



[ 2.5862616 [ 2.9349616 [ 2.93	the mean vectoriaxis = 0)  mu  82, -0.2736000 09, -0.0112626 51, -0.4189096 98, -0.1214542 3, -0.4494509 92, -0.1520123 82, -0.7707176 14, -0.5864150 31, -0.8299889 77, -0.6305353 73, -0.9092640 89, -0.6893936  econstructed as ature' + str (is a pd. DataFrame)  rel feature2 fill 600 -0.183238 -0 609 -0.331295 -0 6257 -0.208402 -0 629 -0.203351 -0 6257 -0.751676 -0 6257 -0.751676 -0 6257 -0.786242 -0 6265 -0.926393 -0 636  Components fill Comp	089179e+00] 031118e+00] 031118e+00] 031218e+01] 129361e+01] 159395e+01] 048462e+01] 05800e+01] 123145e+01] 928174e+01] 484688e+00] 070917e+00] 43685e+00] 83466e+00] 831558e+00] 75130e+00] 232377e+00] 75130e+00] 232377e+00] 482463e+00] 75130e+00] 23287e+00] 75130e+00] 2377e+00] 482463e+00] 33736e+00] 37452e-01] 133736e+00] 62986e+00] 299105e+00] 29768e+00] 297767e+00] 298190e+00] 29768e+00] 27767e+00] 84733e+00] 657505e+00] 427767e+00] 848492e+00] 751445e+00] 76766e+00] 848492e+00] 87767e+00] 87767e+00] 87767e+00] 87767e+00] 87767e+00] 87767e+00] 87767e+00] 87767e+00] 99105e+00] 99105e+00] 99105e+00] 99105e+00] 99105e+00] 99105e+00] 777790e+00] 777790e+00] 777790e+00] 77790e+00] 7790e+00] 779	, , , , , , , , , , , , , , , , , , ,	onstruction:  0.20211775, 0.3407869, 0.37215633, 0.7360871, 0.79240138, 0.86767611,  be more easiling p.shape[1])]at_cols)  feature6 feature7 feature6 feature7 feature6 feature7 feature8 featu	re7 feature8 4843 -0.808134 3614 -0.938364 2292 -0.944512 7361 -0.802396 4434 -0.786424 9318 -0.633827	feature90.8605490.9969471.0028530.853930	feature82 -0.158315 -0.301530 -0.335829	priginal:
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[-2.9396144] [-2.609227] [-2.475936] [-1.923855] [-1.923855] [-1.923826] [-4.042030] [-1.690498] [-1.8808616] [-4.3835292] [-6.2011465] [-8.833890] [-7.6122025] [-4.3612063] [-1.0000523] [-6.2984073] [-1.3479903]  enow multiply nat = np.dot(Z, inally, we add = np.mean(x, a 2Comp = X_hat + 2Comp  ay([[-0.2515438] 0.002856] [-0.384909] -0.1264859 [-0.412924] -0.1629603, [-0.7073638] -0.6884901] -0.7617653 -0.7602097 [-0.8345277 -0.8091938]  now put the relation of the component of the compone	93e+00, -5.49 48e+00, -5.39 48e+00, -5.39 62e+00, -5.26 76e+00, -5.09 44e+00, -4.97 48e+00, -4.76 50e-01, -4.56 60e-01, -4.36 60e-01, -4.36 60e-01, -4.36 60e-01, -4.36 60e-01, -4.39 60	429901e+00] 304956e+0] 304956e+0] 270488e+00] 659560e+0] 235560e+0] 951942e+0] 966129e+0] 966129e+0] 108289e+0] 27808e+00] 9735539e+0] 810052e+00] 992583e+00] 992583e+00] 992583e+00] 992740e+00] 992740e+00] 992787 -0.3660 31], 41, -0.7862 61], 92, -0.8462 39], 65, -0.9263 6]])  array into i) for i in me (X_2Comp,  feature3 feat 0.145707 -0.40 0.292787 -0.55 0.328648 -0.57 0.172269 -0.42 0.167899 -0.41 0.748252 -0.72 0.751237 -0.73 0.781418 -0.76 0.840858 -0.82 0.920258 -0.90  nts:  ts: = 5) ca_Image5.f  5 principal pd.DataFra  pmponent 2 feat 2.066142 1.243403 0.934175 1.793434	### Teach	onstruction:  0.20211775, 0.3407869, 0.37215633, 0.7360871, 0.79240138, 0.86767611,  be more easiling p.shape[1])]at_cols)  feature6 feature7 feature6 feature7 feature6 feature7 feature8 featu	re7 feature8 4843 -0.808134 3614 -0.938364 2292 -0.944512 7361 -0.802396 4434 -0.786424 9318 -0.633827	feature90.8605490.9969471.0028530.853930	feature82 -0.158315 -0.301530 -0.335829	priginal:
