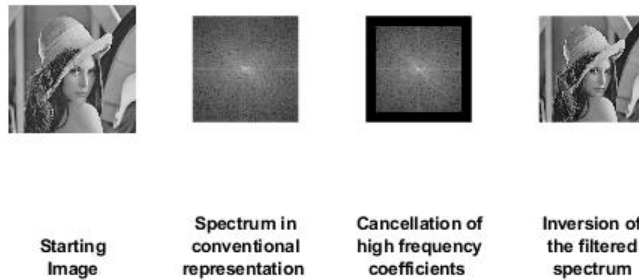


TP 1 : Spectral characterization

I. Frequency filtering

1) 2)

Voici les 3 images que l'on obtient après les diverses transformations et filtrage.

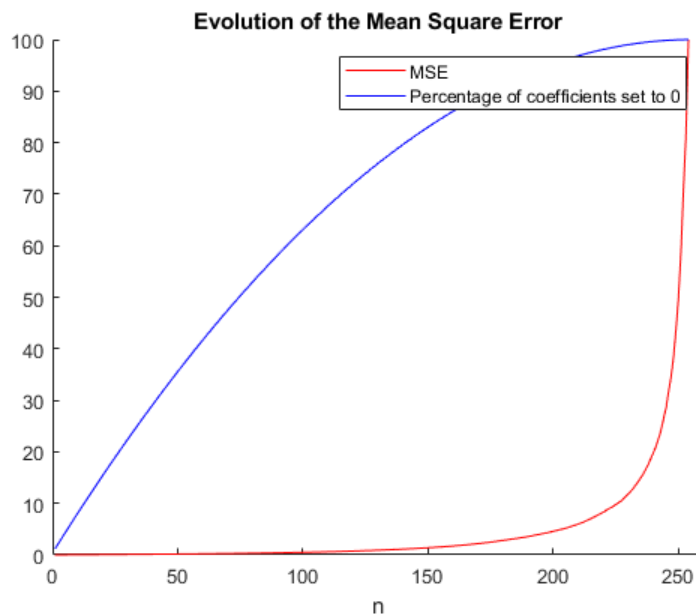


L'erreur quadratique moyenne entre l'image de base et l'image après la transformé inverse est la suivante :

$$\text{rmse} = 3.1142$$

3)

Le graphe sur l'évolution de l'erreur moyenne quadratique est le suivant:



II. Characterization

1)

On commence par établir pour chaque image dans notre base un vecteur de caractéristiques caractérisant la texture. On obtient la matrice 50x18 suivante (pour 50 images et 18 zones prédéfinies ou feature)

