# ENCRYPTION METRICS

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000200\_00\_000100\_000171** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0093366164 | -0.0088208809 | | 0.0265645431 | 7.9998168248 | 7.9998098544 | 7.9997920839 | 7.9999289838 | 99.6056857639 | 33.3797984182 |
| **2** | 0.0130479854 | 0.0309011523 | | -0.0197864653 | 7.9998155520 | 7.9997981205 | 7.9997579220 | 7.9999278335 | 99.6095558449 | 33.3709246777 |
| **3** | -0.0242558080 | -0.0228771245 | | 0.0105524921 | 7.9998064064 | 7.9998179016 | 7.9998023201 | 7.9999359538 | 99.6084707755 | 33.4364692549 |
| **4** | -0.0181681346 | 0.0025707085 | | 0.0136506625 | 7.9997974592 | 7.9997918488 | 7.9997907886 | 7.9999355525 | 99.6085431134 | 33.3957617046 |
| **5** | -0.0035522414 | -0.0195617396 | | -0.0413520283 | 7.9998002793 | 7.9997704106 | 7.9998094342 | 7.9999248214 | 99.6116174769 | 33.3788309334 |
| **6** | -0.0004951817 | 0.0267107271 | | -0.0001577695 | 7.9997619074 | 7.9998006547 | 7.9998150057 | 7.9999273257 | 99.6095196759 | 33.3850752598 |
| **7** | -0.0217167645 | 0.0143785617 | | 0.0248808345 | 7.9997983128 | 7.9998398132 | 7.9997977582 | 7.9999339438 | 99.6173683449 | 33.3860047318 |
| **8** | -0.0183752992 | -0.0086175870 | | 0.0083507687 | 7.9998074138 | 7.9997623684 | 7.9998076921 | 7.9999283304 | 99.6145471644 | 33.3802028016 |
| **9** | -0.0175506504 | 0.0024935040 | | 0.0064022106 | 7.9998110947 | 7.9998078095 | 7.9998200487 | 7.9999438551 | 99.6105685764 | 33.3724518598 |
| **10** | 0.0187356834 | -0.0088916022 | | 0.0041572312 | 7.9997874747 | 7.9997654890 | 7.9998293584 | 7.9999255374 | 99.6113642940 | 33.3889850558 |
| **11** | -0.0242910277 | -0.0095460119 | | 0.0000438740 | 7.9997852825 | 7.9998288990 | 7.9997910454 | 7.9999448706 | 99.6142578125 | 33.3942357991 |
| **12** | -0.0272320850 | 0.0231454830 | | 0.0216961751 | 7.9998080903 | 7.9998010753 | 7.9998071075 | 7.9999351781 | 99.6118344907 | 33.4079134895 |
| **13** | -0.0106346216 | -0.0043336494 | | 0.0412341157 | 7.9997647943 | 7.9997932143 | 7.9997988741 | 7.9999262730 | 99.6087962963 | 33.3953449812 |
| **14** | -0.0014126143 | 0.0166971384 | | -0.0127127976 | 7.9997989355 | 7.9997770091 | 7.9997936884 | 7.9999394976 | 99.6043836806 | 33.3732271525 |
| **15** | -0.0144835824 | -0.0083323024 | | -0.0474169891 | 7.9998184980 | 7.9998079139 | 7.9998185856 | 7.9999416896 | 99.6111111111 | 33.4071058574 |
| **16** | 0.0217752027 | -0.0066384354 | | -0.0163465194 | 7.9998006885 | 7.9997980698 | 7.9998013587 | 7.9999306358 | 99.6099175347 | 33.4082320602 |
| **17** | -0.0104083076 | 0.0220444213 | | -0.0498908491 | 7.9997895657 | 7.9997893922 | 7.9998299224 | 7.9999391278 | 99.6089771412 | 33.3752831109 |
| **18** | -0.0283635372 | 0.0238933951 | | 0.0761407415 | 7.9997861736 | 7.9998409447 | 7.9998242994 | 7.9999419685 | 99.6118344907 | 33.3847147047 |
