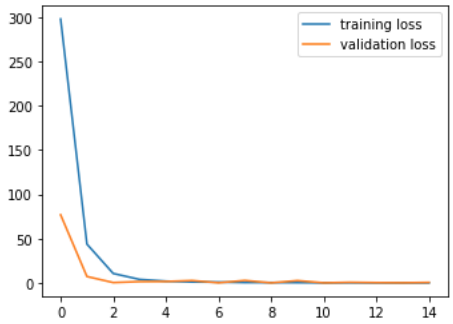
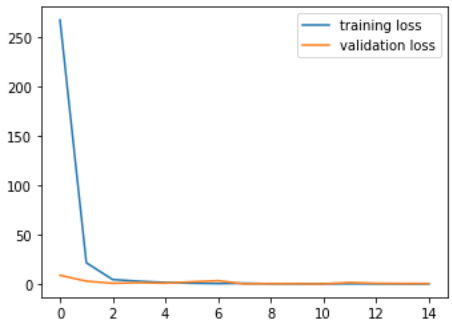
1. Questionnarie

1.1. Check the plots of the losses from both models (with and without data augmentation). Is there any difference?



Without data augmentation



With data augmentation

As it can be appreciated, the training loss is reduced when using data augmentation, as the starting value is 250 and in the other one 300. Besides, it decreases a little more quickly than the one with no data augmentation.
On the other hand, there is a significant difference in the validation loss of one plot and another, since the plot without data augmentation starts around the value 75 and the one with data augmentation is practically 0 during the whole validation phase.

1.2. Can you extract any insight from the precision and recall tables of both models?

	precision	recall	f1-score	support
Bulbasaur	1.00	0.87	0.93	15
Charmander	0.73	0.85	0.79	13
Pikachu	1.00	0.67	0.80	15
Squirtle	0.75	1.00	0.86	15
accuracy			0.84	58
macro avg	0.87	0.84	0.84	58
weighted avg	0.88	0.84	0.84	58

Without data augmentation

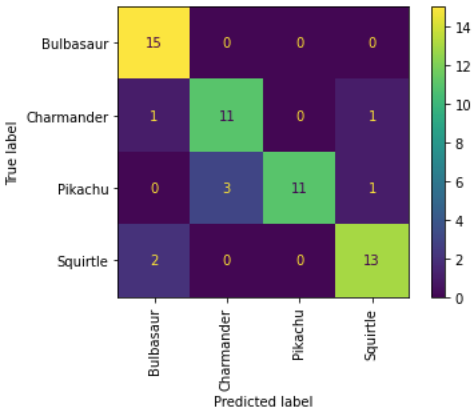
	precision	recall	f1-score	support
Bulbasaur	0.88	1.00	0.94	15
Charmander	1.00	0.77	0.87	13
Pikachu	0.94	1.00	0.97	15
Squirtle	0.87	0.87	0.87	15
accuracy			0.91	58
macro avg	0.92	0.91	0.91	58
weighted avg	0.92	0.91	0.91	58

With data augmentation

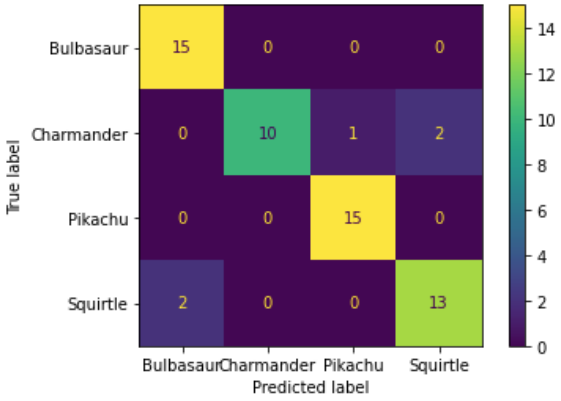
By observing both tables, for Bulbasaur and Pikachu, it can be seen that the model without data augmentation gives a better precision but a worse recall than when using data augmentation. However, for Charmander and Squirtle happens the opposite. This means that without data augmentation, 100% of the pokemons assigned with the labels Bulbasaur or Pikachu are correct but not all Bulbasaurs and Pikachus are assigned the correct label. With data augmentation, the precision value decreases slightly, which means that there are some pokemons being assigned these labels wrongly but as a consequence, 100% of all Bulbasaurs and Pikachus are assigned correctly.
On the other hand, without data augmentation, Charmander and Squirtle have a lower precision and a higher recall, although Charmander doesn't have enough high values for either metric. With data augmentation, all Charmander's labels are assigned correctly, with the downside of having a poorer recall value. However, Squirtle obtains an average of 87% for both metrics.