1.0e+04 *

Columns 1 through 12

1.8629	0.9761	1.0080	1.0234	0.9963	1.8775	0.9594	0.5016	0.5445
0.5576	0.5239	0.9805						
1.7688	0.9667	1.0251	1.0250	0.9702	1.7741	0.9485	0.5172	0.5611
0.5688	0.5194	0.9466						
1.6397	0.9515	1.0632	1.0904	0.9622	1.6519	0.8538	0.4913	0.5564
0.5696	0.4989	0.8575						
1.7532	0.9663	1.0854	1.0648	0.9613	1.7490	0.9187	0.5135	0.5839
0.5714	0.5075	0.9229						
1.7132	0.8150	0.8531	0.8908	0.8658	1.7724	0.9515	0.4353	0.4443
0.4854	0.4811	1.0034						
1.6978	0.7964	0.8094	0.8254	0.8344	1.7474	0.9431	0.4161	0.4301
0.4705	0.4932	1.0393						
1.6428	0.8009	0.7941	0.8005	0.7933	1.6077	1.0070	0.4738	0.4342
0.4296	0.4271	0.9146						
1.9649	0.9742	0.9514	0.9380	0.9793	1.9702	1.0146	0.5040	0.4800
0.4950	0.5232	1.0200						
1.9409	0.9723	0.9597	0.9412	0.9412	1.9098	0.9964	0.5021	0.4888
0.4765	0.4910	0.9904						
1.7378	0.9086	0.9381	0.9445	0.9131	1.7265	0.9662	0.5129	0.5316
0.5358	0.5211	0.9604						
1.7720	0.9304	0.9552	0.9671	0.9487	1.7804	0.9612	0.5197	0.5408
0.5520	0.5286	0.9701						
1.9313	0.9903	1.0209	1.0355	1.0207	1.9721	1.0385	0.5442	0.5593
0.5808	0.5735	1.0740						
1.7613	1.0161	1.0829	1.0746	1.0079	1.7592	0.9022	0.5223	0.5854
0.5823	0.5209	0.9013						
1.6355	0.8942	0.9574	0.9325	0.8775	1.6585	0.8610	0.4702	0.5185
0.5072	0.5112	0.9196						
1.6649	0.9137	0.9663	0.9607	0.9274	1.6977	0.8276	0.4696	0.5250
0.5363	0.5324	0.8322						
1.2788	0.7272	0.8513	0.8709	0.7320	1.2917	0.7119	0.4114	0.4761
0.4890	0.4078	0.7209						
1.5477	0.8645	0.9279	0.9445	0.8916	1.6033	0.8143	0.4618	0.5057
0.5227	0.4794	0.8375						
1.8358	0.9458	0.9515	0.9475	0.9694	1.8007	0.9527	0.5601	0.5267
0.5266	0.4979	0.9182						
1.7494	0.8955	0.8962	0.8995	0.8990	1.7589	0.8797	0.5172	0.5149
0.5070	0.5150	0.9141						
1.5748	0.8616	0.9368	0.8929	0.8609	1.5840	0.8240	0.4255	0.4861
0.4715	0.4587	0.8695						
1.6973	0.9164	0.9917	0.9990	0.9250	1.7204	0.9173	0.4882	0.5096
0.5213	0.5134	0.9795						
1.7520	0.8757	0.9511	0.9872	0.9050	1.7853	0.9317	0.5017	0.5249
0.5539	0.5211	0.9726						

1.6237	0.8632	0.9042	0.9017	0.8542	1.6168	0.9135	0.4948	0.5208
0.5112	0.4930	0.9060						
1.6119	0.8713	0.9057	0.9030	0.8675	1.6036	0.9245	0.4956	0.5158
0.5127	0.4919	0.9040						
1.7629	0.9126	0.9606	1.0056	0.9209	1.7757	0.9195	0.4818	0.5102
0.5431	0.4864	0.9209						
1.9082	0.9934	1.0339	1.0245	0.9771	1.8881	0.9839	0.5291	0.5581
0.5494	0.5148	0.9628						
1.6212	0.8941	0.9508	0.9760	0.8914	1.6155	0.8563	0.4591	0.4975
0.5146	0.4601	0.8603						
1.8626	0.9586	0.9623	0.9624	0.9418	1.8515	0.9648	0.5027	0.5185
0.5134	0.5002	0.9644						
1.1746	0.6700	0.7682	0.8008	0.6789	1.1895	0.6577	0.3792	0.4272
0.4513	0.3727	0.6680						
1.6934	0.8758	0.8891	0.9082	0.8769	1.6917	0.8955	0.4786	0.4945
0.5048	0.4808	0.8993						
1.5242	0.8158	0.8470	0.8572	0.8264	1.5204	0.8386	0.4608	0.4804
0.5023	0.4682	0.8606						
1.8096	0.9450	0.9882	0.9939	0.9625	1.8326	0.9586	0.5090	0.5455
0.5470	0.5228	0.9853						
1.5285	0.8088	0.8433	0.8533	0.8111	1.5349	0.8879	0.4610	0.4762
0.4842	0.4690	0.8953						
1.5439	0.8627	0.9119	0.9122	0.8552	1.5299	0.8307	0.4869	0.5194
0.5147	0.4769	0.8182						
1.6950	0.9261	0.9693	0.9573	0.9233	1.6938	0.8885	0.4933	0.5445
0.5401	0.4994	0.8901						
1.7837	0.9365	0.9589	0.9465	0.9229	1.7769	0.9680	0.5161	0.5343
0.5211	0.5010	0.9607						
1.5892	0.8792	0.9050	0.9028	0.8845	1.5987	0.8247	0.4872	0.5176
0.5200	0.4790	0.8474						
1.4697	0.7664	0.7702	0.7786	0.7732	1.4584	0.8000	0.4202	0.4301
0.4531	0.4611	0.7944						
1.7394	0.8838	0.9085	0.9174	0.8766	1.7237	0.9478	0.4811	0.4949
0.5034	0.4772	0.9327						
1.7397	0.9081	0.9983	0.9956	0.8987	1.7346	0.9235	0.4980	0.5436
0.5361	0.4906	0.9288						
1.7300	0.9055	0.9666	0.9680	0.9033	1.7192	0.9212	0.4985	0.5244
0.5286	0.5046	0.9468						
1.7729	0.9524	0.9603	0.9817	0.9572	1.7829	0.9462	0.5065	0.5356
0.5454	0.5095	0.9579						
1.6383	0.8702	0.9240	0.9536	0.8893	1.6527	0.9047	0.4793	0.5129
0.5330	0.4955	0.9106						
1.4441	0.7804	0.8467	0.8774	0.8368	1.4306	0.8022	0.4269	0.4522
0.5002	0.4160	0.7446						
1.3991	0.7750	0.8728	0.8991	0.7897	1.3850	0.7930	0.4277	0.4642
0.4921	0.4076	0.7506						
1.4211	0.7904	0.8613	0.9063	0.8353	1.4289	0.7420	0.3953	0.4667
0.5082	0.4247	0.7440						
1.3993	0.7978	0.8683	0.9107	0.8058	1.4078	0.7568	0.4180	0.4669
0.5058	0.4205	0.7504						
1.6663	0.9105	1.0018	1.0063	0.9172	1.6965	0.8894	0.4797	0.5449
0.5475	0.5070	0.8885						
1.8966	0.9713	1.0119	1.0056	0.9377	1.8154	0.9984	0.5163	0.5391
0.5362	0.4960	0.9449						
1.7310	0.9179	1.0149	1.0042	0.9183	1.7186	0.9176	0.4985	0.5440
0.5376	0.4880	0.9156						