= np.mean(x, a 2Comp = X_hat + 2Comp = X_hat + 2Cond = 2Conp = 2Con	axis = 0)  # mu  82, -0.2736000  99, -0.0112626  51, -0.4189096  98, -0.1214542  3, -0.4494509  92, -0.1520123  82, -0.7707176  14, -0.5864150  31, -0.8299889  77, -0.6305353  73, -0.9092640  89, -0.6893936  ### feature	05, -0.1832 48], 48, -0.3312 21], 93, -0.3660 31], 41, -0.7862 61], 92, -0.8462 39], 65, -0.9263 6 ]])  array into i) for i in me (X_2Comp,  feature3 feat 0.145707 -0.40 0.292787 -0.55 0.328648 -0.57 0.172269 -0.42 0.167899 -0.41 0.748252 -0.72 0.751237 -0.73 0.781418 -0.76 0.840858 -0.82 0.920258 -0.90  nts:  ts: = 5) ca_Image5.f  5 principal pd.DataFra  pmponent 2 principal pd.DataFra  pmponent 2 principal pd.DataFra  1.243403 0.934175 1.793434	3841,, -0 9472,, -0 1536,, -0 4183,, -0 4183,, -0 31 ,, -0 9257,, -0  a dataset to range(X_2Com columns = fe  sure4 feature5 7859 -0.503505 2236 -0.645578 7453 -0.666542 2523 -0.513535 3514 -0.502849 3312 -0.707452 0466 -0.716121 4413 -0.751193 3878 -0.810139 3517 -0.889163	.20211775, .3407869, .37215633, .7360871, .79240138, .86767611,  be more easil p.shape[1])] at_cols)  feature6 featu -0.637913 -0.632 -0.774692 -0.768 -0.789099 -0.782 -0.640971 -0.637 -0.627953 -0.6220.674614 -0.659 -0.685404 -0.670 -0.721667 -0.709 -0.779063 -0.761	feature8  4843 -0.808134  3614 -0.938364  2292 -0.944512  7361 -0.802396  4434 -0.786424   9318 -0.633827	feature90.8605490.9969471.0028530.853930	feature82 -0.158315 -0.301530 -0.335829	feature83
feature0 feature -0.251544 -0.2736 -0.384910 -0.4189 -0.412924 -0.4494 -0.270484 -0.2942 -0.264394 -0.28760.673437 -0.7337 -0.678049 -0.7387 -0.761765 -0.8299 -0.834528 -0.9092  frows × 92 columns  from y PCA of a Image5 =	re1 feature2 (1) 600 -0.183238 -0 609 -0.331295 -0 451 -0.366015 -0 257 -0.208402 -0 629 -0.203351 -0 629 -0.755264 -0 785 -0.755264 -0 785 -0.755264 -0 785 -0.926393 -0 6012	feature3 feat  0.145707 -0.40  0.292787 -0.55  0.328648 -0.57  0.172269 -0.42  0.167899 -0.41   0.748252 -0.72  0.751237 -0.73  0.781418 -0.76  0.840858 -0.82  0.920258 -0.90  nts:  ts: = 5) ca_Image5.f  5 principal pd.DataFra  pmponent 2 principal pd.DataFra  pmponent 2 principal pd.DataFra  pmponent 2 principal pd.DataFra	feature5 7859 -0.503505 2236 -0.645578 7453 -0.666542 2523 -0.513535 3514 -0.502849 3312 -0.707452 0466 -0.716121 4413 -0.751193 3878 -0.810139 3517 -0.889163	feature6 feature6	-0.808134 -0.938364 -0.938364 -0.944512 -0.802396 -0.786424  -0.633827	-0.860549 -0.996947 -1.002853 -0.853930	-0.158315 -0.301530 -0.335829	
-0.834528 -0.9092  Frows × 92 columns  A: 5 Principal  Performing PCA of a Image5 = PCA of incipalComponent  Principal Component  20.37  20.39  19.63  19.50  19.14  -0.76  -0.43  -0.10  -0.00  0.13  Frows × 5 columns  From × 5 columns	Component   Comp	nts:  ts: = 5) ca_Image5.f  pd.DataFra  pmponent 2 2.066142 1.243403 0.934175 1.793434	it_transform(  components:			-0.677592 -0.717415	-0.178923  -0.727898 -0.731067 -0.760723	-0.332678 -0.367658 -0.209008 -0.203939  -0.756673 -0.760273 -0.791442