| **19** | 0.0141422337 | -0.0101314441 | | 0.0238470539 | 7.9998115121 | 7.9997884412 | 7.9997699309 | 7.9999243060 | 99.6103153935 | 33.3914234125 |
| **20** | 0.0092575577 | -0.0331063888 | | -0.0584100735 | 7.9998188896 | 7.9998295854 | 7.9997733468 | 7.9999323928 | 99.6069878472 | 33.3870554761 |
| **21** | -0.0405007682 | -0.0097206048 | | 0.0269426151 | 7.9997793852 | 7.9998083858 | 7.9997992722 | 7.9999256837 | 99.6093750000 | 33.3743417245 |
| **22** | 0.0075490115 | 0.0046055063 | | 0.0557217498 | 7.9997870567 | 7.9997868028 | 7.9998061645 | 7.9999228041 | 99.6095196759 | 33.4072901064 |
| **23** | -0.0074014879 | -0.0276218127 | | -0.0229709556 | 7.9998049247 | 7.9997668676 | 7.9998279074 | 7.9999409925 | 99.6102792245 | 33.3832695057 |
| **24** | 0.0053248800 | -0.0193271357 | | 0.0144233205 | 7.9997843391 | 7.9997883229 | 7.9997987420 | 7.9999281274 | 99.6080367477 | 33.4002787139 |
| **25** | 0.0249141027 | 0.0121491065 | | 0.0093409791 | 7.9998152769 | 7.9998343823 | 7.9997655855 | 7.9999373449 | 99.6095196759 | 33.3930630730 |
| **26** | 0.0226595803 | -0.0141464220 | | 0.0355028089 | 7.9998052750 | 7.9997734707 | 7.9998046784 | 7.9999299454 | 99.6123408565 | 33.3949177617 |
| **27** | 0.0210283591 | -0.0178756561 | | 0.0158436572 | 7.9998047081 | 7.9998180505 | 7.9997852852 | 7.9999293502 | 99.6105685764 | 33.3752507716 |
| **28** | -0.0069278425 | -0.0154372862 | | -0.0018844837 | 7.9997937869 | 7.9997974855 | 7.9997807393 | 7.9999310545 | 99.6072048611 | 33.3873024181 |
| **29** | -0.0146444703 | 0.0076022739 | | 0.0597825893 | 7.9997927603 | 7.9997801041 | 7.9998022642 | 7.9999352553 | 99.6041304977 | 33.3794676493 |
| **30** | -0.0180305519 | -0.0086229689 | | 0.0299526850 | 7.9998026616 | 7.9997785705 | 7.9997901251 | 7.9999264516 | 99.6071686921 | 33.3930076139 |
| **31** | 0.0042772639 | 0.0163146545 | | 0.0624992570 | 7.9997844136 | 7.9998204715 | 7.9998071841 | 7.9999416744 | 99.6055410880 | 33.3849683131 |
| **32** | -0.0056475594 | 0.0239455610 | | 0.0095127935 | 7.9997806849 | 7.9997979877 | 7.9997996133 | 7.9999304743 | 99.5995008681 | 33.4047733127 |
| **33** | -0.0248125539 | 0.0070597666 | | 0.0036431029 | 7.9998067837 | 7.9997497279 | 7.9998139866 | 7.9999317558 | 99.6064091435 | 33.4114198949 |
| **34** | -0.0190264918 | -0.0007127844 | | -0.0065825763 | 7.9997863907 | 7.9997814585 | 7.9998099222 | 7.9999279002 | 99.6061921296 | 33.3780970577 |
| **35** | -0.0329318771 | 0.0056372792 | | 0.0223042622 | 7.9997892998 | 7.9998052211 | 7.9998184573 | 7.9999340667 | 99.6123046875 | 33.4107624705 |
| **36** | -0.0123415687 | 0.0003165321 | | -0.0141805529 | 7.9997966087 | 7.9998162102 | 7.9997759072 | 7.9999375348 | 99.6117259838 | 33.3748618487 |
| **37** | 0.0121246434 | 0.0396864057 | | 0.0155611695 | 7.9998240915 | 7.9997929576 | 7.9998032698 | 7.9999334645 | 99.6140769676 | 33.3883299008 |