Columns 13 through 18

0.9594	0.5016	0.5445	0.5576	0.5239	0.9805
0.9485	0.5172	0.5611	0.5688	0.5194	0.9466
0.8538	0.4913	0.5564	0.5696	0.4989	0.8575
0.9187	0.5135	0.5839	0.5714	0.5075	0.9229
0.9515	0.4353	0.4443	0.4854	0.4811	1.0034
0.9431	0.4161	0.4301	0.4705	0.4932	1.0393
1.0070	0.4738	0.4342	0.4296	0.4271	0.9146
1.0146	0.5040	0.4800	0.4950	0.5232	1.0200
0.9964	0.5021	0.4888	0.4765	0.4910	0.9904
0.9662	0.5129	0.5316	0.5358	0.5211	0.9604
0.9612	0.5197	0.5408	0.5520	0.5286	0.9701
1.0385	0.5442	0.5593	0.5808	0.5735	1.0740
0.9022	0.5223	0.5854	0.5823	0.5209	0.9013
0.8610	0.4702	0.5185	0.5072	0.5112	0.9196
0.8276	0.4696	0.5250	0.5363	0.5324	0.8322
0.7119	0.4114	0.4761	0.4890	0.4078	0.7209
0.8143	0.4618	0.5057	0.5227	0.4794	0.8375
0.9527	0.5601	0.5267	0.5266	0.4979	0.9182
0.8797	0.5172	0.5149	0.5070	0.5150	0.9141
0.8240	0.4255	0.4861	0.4715	0.4587	0.8695
0.9173	0.4882	0.5096	0.5213	0.5134	0.9795
0.9317	0.5017	0.5249	0.5539	0.5211	0.9726
0.9135	0.4948	0.5208	0.5112	0.4930	0.9060
0.9245	0.4956	0.5158	0.5127	0.4919	0.9040
0.9195	0.4818	0.5102	0.5431	0.4864	0.9209
0.9839	0.5291	0.5581	0.5494	0.5148	0.9628
0.8563	0.4591	0.4975	0.5146	0.4601	0.8603
0.9648	0.5027	0.5185	0.5134	0.5002	0.9644
0.6577	0.3792	0.4272	0.4513	0.3727	0.6680
0.8955	0.4786	0.4945	0.5048	0.4808	0.8993
0.8386	0.4608	0.4804	0.5023	0.4682	0.8606
0.9586	0.5090	0.5455	0.5470	0.5228	0.9853
0.8879	0.4610	0.4762	0.4842	0.4690	0.8953
0.8307	0.4869	0.5194	0.5147	0.4769	0.8182
0.8885	0.4933	0.5445	0.5401	0.4994	0.8901
0.9680	0.5161	0.5343	0.5211	0.5010	0.9607
0.8247	0.4872	0.5176	0.5200	0.4790	0.8474
0.8000	0.4202	0.4301	0.4531	0.4611	0.7944
0.9478	0.4811	0.4949	0.5034	0.4772	0.9327
0.9235	0.4980	0.5436	0.5361	0.4906	0.9288
0.9212	0.4985	0.5244	0.5286	0.5046	0.9468
0.9462	0.5065	0.5356	0.5454	0.5095	0.9579
0.9047	0.4793	0.5129	0.5330	0.4955	0.9106
0.8022	0.4269	0.4522	0.5002	0.4160	0.7446
0.7930	0.4277	0.4642	0.4921	0.4076	0.7506
0.7420	0.3953	0.4667	0.5082	0.4247	0.7440
0.7568	0.4180	0.4669	0.5058	0.4205	0.7504
0.8894	0.4797	0.5449	0.5475	0.5070	0.8885
0.9984	0.5163	0.5391	0.5362	0.4960	0.9449
0.9176	0.4985	0.5440	0.5376	0.4880	0.9156

