

Énoncé : Peut-on améliorer la qualité de l'image par exemple en ajoutant du bruit sur des images de bonne qualité ?

Méthodologie :

- Identifier les différents types de bruit ;
- Augmenter les données en utilisant des bruits additifs et multiplicatif;
- Étudier l'impact de la data augmentation sur la détection des thrips.

Bruits :

- **Gaussien** : bruit additif suivant la loi normale avec comme moyenne 0 et variance 0.01
- **Poisson** : bruit additif fortement corrélé à l'intensité de chaque pixel.
- **Salt & Pepper** : bruit impulsionnel modifiant un pourcentage de 5% à 40% de pixel aléatoirement

Expériences

Expériences	description	Résultat																														
Baseline	0_thrips -> 462 images AUTRES -> 4120 images Total images: 4582	Rapport par classe (test): <table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0_thrips</td><td>0.8889</td><td>0.3478</td><td>0.5000</td><td>46</td></tr><tr><td>AUTRES</td><td>0.9320</td><td>0.9952</td><td>0.9625</td><td>413</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.9303</td><td>459</td></tr><tr><td>macro avg</td><td>0.9104</td><td>0.6715</td><td>0.7313</td><td>459</td></tr><tr><td>weighted avg</td><td>0.9277</td><td>0.9303</td><td>0.9162</td><td>459</td></tr></tbody></table>		precision	recall	f1-score	support	0_thrips	0.8889	0.3478	0.5000	46	AUTRES	0.9320	0.9952	0.9625	413	accuracy			0.9303	459	macro avg	0.9104	0.6715	0.7313	459	weighted avg	0.9277	0.9303	0.9162	459
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Gaussien	0_thrips -> 817 images AUTRES -> 4120 images Total images: 4937	<table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0_thrips</td><td>0.9535</td><td>0.5000</td><td>0.6560</td><td>82</td></tr><tr><td>AUTRES</td><td>0.9091</td><td>0.9951</td><td>0.9502</td><td>412</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.9130</td><td>494</td></tr><tr><td>macro avg</td><td>0.9313</td><td>0.7476</td><td>0.8031</td><td>494</td></tr><tr><td>weighted avg</td><td>0.9165</td><td>0.9130</td><td>0.9013</td><td>494</td></tr></tbody></table>		precision	recall	f1-score	support	0_thrips	0.9535	0.5000	0.6560	82	AUTRES	0.9091	0.9951	0.9502	412	accuracy			0.9130	494	macro avg	0.9313	0.7476	0.8031	494	weighted avg	0.9165	0.9130	0.9013	494
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Gaussien et Poisson	0_thrips -> 1172 images AUTRES -> 4120 images Total images: 5292	<table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0_thrips</td><td>0.9798</td><td>0.8291</td><td>0.8981</td><td>117</td></tr><tr><td>AUTRES</td><td>0.9536</td><td>0.9952</td><td>0.9739</td><td>413</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.9585</td><td>530</td></tr><tr><td>macro avg</td><td>0.9667</td><td>0.9121</td><td>0.9360</td><td>530</td></tr><tr><td>weighted avg</td><td>0.9594</td><td>0.9585</td><td>0.9572</td><td>530</td></tr></tbody></table>		precision	recall	f1-score	support	0_thrips	0.9798	0.8291	0.8981	117	AUTRES	0.9536	0.9952	0.9739	413	accuracy			0.9585	530	macro avg	0.9667	0.9121	0.9360	530	weighted avg	0.9594	0.9585	0.9572	530
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Salt & Pepper	0_thrips -> 2906 images AUTRES -> 10216 images Total images: 13122	<table><thead><tr><th></th><th>precision</th><th>recall</th><th>f1-score</th><th>support</th></tr></thead><tbody><tr><td>0_thrips</td><td>0.8154</td><td>0.8281</td><td>0.8217</td><td>120</td></tr><tr><td>AUTRES</td><td>0.9814</td><td>0.9797</td><td>0.9806</td><td>1185</td></tr><tr><td>accuracy</td><td></td><td></td><td>0.9650</td><td>1313</td></tr><tr><td>macro avg</td><td>0.8984</td><td>0.9039</td><td>0.9011</td><td>1313</td></tr><tr><td>weighted avg</td><td>0.9652</td><td>0.9650</td><td>0.9651</td><td>1313</td></tr></tbody></table>		precision	recall	f1-score	support	0_thrips	0.8154	0.8281	0.8217	120	AUTRES	0.9814	0.9797	0.9806	1185	accuracy			0.9650	1313	macro avg	0.8984	0.9039	0.9011	1313	weighted avg	0.9652	0.9650	0.9651	1313
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Conclusion: On peut conclure que l'augmentation des données à l'aide d'images bruitées issues d'images de bonne qualité influence progressivement le **F1-score** du modèle de détection des thrips. 0_thrips ->

Références

Yelkuvan, Ahmet Firat. (2025). Analyzing the Side Effects of Blur in Image Classification with Convolutional Neural Networks. 3. 32-37.