| **38** | -0.0001296648 | -0.0031566982 | | -0.0166631909 | 7.9998091837 | 7.9998284213 | 7.9997902449 | 7.9999307986 | 99.6064091435 | 33.3942992012 |
| **39** | -0.0035391620 | -0.0101653015 | | -0.0012948000 | 7.9998279025 | 7.9998195918 | 7.9998157567 | 7.9999384075 | 99.6032624421 | 33.3741702410 |
| **40** | 0.0087547245 | 0.0238386147 | | 0.0037002166 | 7.9997947871 | 7.9998135658 | 7.9997839205 | 7.9999402488 | 99.6046730324 | 33.4017755424 |
| **41** | 0.0227777863 | 0.0510644161 | | 0.0028625496 | 7.9997896711 | 7.9998052348 | 7.9998027365 | 7.9999356937 | 99.6107132523 | 33.3727793664 |
| **42** | 0.0063078207 | -0.0053812706 | | -0.0072290487 | 7.9998078793 | 7.9997985701 | 7.9997797106 | 7.9999405243 | 99.6055410880 | 33.3659852714 |
| **43** | 0.0405222293 | 0.0173626128 | | -0.0092041326 | 7.9998237156 | 7.9998064456 | 7.9998178424 | 7.9999430959 | 99.6005135995 | 33.3800879119 |
| **44** | -0.0097466009 | 0.0213699324 | | -0.0187957547 | 7.9998033655 | 7.9997838473 | 7.9998117888 | 7.9999310405 | 99.6092303241 | 33.3734918244 |
| **45** | -0.0088325375 | -0.0166863254 | | 0.0426662075 | 7.9997941672 | 7.9998151704 | 7.9997938119 | 7.9999391820 | 99.6108217593 | 33.3930881786 |
| **46** | -0.0026803782 | -0.0405103708 | | -0.0038546694 | 7.9998202484 | 7.9998199193 | 7.9998078772 | 7.9999389153 | 99.6073495370 | 33.3808288796 |
| **47** | 0.0178720103 | -0.0253062065 | | -0.0223486799 | 7.9997902142 | 7.9997745268 | 7.9998106918 | 7.9999369895 | 99.6063006366 | 33.3720262005 |
| **48** | 0.0049330433 | -0.0170390591 | | -0.0003176536 | 7.9998194885 | 7.9997902345 | 7.9997948804 | 7.9999322434 | 99.6082537616 | 33.4012583969 |
| **49** | 0.0023136084 | 0.0270345507 | | -0.0004653855 | 7.9997805566 | 7.9998051294 | 7.9998090183 | 7.9999394165 | 99.6071325231 | 33.3989189020 |
| **50** | 0.0001234121 | -0.0341168738 | | 0.0447972822 | 7.9998081350 | 7.9998218681 | 7.9997928356 | 7.9999436371 | 99.6116174769 | 33.4075519415 |
| **Total** | -0.1403556157 | 0.0141383608 | | 0.3407125728 | 399.9899929172 | 399.9899978182 | 399.9900307912 | 399.9967021506 | 4980.4413700810 | 1669.4567047362 |
| **Average** | -0.0028071049 | 0.0002827672 | | 0.0068141460 | 7.9997998583 | 7.9997999564 | 7.9998006158 | 7.9999340430 | 99.6088274016 | 33.3891340947 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000200\_01\_000226\_000268** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0283610744 | -0.0210601020 | | 0.0354424956 | 7.9997881258 | 7.9997920037 | 7.9997942073 | 7.9999289664 | 99.6033347801 | 33.3595962691 |
| **2** | -0.0083305160 | -0.0227645384 | | -0.0018321238 | 7.9998335101 | 7.9998225987 | 7.9997881826 | 7.9999416675 | 99.6052879051 | 33.3932688816 |
| **3** | -0.0118455768 | -0.0138430152 | | 0.0040730313 | 7.9997991619 | 7.9997788712 | 7.9997950506 | 7.9999314231 | 99.6103877315 | 33.3485521060 |