20.39 19.63 19.50 19.14 -0.76 -0.43 -0.10 -0.00 0.13 rows × 5 columns int ('Explained lained Variation of that, by just according to that, by just according to that, as	17037 14234 14019 10612  11220 16121 100005	1.243403 0.934175 1.793434	orincipal compone	incipalCompon	7307 -0.815257	-0.853883 columns =	-0.896090	-0.851824 -0.932510
int ('Explained lained Variation variation variance. Thus, as		-4.307355 -4.278101 -4.399926 -4.720277 -5.145946	2.17° 1.869 2.17° 1.786 1.419 0.34° 1.17° 1.92° 2.45° 2.634	9856 9761 5875 9552  1723 9899 9312	1.042095 0.312421 -0.441465 0.596892 1.0977762.283421 -2.117358 -2.184990 -2.632512 -3.167513	-0.40 -0.20 -0.14 -1.06 2.61 2.40 1.81	9653 8086 2023 5944 8844  3039 2760 4668 8229	
centered = x - v_matrix = np.c genvalues = pca r eigenvalue, e print("Eigenv print("Eigenv int("Eigenvecto	dding the explain we found earlier ata and compute np.mean(x, ax dot(x_centered a_Image5.explain explain through yalue through	pal compone ned variance for the need throws ting the same xis = 0) d.T, x_cental ained_varial ained_varial Method 1:"	nt: [0.476578 or the first three ee principal com  mple covarian ered)/112 nce_ values, pca_I , np.dot(eige ,eigenvalue)	principal compr ponents to retain ce matrix:	nents, we get ap n 80% of the da	0.04111244 oproximately . ta variance.	0.0294410 <b>82405, or 82</b> .	9]
3.77173489e-02 5.55738706e-02 7.30912149e-02 7.59072856e-02 1.31005288e-01 1.23950983e-01 1.19156359e-01 1.21205135e-01 1.28170567e-01	h Method 2: 44 h Method 1: 24 h Method 1: 7 h Method 2: 7 h Method 1: 3 h Method 2: 3 h Method 2: 3 h Method 2: 2 h Method 2: 2 2 -3.125919286 -4.21165512e -5.88982817e -8.03051844e -1.19993837e -1.30588888e -1.18846960e -1.17781602e -1.25069696e -1.29427861e	4.240240528 4.285896066 4.504687922 .6836031307 .7528247805 .7823441767 .8164193495 .7085806676 .7329822952 e-02 -2.717 -02 -4.8045 -02 -5.2970 -02 -8.1778 -01 -1.3044 -01 -1.2910 -01 -1.1586 -01 -1.2008 -01 -1.3178 -01 -1.2985	18892 250018 702708 68622 953585 822166 460177 361175 72481 31537e-02 -2. 7200e-02 -4.7 0548e-02 -5.9 1869e-02 -8.1 1852e-01 -1.2 2825e-01 -1.1 2402e-01 -1.2 5198e-01 -1.2	5256680e-02 1694426e-02 0540616e-02 8716485e-01 8322340e-01 8669160e-01 0320148e-01 6443397e-01 6912333e-01				
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1.59684428e-01 1.82626702e-01 1.73582517e-01 2.06187899e-01 6.81036311e-02 3.90343260e-02 9.18439047e-02 1.33442388e-01 1.43615070e-01 6.64820818e-02 6.66093289e-03 3.15334649e-03 1.46663276e-02 1.29400119e-01 1.40614531e-01 1.06897224e-02 2.22486631e-01 3.12228328e-01 9.80479294e-04 7.53478069e-02 8.83395279e-02	-1.70898275e1.67167651e1.82953947e1.77945132e4.37461822e- 5.47857037e- 1.16918581e- 1.27006763e- 1.38792554e1.67446230e- 1.94212456e- 8.43511608e- 1.02029622e1.54587418e1.06362542e- 5.41651856e- 2.49464742e- 1.61333525e2.30420642e7.63454219e1.04608003e-	-01 -1.9598 -01 -1.6137 -01 -2.0854 -01 -1.4663 -02 -3.9937 -02 6.7970 -01 1.1705 -01 1.2128 -01 1.2660 -02 -9.4290 -02 1.2283 -03 -2.9383 -02 1.0455 -01 -1.6477 -01 -7.8683 -02 1.0062 -01 2.7223 -01 2.4809 -02 -4.3031 -02 -7.0139 -01 -1.1794	6955e-01 -1.8 1885e-01 -1.7 6918e-01 -2.1 8646e-01 -1.1 7845e-02 -1.3 6018e-02 9.2 0402e-01 1.1 6732e-01 1.2 2267e-01 1.5 5565e-02 1.0 2515e-03 1.9 2523e-02 2.5 7380e-01 -1.6 8355e-02 -7.1 4357e-01 1.5 1394e-01 2.9 4363e-02 -6.3 2133e-02 -8.0 0815e-01 -1.0	6286701e-01 4022001e-01 9840746e-01 1539879e-01 8181383e-02 6846460e-02 9765301e-01 3571475e-01 1893419e-01 0478032e-02 15271577e-02 1050594e-02 4664624e-02] 12103804e-01 6390074e-02 7540745e-01 1872763e-01 7537947e-02 4999184e-02 4609569e-02 9804325e-01				
7.84348790e-02 4.51889506e-03 7.07832892e-02 1.11635900e-02 3.38797073e-02 4.86703321e-02 2.11084195e-02 5.39959445e-02 7.29430706e-02 3.73154799e-02 1.18781731e-01 4.02686454e-02 1.11156881e-01 1.24223584e-01 9.45870864e-02 5.21891103e-02 5.21891103e-02 1.59327257e-01 2.10988969e-02 6.83141974e-02 9.30589203e-02 5.87558838e-03	-3.54309929e- 1.30843521e- 3.02870799e1.93473218e2.47739038e2.49310683e- 3.23053775e- 5.30708366e- 6.25447743e- 2.53444192e- 2.26401721e5.40465910e1.12646137e1.30886157e- 6.37033620e9.61945650e1.01710375e1.07191511e- 6.79158935e- 8.15074671e5.16704781e-	-02 -3.6107 -02 4.5126 -02 1.7207 -02 -3.0015 -02 -6.8903 -02 -4.7447 -02 5.4333 -02 7.1763 -02 5.2441 -02 -5.1654 -01 1.3778 -02 -6.6805 -01 -1.2037 -01 -1.2370 -02 3.4466 -02 -1.8019 -01 5.6448 -02 -5.2539 -02 1.3408 -02 9.1938 -02 -2.4617	8444e-02 -2.3 7337e-02 8.0 7337e-02 7.6 7675e-02 7.6 7161e-02 -8.2 7775e-03 1.4 5052e-02 4.1 3120e-02 8.2 6607e-02 4.7 7499e-03 -9.8 7122e-01 4.0 1111e-02 -9.8 5509e-01 -1.2 7690e-01 -1.1 3579e-02 4.7 6781e-01 -1.9 0910e-02 4.9 3305e-02 -6.6 1081e-01 9.6 3048e-02 4.2 6362e-02 -8.4	8732246e-02 5018952e-02 4880186e-03 9125127e-02 7533322e-02 5579737e-02 5357306e-02 9017374e-02 4412048e-02 2874602e-02 5025996e-02 8235321e-01 4094804e-01] 1167733e-04 9568732e-01 6849104e-02 6527245e-02 5230681e-02 7593090e-02 8684116e-02				
1.28043540e-01 1.17612572e-01 2.67605960e-02 2.01003729e-02 2.54110169e-02 1.28706034e-01 2.12786181e-01 1.28189335e-01 1.89306387e-02 1.47267874e-01 1.19944897e-01 2.13972474e-01 4.86613821e-02 1.24052158e-01 , I print out the fiverent results. I kept	1.27332763e- 9.31275541e1.50586903e- 3.36980846e7.41429906e1.34797467e1.78858687e1.28723956e- 6.23096498e- 1.41223271e- 1.26161302e1.92136460e- 5.82185931e- 1.32783028e-  e eigenvalues tw both in my code	-01 1.2648 -02 5.1540 -02 1.2190 -02 2.8773 -02 -1.1026 -01 -8.2838 -01 -1.6087 -01 2.8083 -02 1.0316 -01 1.6950 -02 1.6347 -01 -1.8987 -02 1.0269 -01 6.6245 vice because I	0945e-01 1.3 3333e-02 3.2 5611e-02 1.2 1632e-02 2.7 6555e-01 -1.2 2677e-02 -9.7 9124e-01 -2.2 2131e-02 4.3 0729e-01 1.3 7718e-01 2.0 2914e-02 -8.8 5154e-01 -1.1 4600e-01 1.0 6947e-02 -7.9 found two differ  d like me to use	4488531e-01 1758195e-02 1393288e-02 2945028e-02 5913555e-01 2189223e-02 8901276e-01 9765174e-02 1452259e-01 5844468e-01 6864264e-02 6831134e-01 9838989e-03]] ent methods to	find the eigen v	uct an array s	imilar to the	original