As a whole, the model with data augmentation works better, as it gives a 92% of precision and 91% of recall values, in contrast with the 87% precision and 84% recall given by the model with no data augmentation.

1.3. Include the confusion matrix generated. What are the differences of this one with respect to the one obtained from the model without data augmentation?



Without data augmentation



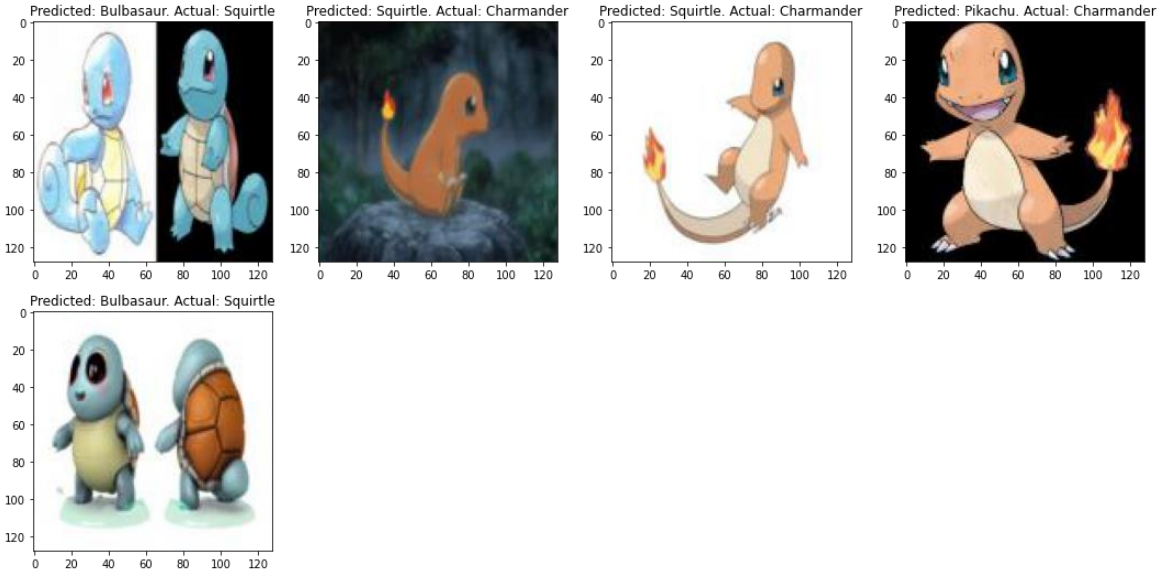
With data augmentation

As it can be seen, for Bulbasaur, there is a 100% of recall in both models, as all 15 Bulbasaurs are labelled correctly and there is a better precision in the model with data augmentation, as there is only 2 wrongly assigned pokemons as Bulbasaur in contrast with the 3 of the other model. For Charmander, the precision value is better in the second model, as the 10 pokemons assigned as Charmander are correctly assigned, in contrast with the 14 pokemons assigned in the first model, where only 11 of them are Charmanders. Looking at the recall values, they are slightly better in the model with no data augmentation (11/13 and 10/13). For Pikachu, there is a 100% of recall in the model with data augmentation but there is less precision. Finally, for Squirtle we can see that both recall and precision values are the same, with the only differences that in the second model it labels wrongly the same pokemon twice and in the first one two different pokemons.

1.4. Check the images that are wrongly classified with both models. Is there any difference? What could be the reason for these differences?

As it can be seen in the images below, in the model without data augmentation, there are 9 pokemons labelled wrongly, in contrast with only 5 of them being assigned incorrectly with data augmentation. For this reason, the second model gives a better performance than the first one.
Moreover, it is noticeable that the first model has difficulties when classifying Pikachus, but all Squirtles are classified correctly. In comparison, the model with data augmentation classifies perfectly all Pikachus and Bulbasaurs and only has problems with Charmanders and Squirtles.

Without data augmentation



With data augmentation