| **4** | 0.0031668685 | 0.0021798826 | | 0.0153530626 | 7.9998018657 | 7.9998110288 | 7.9998216750 | 7.9999431064 | 99.6091218171 | 33.3797805465 |
| **5** | 0.0198746496 | 0.0130502037 | | 0.0182732843 | 7.9998134202 | 7.9997791664 | 7.9997945249 | 7.9999318587 | 99.6104600694 | 33.3854224821 |
| **6** | 0.0050555743 | 0.0173594794 | | -0.0241756202 | 7.9997905178 | 7.9998131227 | 7.9998123676 | 7.9999332400 | 99.6137514468 | 33.3871882376 |
| **7** | -0.0410468784 | -0.0088732544 | | -0.0399803934 | 7.9997801342 | 7.9997788177 | 7.9998123600 | 7.9999286799 | 99.6127748843 | 33.4077405876 |
| **8** | -0.0009913175 | -0.0040442039 | | -0.0343401751 | 7.9998465098 | 7.9997934682 | 7.9997875403 | 7.9999386838 | 99.6154152199 | 33.3961744565 |
| **9** | 0.0064221523 | -0.0285751574 | | 0.0446506130 | 7.9997977949 | 7.9997907041 | 7.9998324997 | 7.9999319585 | 99.6029369213 | 33.3976056134 |
| **10** | -0.0079119096 | -0.0206737169 | | -0.0130051738 | 7.9997861372 | 7.9998197081 | 7.9998022109 | 7.9999334930 | 99.6112196181 | 33.3954295173 |
| **11** | 0.0267643860 | 0.0115943241 | | 0.0056858078 | 7.9997768279 | 7.9998208568 | 7.9998055175 | 7.9999334269 | 99.6083984375 | 33.3822247186 |
| **12** | 0.0111576414 | -0.0077842737 | | -0.0457712520 | 7.9997944246 | 7.9998332456 | 7.9997688174 | 7.9999350078 | 99.6059751157 | 33.3897688589 |
| **13** | 0.0022267906 | -0.0025038562 | | -0.0016618104 | 7.9998228394 | 7.9997969725 | 7.9998205483 | 7.9999318754 | 99.6078559028 | 33.3830273863 |
| **14** | 0.0011615923 | -0.0224562138 | | -0.0056882280 | 7.9997822877 | 7.9997790699 | 7.9997934012 | 7.9999262527 | 99.6142216435 | 33.3893338383 |
| **15** | -0.0044304624 | -0.0135419261 | | 0.0077252043 | 7.9997683876 | 7.9998074614 | 7.9997736890 | 7.9999355328 | 99.6047815394 | 33.3734318264 |
| **16** | 0.0146989631 | 0.0127095062 | | -0.0346143630 | 7.9998216861 | 7.9997806919 | 7.9998070540 | 7.9999390346 | 99.6120515046 | 33.3684497265 |
| **17** | -0.0007936412 | -0.0220612826 | | -0.0264311885 | 7.9998071569 | 7.9998136032 | 7.9998121079 | 7.9999421818 | 99.6116536458 | 33.3629151632 |
| **18** | -0.0176190697 | -0.0151317624 | | -0.0539946964 | 7.9997913775 | 7.9997812944 | 7.9997687258 | 7.9999315501 | 99.6086154514 | 33.4275001986 |
| **19** | 0.0131347884 | -0.0202216403 | | -0.0086580297 | 7.9997791279 | 7.9998148323 | 7.9997900045 | 7.9999349098 | 99.6121600116 | 33.4116486815 |
| **20** | 0.0111573001 | -0.0077601463 | | -0.0036930148 | 7.9997828632 | 7.9997848867 | 7.9998237281 | 7.9999319890 | 99.6100622106 | 33.3730972279 |
| **21** | -0.0045647372 | -0.0196072768 | | -0.0296495749 | 7.9997826775 | 7.9997765294 | 7.9998059175 | 7.9999271981 | 99.6080367477 | 33.3930722926 |
| **22** | -0.0020734847 | -0.0436115006 | | 0.0451358165 | 7.9998074030 | 7.9997971616 | 7.9998195969 | 7.9999401283 | 99.6031177662 | 33.3947326616 |