ass 'numpy.ndarass 'numpy.ndarass 'numpy.ndarass' 1.0420949 [ 2.0377553	nis PCA reconstrutay/matrix of size  mage5.componer  a_Image5.componer  a_Image5.componer	112 x 92 by t 112 x 92 by t 112 x 92 by t 112 x 92 by t 113 x 92 by t 114 x 92 by t 115 x 92 by t 115 x 92 by t 116 x 92 by t 117 x	2.17185986e  2.17185986e  1.86985608e  2.17076106e  1.78687459e  1.41955174e  6.18903144e	eres by the eiger matrix of size 92 eres of si	n vectors and a	dd the mean.	First, we mul	
1.4887972 [ 1.7859338	23e+00, -1.31s 87e+01, 1.17s 20e+00, -9.77s 08e+01, 9.01s 48e+00, -6.81s 21e+01, 5.71s 13e-01, -7.14s 31e+01, 2.73s 33e-01, -8.00s 52e+01, -4.32s 10e-01, -1.01s 32e+00, -6.03s 53e+00, -1.31s 70e+00, -2.12s 87e+00, -1.31s 35e+00, -2.20s 24e-01, -2.06s 25e+00, -2.44s 07e-01, -2.26s	511499e+00] 125063e+00, 188418e-01] 690820e-01, 550081e-01] 603499e-01, 050584e-01] 510178e-01, 793936e-01] 164455e-01, 168041e+00] 712329e+00, 148132e-01] 599529e+00, 239858e+00] 020147e+00, 429239e+00] 141228e+00, 218526e+00]	1.719464066 1.7194640666 1.7194640666 1.7194640666 1.71946666 1.71946666 1.719466666 1.7194666666 1.7194666666666666666666666666666666666666	e-02, e-01, e-01, e+00, e+00, e+00, e+00, e+00, e+00,				
-1.0153174 [ 3.2200273 -1.0087410 [-8.6700585 -3.0508441 [-1.4205323 2.8871571 [-1.9835853 7.4686363 [-2.4227090 9.5409805 [-2.9194123 1.1830011 [-2.9766702 1.1170484 [-3.2447251 1.2045261 [-3.4954593 1.2647706 [-3.6383383	43e+00, -2.24e 73e-01, -2.942 09e+00, -2.50e 54e-01, -2.86e 11e-01, -2.322 77e+00, -2.628 19e-01, -1.832 35e+00, -2.57e 33e-01, -1.24e 06e+00, -2.812 52e-01, -1.008 34e+00, -2.628 10e+00, -7.912 25e+00, -2.382 44e+00, -6.898 17e+00, -7.407 30e+00, -2.256 68e+00, -6.966 36e+00, -2.166	626818e+00] 268187e+00, 420210e+00] 434534e+00, 765874e+00] 803274e+00, 215789e+00] 606366e+00, 615939e+00] 368215e+00, 857111e+00] 894911e+00, 168457e-01] 374764e+00, 523323e-01] 749341e+00, 706549e-01] 703138e+00, 111194e-01] 075382e+00,	'-6.354473756 '-5.185263576 '-3.918304596 '-2.743388296 '-2.070611266 '-1.680452976 '-1.461736876 '-1.582398116 '-1.710854496	x+00, x+00, x+00, x+00, x+00, x+00, x+00, x+00,				
[-3.5346320 1.1887028 [-3.6590719 1.1157650 [-3.6573665 1.2641754 [-3.9323315 1.5474524 [-4.1685143 1.7038705 [-4.2604346 1.7721852 [-4.6543165 1.6877972 [-4.8954833 1.8536160 [-5.1083467 2.0286667 [-5.0640146 1.8526296 [-5.0648278	06e+00, -2.14 83e+00, -8.73 97e+00, -2.16 01e+00, -7.79 55e+00, -2.22 44e+00, -6.41 56e+00, -2.17 47e+00, -6.65 35e+00, -2.29 54e+00, -4.47 62e+00, -3.47 58e+00, -1.83 27e+00, -1.86 03e+00, -1.33 79e+00, -1.66 73e+00, -1.70 61e+00, -2.45 63e+00, -2.45 684e+00, -1.53	756868e+00, 973252e-01] 289448e+00, 984577e-01] 761078e+00, 463855e-01] 394699e+00, 690058e-01] 570612e+00, 552609e-01] 812487e+00, 962497e-01] 292503e+00, 274389e-01] 601261e+00, 198599e-01] 495506e+00, 578296e-01] 259486e+00, 672924e-01] 050334e+00,	-1.530082756 , -1.389407806 , -1.441720716 , -1.522393206 , -1.685940676 , -1.655056786 , -1.715253026 , -1.793077646 , -1.768574636 , -1.677115086 , -1.596276436	2+00, 2+00, 2+00, 2+00, 2+00, 2+00, 2+00, 2+00,				