On effectue un test de similarité sur toutes les images de notre base entre elles à l'aide de la distance Manhattan entre les vecteurs des images. L'image avec la distance la plus faible sera la plus ressemblante.

L image 1 ressemble le plus a l image 32
L image 2 ressemble le plus a l image 42
L image 3 ressemble le plus a l image 48
L image 4 ressemble le plus a l image 13
L image 5 ressemble le plus a l image 6
L image 6 ressemble le plus a l image 5
L image 7 ressemble le plus a l image 33
L image 8 ressemble le plus a l image 9
L image 9 ressemble le plus a l image 8
L image 10 ressemble le plus a l image 36
L image 11 ressemble le plus a l image 42
L image 12 ressemble le plus a l image 26
L image 13 ressemble le plus a l image 4
L image 14 ressemble le plus a l image 43
L image 15 ressemble le plus a l image 35
L image 16 ressemble le plus a l image 45
L image 17 ressemble le plus a l image 37
L image 18 ressemble le plus a l image 36
L image 19 ressemble le plus a l image 30
L image 20 ressemble le plus a l image 17
L image 21 ressemble le plus a l image 41
L image 22 ressemble le plus a l image 42
L image 23 ressemble le plus a l image 24
L image 24 ressemble le plus a l image 23
L image 25 ressemble le plus a l image 50
L image 26 ressemble le plus a l image 1
L image 27 ressemble le plus a l image 17
L image 28 ressemble le plus a l image 36
L image 29 ressemble le plus a l image 16
L image 30 ressemble le plus a l image 39
L image 31 ressemble le plus a l image 33
L image 32 ressemble le plus a l image 1
L image 33 ressemble le plus a l image 31
L image 34 ressemble le plus a l image 37
L image 35 ressemble le plus a l image 48
L image 36 ressemble le plus a l image 42
L image 37 ressemble le plus a l image 17
L image 38 ressemble le plus a l image 44
L image 39 ressemble le plus a l image 30
L image 40 ressemble le plus a l image 50
L image 41 ressemble le plus a l image 40
L image 42 ressemble le plus a l image 11
L image 43 ressemble le plus a l image 23
L image 44 ressemble le plus a l image 45
L image 45 ressemble le plus a l image 47
L image 46 ressemble le plus a l image 47
L image 47 ressemble le plus a l image 46
L image 48 ressemble le plus a l image 35
L image 49 ressemble le plus a l image 26
L image 50 ressemble le plus a l image 40