| **23** | -0.0233946290 | -0.0121794758 | | -0.0488241846 | 7.9997678162 | 7.9997889774 | 7.9997893365 | 7.9999289803 | 99.6169704861 | 33.3761924417 |
| **24** | -0.0313360897 | 0.0408130142 | | -0.0259160811 | 7.9997793514 | 7.9997852000 | 7.9998137585 | 7.9999242090 | 99.6137876157 | 33.3817813294 |
| **25** | 0.0228248384 | -0.0018433860 | | -0.0103899522 | 7.9998036371 | 7.9998166517 | 7.9998129896 | 7.9999397858 | 99.6128110532 | 33.3819845849 |
| **26** | -0.0006616863 | -0.0137381344 | | -0.0220878790 | 7.9998137121 | 7.9997973869 | 7.9998095524 | 7.9999347904 | 99.6068070023 | 33.4064285755 |
| **27** | -0.0111020622 | -0.0173047683 | | -0.0194145718 | 7.9998108773 | 7.9997683034 | 7.9998000392 | 7.9999304985 | 99.6106409144 | 33.4002041065 |
| **28** | -0.0072158670 | 0.0317648604 | | -0.0225707084 | 7.9997789794 | 7.9997823388 | 7.9998107373 | 7.9999252204 | 99.6070240162 | 33.3903857174 |
| **29** | -0.0371604322 | 0.0038691569 | | 0.0045683365 | 7.9998238549 | 7.9997848742 | 7.9997951723 | 7.9999320505 | 99.6089048032 | 33.3984285641 |
| **30** | -0.0274595185 | -0.0079295741 | | -0.0492927578 | 7.9998052422 | 7.9998145652 | 7.9997923028 | 7.9999306131 | 99.6055772569 | 33.3926083367 |
| **31** | 0.0284380625 | 0.0132350790 | | -0.0248517538 | 7.9997994579 | 7.9997917407 | 7.9998163984 | 7.9999402231 | 99.6073857060 | 33.3897968012 |
| **32** | 0.0198600890 | -0.0026626683 | | 0.0323756714 | 7.9998172455 | 7.9997747015 | 7.9998002821 | 7.9999243538 | 99.6096643519 | 33.3958262414 |
| **33** | -0.0053711102 | -0.0048497465 | | 0.0313001256 | 7.9997773644 | 7.9998150229 | 7.9998024305 | 7.9999277335 | 99.6080005787 | 33.3720237893 |
| **34** | -0.0051258363 | -0.0144657568 | | -0.0733898292 | 7.9998151767 | 7.9997903432 | 7.9997982216 | 7.9999344176 | 99.6098451968 | 33.3948028720 |
| **35** | -0.0191860560 | -0.0073695496 | | -0.0281557934 | 7.9998180512 | 7.9997996313 | 7.9997645224 | 7.9999359046 | 99.6093026620 | 33.4128591367 |
| **36** | 0.0259578383 | 0.0301596450 | | 0.0100718796 | 7.9997993546 | 7.9998196861 | 7.9998075914 | 7.9999282881 | 99.6120876736 | 33.4178354212 |
| **37** | -0.0213477527 | -0.0081639356 | | -0.0159084485 | 7.9997878468 | 7.9998065364 | 7.9997886915 | 7.9999231658 | 99.6057942708 | 33.3912478157 |
| **38** | 0.0092572031 | -0.0289364802 | | -0.0306453968 | 7.9998005887 | 7.9997995086 | 7.9998271891 | 7.9999404445 | 99.6149088542 | 33.3745872481 |
| **39** | 0.0122774703 | 0.0128188655 | | 0.0140801483 | 7.9998249351 | 7.9997826347 | 7.9997995273 | 7.9999373476 | 99.6107494213 | 33.3992224378 |
| **40** | 0.0089643048 | 0.0168427787 | | -0.0373925285 | 7.9998081987 | 7.9997699225 | 7.9998002204 | 7.9999312994 | 99.6082899306 | 33.3917113460 |
| **41** | 0.0226710945 | -0.0306279836 | | 0.0159717957 | 7.9997945510 | 7.9997747156 | 7.9998056182 | 7.9999353135 | 99.6175130208 | 33.4052290418 |