1.9616335 [-4.8749864 2.0880336 [-4.6626135 2.2175248 [-4.2526331 2.1934863 [-3.5601618 2.0411233 [-2.1519574 2.0259622 [-5.7723785 2.6418727 [ 1.0142816 2.7726143 [ 1.0326023 3.2484333 [-8.8083892 3.0235414 [-1.9258014	57e+00, -5.12: 42e+00, -1.59: 02e+00, 2.87: 56e+00, -1.49: 85e+00, 4.54: 12e+00, -1.51: 32e+00, 5.11: 80e+00, -1.37: 37e+00, 6.60: 47e+00, -8.01: 26e+00, 1.36: 58e-02, 1.53: 75e+00, 2.62: 65e+00, 7.15: 35e+00, 3.04: 75e+00, 2.38: 22e-01, 1.28: 44e+00, 1.69:	113757e-02] 170692e+00, 534502e-01] 006845e+00, 743041e-01] 517045e+00, 701274e-01] 159993e+00, 509809e-01] 112299e-01, 237595e+00] 371310e-01, 404752e+00] 231074e-01, 500311e+00] 044634e-01, 120655e+00] 124799e-01, 599274e+00] 657339e-01,	'-1.646042706 '-1.433132946 '-1.325035296 '-1.368368196 '-1.661951536 '-2.187788026 '-2.367813626 '-2.272317086 '-1.482596256 '-1.339606506	x+00, x+00, x+00, x+00, x+00, x+00, x+00, x+00,				
1.1171511 [ 2.5862616 1.4226438 [ 2.9349616 7.6039914 [ 2.0222882 3.0771713 [ 1.1196006 -5.0676258 [ 2.1537700 -1.3585461 [-8.1849119 -1.1810860 [-8.5157519 -6.4700263 [-2.1422820 -8.5140600 [-2.8715307 -1.6236700 [-2.8365108	12e+00, 5.95; 64e+00, 6.50; 83e+00, 6.54; 62e+00, 8.45; 42e-01, 5.39; 26e+00, 9.76; 34e-01, 3.09; 62e+00, 1.03; 82e-01, 1.25; 03e-01, 1.09; 17e+00, 2.78; 92e-02, 1.10; 02e+00, -7.76; 99e-01, 1.06; 37e-01, -9.31; 00e+00, 1.02; 77e+00, 1.04; 08e+00, -1.00; 81e+00, 9.37;	502911e+00] 089179e+00, 326761e+00] 031118e+00, 727321e+00] 602218e+00, 061326e+00] 129361e+01, 783088e+00] 559395e+01, 581286e-02] 048462e+01, 380645e-01] 058000e+01, 025439e-01] 123145e+01, 751013e-01] 928174e+01, 763880e-01] 484688e+00,	, -3.219824386 , -3.158618886 , -2.212043336 , -5.991388386 , 8.534063426 , 4.030676976 , 1.168619786 , 1.605678696 , 1.815625556	x+00, x+00, x+00, x-01, x-02, x-01, x+00, x+00,				
-1.1841110 [-3.3960634 -1.2535517 [-3.8996935 -1.5165461 [-4.2777607 -1.6819495 [-4.6025764 -1.5506252 [-5.1367049 -1.7638047 [-5.3634262 -2.2906233 [-5.5477332 -2.4017801 [-5.7814755 -2.0773294 [-5.8987747 -1.6620857 [-6.0628978	02e+00, 1.023 42e+00, 8.104 78e+00, 5.093 95e+00, 8.283 15e+00, 2.293 70e+00, 8.393 95e+00, 5.683 41e+00, 8.213 20e+00, 2.013 90e+00, 8.173 74e+00, -1.303 22e+00, 8.766 36e+00, -6.214 24e+00, 8.893 19e+00, -1.013 57e+00, 8.523 47e+00, -1.655 72e+00, 8.083 71e+00, -2.183 85e+00, 7.683	367687e+00] 436885e+00, 323924e-01] 874661e+00, 370119e-01] 769656e+00, 924012e-02] 836466e+00, 163741e-03] 831558e+00, 274513e-01] 630342e+00, 442323e-01] 232377e+00, 748465e+00] 535515e+00, 958828e+00] 775130e+00, 928701e+00]	7.74005559e 7.74005599 7.74005599 7.74005599 7.74005599 7.74005599 7.74005599 7.74005599 7.74005599 7.74005599 7.74005599 7.74005599 7.74005599 7.74005599 7.7400599 7.74005599 7.74005599 7.74005599 7.7400599 7.7400599 7.7400599 7.7400599 7.74006311e 7.74006311e 7.74006311e 7.74006315e 7.74006315e 7.74006399 7.7400	e-01, e-01, e-01, e-01, e-01, e+00, e+00, e+00,				
-2.4336043 [-6.4972205 7.6211226 [-6.4329173 1.7763841 [-5.0759605 2.9473613 [-4.0865141 3.9182942 [-3.8317396 3.5046638 [-4.4884182 3.1294473 [-4.5759146 3.0158589 [-4.3907470 2.8124520 [-4.2119833 2.6972122 [-4.1578414	35e-01, -2.85; 55e+00, 5.17; 65e-01, -3.08; 34e+00, 3.94; 18e+00, -3.31; 56e+00, 2.73; 35e+00, -3.18; 18e+00, -1.12; 69e+00, -1.35; 88e+00, 1.98; 29e+00, -2.23; 36e+00, 4.03; 65e+00, -2.45; 93e+00, -2.79; 07e+00, 1.61; 33e+00, -3.05; 20e+00, 4.58; 45e+00, -3.27;	545169e+00] 323881e+00, 834709e+00] 792254e+00, 189580e+00] 762986e+00, 808218e+00] 307452e-01, 757405e+00] 133736e+00, 376067e-01] 616727e+00, 045346e-01] 298190e+00, 359576e-01] 299105e+00, 074963e-01] 429768e+00, 487077e-02] 550962e+00,	6.749071926 8.390766796 2.755507536 3.051315356 3.155631746 2.504985746 2.304255846 2.552033666 2.694181466	x-01, x-01, x+00, x+00, x+00, x+00, x+00, x+00,				
1.9348947 [-3.6817783 1.2691100 [-3.7205527 6.3610256 [-4.1374448 4.0488377 [-3.7743161 -3.9843058 [-1.8615488 -1.2163356 [2.2088200 8.1206029 [5.7948018 1.4341138 [3.9218819 5.1302694 [1.6849955 -6.8242868 [-1.0768427	77e+00, 4.863 33e+00, -3.884 00e+00, 3.663 77e+00, -4.352 65e-01, 1.913 85e+00, -4.79 76e-02, 1.556 18e+00, -5.068 52e-01, -2.763 58e+00, -4.778 66e-01, -8.668 08e+00, -3.753 99e-01, -1.054 85e+00, -3.534 48e-01, 3.342 54e+00, -4.383 58e-01, 5.620 76e-01, -5.038	578792e-01] 484733e+00, 152390e-01] 277671e+00, 131957e-01] 076706e+00, 604446e-01] 848492e+00, 582007e-01] 812771e+00, 827117e-01] 789564e+00, 445789e+00] 867505e+00, 018675e-01] 419176e+00, 252588e-01] 751445e+00, 085241e-02] 523643e+00,	2.843767726 2.888593286 2.389553216 2.789057456 4.260444296 7.708614716 1.017915966 8.048162406 5.834236736	x+00, x+00, x+00, x+00, x+00, x+01, x+00, x+00,				
[-1.3018392 -2.6999319 [-2.1591210 -2.9940065 [-2.9090715 -3.0461930 [-2.9396149 -3.2243940 [-2.6092274 -3.3282515 [-2.4759360 -3.2857932 [-1.9283857 -3.2857932 [-1.5547584 -3.2251198 [-1.1223624 -3.0645439 [-4.0420305 -2.9347379	28e+00, -5.52e 96e+00, -6.60 01e+00, -5.66s 52e+00, -3.15s 51e+00, -5.58s 05e+00, -2.77s 93e+00, -5.49e 09e+00, -2.64s 48e+00, -5.39s 57e+00, 6.09e 02e+00, -5.26s 22e+00, 1.89s 76e+00, -5.09e 47e+00, 2.55e 44e+00, -4.97s 85e+00, 4.50s 93e+00, 5.72e 93e+00, 8.44s	627588e+00, 759458e-01] 333965e+00, 149613e-01] 966823e+00, 351456e-01] 429901e+00, 355048e-01] 304956e+00, 411105e-02] 270488e+00, 308079e-01] 659560e+00, 193235e-01] 951942e+00, 062322e-01] 680769e+00, 272389e-01]	3.03277514e  1.47580740e  1.47580740e  -1.63403161e  -5.62202659e  -9.36575330e  -1.15123011e  -1.07003460e  -7.98716434e  -5.55484600e  -1.04311415e	x+00, x-01, x-01, x-01, x+00, x+00, x-01, x-01, x-02,				
[-1.8808616 -2.7496444 [-4.3835292 -2.7602495 [-6.2011465 -2.7804038 [-8.8338906 -2.6125071 [-7.6122029 -2.2834214 [-4.3612063 -2.1173575 [-1.0000523 -2.1849898 [-6.2984073 -2.6325124 [1.3479903 -3.1675127	66e-01, -4.380 47e+00, 1.75 21e-01, -4.383 50e+00, 2.083 54e-01, -4.462 87e+00, 2.358 66e-01, -4.413 13e+00, 2.630 94e-01, -4.30 46e+00, 2.613 34e-01, -4.278 50e+00, 2.402 30e-01, -4.39 89e+00, 1.816 36e-03, -4.720 45e+00, 1.228 34e-01, -5.143 75e+00, 6.003	038472e+00, 789356e+00] 108289e+00, 594540e+00] 227808e+00, 893712e+00] 367525e+00, 079366e+00] 735539e+00, 303947e+00] 810052e+00, 276010e+00] 992583e+00, 466817e+00] 027740e+00, 822861e+00] 594622e+00, 169881e-01]	2.083127476 , 1.093394106 , -1.377085176 , -1.504006226 , 3.417226416 , 1.170898646 , 1.920312306 , 2.451340336 , 2.634112256 ])	e-02, e-01, e-01, e-01, e+00, e+00, e+00,	92) to get a	112 by 92	matrix, a:	s we orig.