| **42** | -0.0099833442 | 0.0255404179 | | 0.0037861304 | 7.9998005085 | 7.9998038844 | 7.9998208311 | 7.9999367853 | 99.6095920139 | 33.3864142214 |
| **43** | 0.0122916605 | -0.0226424768 | | -0.0054767328 | 7.9998007069 | 7.9998223531 | 7.9998049142 | 7.9999329637 | 99.6118344907 | 33.3881708991 |
| **44** | -0.0230113759 | 0.0146520196 | | -0.0358768543 | 7.9997716278 | 7.9998221085 | 7.9998194915 | 7.9999404551 | 99.6082537616 | 33.3957085149 |
| **45** | -0.0287789753 | 0.0077369241 | | 0.0040003913 | 7.9998110608 | 7.9998193895 | 7.9997902885 | 7.9999376471 | 99.6093750000 | 33.3848948405 |
| **46** | 0.0204903677 | 0.0181697195 | | -0.0368421035 | 7.9997699394 | 7.9998075289 | 7.9997917504 | 7.9999311549 | 99.6088686343 | 33.3740753506 |
| **47** | -0.0172483828 | 0.0316589739 | | 0.0337182354 | 7.9998081662 | 7.9998177618 | 7.9998163952 | 7.9999402093 | 99.6097005208 | 33.3999456756 |
| **48** | -0.0160102479 | -0.0008238057 | | 0.0142801327 | 7.9997684086 | 7.9998032520 | 7.9998072290 | 7.9999382666 | 99.6115451389 | 33.3945157895 |
| **49** | -0.0082211949 | -0.0357341489 | | -0.0016008933 | 7.9998311505 | 7.9998170191 | 7.9997921004 | 7.9999365831 | 99.6050708912 | 33.3797571430 |
| **50** | -0.0244299624 | 0.0135023367 | | -0.0304305113 | 7.9998073985 | 7.9997780770 | 7.9998089409 | 7.9999331290 | 99.6050347222 | 33.3827075390 |
| **Total** | -0.1471595556 | -0.1861285704 | | -0.5020704620 | 399.9899494454 | 399.9899202109 | 399.9901162498 | 399.9966839978 | 4980.4769603588 | 1669.4593070590 |
| **Average** | -0.0029431826 | -0.0037225542 | | -0.0100410718 | 7.9997989889 | 7.9997984042 | 7.9998023250 | 7.9999336800 | 99.6095392072 | 33.3891861412 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000200\_05\_001525\_001575** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0113093172 | 0.0233895403 | | 0.0501251548 | 7.9998008244 | 7.9998016383 | 7.9998095993 | 7.9999179658 | 99.6062644676 | 33.3886961295 |
| **2** | -0.0043817119 | 0.0073603401 | | -0.0294341273 | 7.9997910361 | 7.9998113196 | 7.9998201013 | 7.9999314514 | 99.5998987269 | 33.3710482196 |
| **3** | -0.0034862467 | -0.0103551848 | | 0.0062503322 | 7.9998168521 | 7.9997945481 | 7.9997733607 | 7.9999325966 | 99.6016710069 | 33.4039269585 |
| **4** | 0.0007962321 | 0.0311163302 | | -0.0082077119 | 7.9997772155 | 7.9998153451 | 7.9998358149 | 7.9999387414 | 99.6088324653 | 33.4006941608 |
| **5** | -0.0079424306 | -0.0140207466 | | -0.0192486479 | 7.9998181603 | 7.9997999990 | 7.9998100855 | 7.9999296024 | 99.6151982060 | 33.4208499285 |
| **6** | 0.0041300215 | -0.0023252342 | | 0.0243520936 | 7.9997932437 | 7.9997817725 | 7.9998303302 | 7.9999265628 | 99.6091579861 | 33.3796751600 |
| **7** | 0.0119703395 | -0.0027409942 | | -0.0113796517 | 7.9998383703 | 7.9998045669 | 7.9997775403 | 7.9999439995 | 99.6051793981 | 33.3842640818 |
| **8** | 0.0061437627 | 0.0049606987 | | -0.0042284318 | 7.9998157894 | 7.9997992030 | 7.9998240756 | 7.9999361193 | 99.6164279514 | 33.4330095146 |