inally, we add = np.mean(x, a 2Comp = X_hat + 2Comp  ay([[-0.4298820 -0.1338013 [-0.4639484 -0.1726190 [-0.3749212 -0.0990356, [-0.2529938 -0.2778987 [-0.3049588 -0.3075534 [-0.3678996	the mean vectors axis = 0) mu  02, -0.4385306 73, -0.0711746 44, -0.4712956 04, -0.1062173 23, -0.3686428 61, -0.0447466 89, -0.2948468 78, -0.3027306 89, -0.3160733 49, -0.2775763	64, -0.3332 03], 05, -0.3644 19], 84, -0.2626 02], 56, -0.3304 48], 33, -0.3276 29], 84, -0.3381	0312,, -0 7563,, -0 6244,, -0 9104,, -0	.37738821, .41678739, .3190517, .18955217,				
### at_cols = ['featonstructed2df constructed2df feature0 feature0 -0.429882 -0.4385 -0.463948 -0.4712 -0.374921 -0.36866 -0.507554 -0.50876	rel feature2 1  531 -0.333203 -0  295 -0.364476 -0  643 -0.262662 -0  891 -0.280858 -0  789 -0.396509 -0	i) for i in me (X_2Comp, feature3 feature3 feature3 -0.47	range (X_2Com columns = fe cure4 feature5 4224 -0.545036 6502 -0.617949 8683 -0.575073 2618 -0.542338 5376 -0.500393 	p.shape[1])] at_cols)  feature6 feature6 -0.577199 -0.543 -0.674183 -0.645 -0.658107 -0.636 -0.612370 -0.590 -0.482588 -0.447	feature8  3760 -0.692205  5840 -0.842838  -0.885505  0109 -0.746802  -0.583769	feature90.7936540.9697721.0425010.8366220.692503	feature82 -0.113978 -0.221948 -0.241314 -0.173686 -0.031876	feature83 1 -0.209728 -0.296091 -0.277718 -0.231942
-0.176800 -0.2446 -0.252994 -0.2948 -0.304959 -0.3160 -0.367900 -0.3505 rows × 92 columns  A: 10 Principa  erforming PCA callinger of the property of the principal components incipal components	685 -0.303290 -0.303290 -0.330422 -0.330422 -0.3327691 -0.513 -0.338180 -0.513 -0.5	0.373979 -0.52 0.372420 -0.50 0.344673 -0.45 0.332509 -0.42 ents: s = 10) pca_Image10	.fit_transfor	-0.919488 -0.957 -0.823794 -0.845 -0.725661 -0.734 -0.642413 -0.640 m (x)	7978 -1.035750 5876 -0.969688 4866 -0.928815	-1.056236 -1.052434 -1.084085	-1.031458 -0.935727 -0.845905	-0.820098 -0.768009 -0.710204 -0.662890
principal principal component cor 1 20.377553 20.397037 19.634234 19.504019 19.1406120.761220	principal principal composition   2	ricipal prin composition of the principal compositi	cipal princip componer 4  2095 -0.45965 2421 -0.40808 1465 -0.20202 6892 -0.14594 3421 2.61303	rincipalComposition of the principal component of the principal composition of the	principal	principal	principal	principal component 10 -0.108334 0.420729 0.966031 0.279973 0.150311 0.145336 -0.012006
-0.100005 - -0.006298 - 0.134799 - rows × 10 columns	4.399926 1.92 4.720277 2.45 5.145946 2.63  Variation per principer per per per per per per per per per	20312 -2.18 51340 -2.63 34112 -3.16 r principal pal compone 528 0.00688	4990 1.81466 2512 1.22822 7513 0.60017 component: { nt: [0.476578 879]	0.897790 0.942698 0.1.027396	-2.241633 -1.586575 -0.816982	-0.034915 -0.233885 -0.507028	0.420666 0.325016 0.343545	-0.115195 -0.124156 -0.445227
	Total Colored   Total Colore	March   Marc	1999   1999	Column	March   Marc	Column		