| **9** | -0.0188386750 | -0.0007931971 | | -0.0367141872 | 7.9997792585 | 7.9997950053 | 7.9997821590 | 7.9999303932 | 99.6132450810 | 33.3992991728 |
| **10** | 0.0269312207 | -0.0071401438 | | -0.0292896446 | 7.9998174841 | 7.9997909709 | 7.9997915043 | 7.9999344702 | 99.6110026042 | 33.3770173781 |
| **11** | -0.0013788120 | 0.0068724052 | | -0.0057312733 | 7.9998115783 | 7.9998104156 | 7.9998182863 | 7.9999396679 | 99.6097366898 | 33.3973891669 |
| **12** | 0.0096515822 | 0.0097082454 | | -0.0317103166 | 7.9997859438 | 7.9998146413 | 7.9997968555 | 7.9999314419 | 99.6089409722 | 33.3807900157 |
| **13** | 0.0167125271 | -0.0475401203 | | -0.0440765176 | 7.9998131026 | 7.9997927503 | 7.9997698028 | 7.9999325751 | 99.6149811921 | 33.3823708129 |
| **14** | -0.0039234348 | -0.0109893383 | | 0.0317634016 | 7.9998118663 | 7.9998001974 | 7.9998184303 | 7.9999450338 | 99.6086877894 | 33.4047368600 |
| **15** | 0.0144302098 | 0.0205582383 | | 0.0038582609 | 7.9998263500 | 7.9997888624 | 7.9998145750 | 7.9999380543 | 99.6100983796 | 33.4091524544 |
| **16** | -0.0194717387 | 0.0174489566 | | 0.0336382985 | 7.9997697815 | 7.9997837158 | 7.9998014796 | 7.9999172302 | 99.6078920718 | 33.3816004845 |
| **17** | 0.0293699034 | -0.0087844091 | | -0.0303967582 | 7.9997994190 | 7.9997775026 | 7.9998121443 | 7.9999382714 | 99.6090856481 | 33.4001059538 |
| **18** | -0.0345340650 | -0.0051010467 | | 0.0215860025 | 7.9998103972 | 7.9998139299 | 7.9997844281 | 7.9999303668 | 99.6159577546 | 33.3674419594 |
| **19** | 0.0042676850 | -0.0317559343 | | 0.0482150751 | 7.9997596592 | 7.9997635236 | 7.9998254597 | 7.9999322546 | 99.6098813657 | 33.3704126384 |
| **20** | 0.0045855347 | -0.0001779843 | | -0.0039531244 | 7.9997831252 | 7.9998047530 | 7.9998104073 | 7.9999310942 | 99.6053602431 | 33.3761476205 |
| **21** | 0.0099321460 | 0.0250861857 | | -0.0534852693 | 7.9998026379 | 7.9997858720 | 7.9998282986 | 7.9999364028 | 99.6051793981 | 33.3694016090 |
| **22** | 0.0207147824 | -0.0065140577 | | 0.0124638230 | 7.9998093744 | 7.9997918166 | 7.9998222012 | 7.9999353021 | 99.6112196181 | 33.3951045638 |
| **23** | 0.0162490394 | 0.0005116328 | | 0.0238557661 | 7.9998051605 | 7.9998391111 | 7.9997699434 | 7.9999427334 | 99.6068431713 | 33.4095079033 |
| **24** | 0.0161216434 | 0.0075286045 | | -0.0077739420 | 7.9998049553 | 7.9998188860 | 7.9997604701 | 7.9999271838 | 99.6146918403 | 33.3982393507 |
| **25** | 0.0274506820 | 0.0055784826 | | 0.0157938080 | 7.9998207951 | 7.9997849654 | 7.9997905451 | 7.9999374604 | 99.6218171296 | 33.4044642452 |
| **26** | -0.0060075641 | 0.0047419944 | | -0.0671972920 | 7.9998085638 | 7.9997948776 | 7.9997910728 | 7.9999269938 | 99.6091579861 | 33.4051811002 |
| **27** | -0.0363493579 | -0.0016069596 | | 0.0147364532 | 7.9998234645 | 7.9998085176 | 7.9998046588 | 7.9999399773 | 99.6093750000 | 33.3981417654 |
| **28** | 0.0235207964 | 0.0086401952 | | 0.0349211526 | 7.9998146849 | 7.9998239416 | 7.9997858947 | 7.9999364450 | 99.6094473380 | 33.3914578794 |
| **29** | 0.0005298116 | -0.0166740939 | | -0.0082177377 | 7.9998119080 | 7.9998100398 | 7.9998249467 | 7.9999425425 | 99.6089771412 | 33.3769833367 |
| **30** | 0.0028540427 | 0.0100892372 | | -0.0251909916 | 7.9998072559 | 7.9997856546 | 7.9998240460 | 7.9999380906 | 99.6088324653 | 33.4029774873 |
| **31** | 0.0282547382 | -0.0120822008 | | -0.0629483004 | 7.9998084433 | 7.9997982018 | 7.9998311293 | 7.9999284993 | 99.6138961227 | 33.4200919401 |
| **32** | -0.0047728958 | -0.0156759487 | | 0.0260402437 | 7.9997715782 | 7.9998143612 | 7.9998087234 | 7.9999397563 | 99.6044198495 | 33.3964589858 |
| **33** | -0.0566445709 | -0.0138040360 | | -0.0152990400 | 7.9997836126 | 7.9998284099 | 7.9997540224 | 7.9999208722 | 99.6076027199 | 33.3762151359 |
| **34** | -0.0131681062 | 0.0025068833 | | -0.0343781816 | 7.9998013776 | 7.9998070797 | 7.9997911264 | 7.9999294230 | 99.6033347801 | 33.3845145697 |
| **35** | 0.0074864588 | 0.0165407584 | | 0.0521055427 | 7.9997775768 | 7.9997823023 | 7.9997866034 | 7.9999134404 | 99.6023943866 | 33.3912010088 |
| **36** | -0.0045667833 | -0.0091353516 | | -0.0582300219 | 7.9997654058 | 7.9997527230 | 7.9998143600 | 7.9999199527 | 99.6086154514 | 33.3971779684 |
| **37** | -0.0202487381 | -0.0271033366 | | 0.0653205254 | 7.9998089939 | 7.9998266219 | 7.9997740405 | 7.9999250363 | 99.6096643519 | 33.3706150429 |
| **38** | 0.0351981238 | 0.0073954382 | | 0.0039861961 | 7.9997889479 | 7.9998006574 | 7.9997960404 | 7.9999335906 | 99.6172598380 | 33.4085056679 |
| **39** | -0.0147390732 | 0.0077082033 | | -0.0427159079 | 7.9998037079 | 7.9998070439 | 7.9998076974 | 7.9999371665 | 99.6148365162 | 33.4040736202 |
| **40** | -0.0056233827 | -0.0144231293 | | 0.0423719989 | 7.9998134937 | 7.9997900784 | 7.9997903334 | 7.9999437198 | 99.6080729167 | 33.3574735044 |
| **41** | -0.0026023260 | -0.0059292204 | | -0.0343419637 | 7.9998087539 | 7.9998124547 | 7.9998130559 | 7.9999349897 | 99.6070963542 | 33.3807616478 |
| **42** | -0.0245245325 | -0.0107488833 | | 0.0480442539 | 7.9998007095 | 7.9997910738 | 7.9997940116 | 7.9999276013 | 99.6081814236 | 33.3874974469 |
| **43** | 0.0190436497 | -0.0024284911 | | -0.0039278717 | 7.9997932242 | 7.9998143494 | 7.9997920942 | 7.9999299855 | 99.6108217593 | 33.3648667279 |
| **44** | 0.0124588799 | 0.0205823737 | | -0.0218295804 | 7.9998231676 | 7.9998341425 | 7.9997731764 | 7.9999385006 | 99.6100260417 | 33.3839809709 |
| **45** | 0.0439929925 | 0.0274351324 | | 0.0380083397 | 7.9997919682 | 7.9998151072 | 7.9998168471 | 7.9999340053 | 99.6056134259 | 33.3730441801 |
| **46** | -0.0322137807 | 0.0080569133 | | 0.0244515053 | 7.9998035010 | 7.9998064734 | 7.9997698783 | 7.9999177880 | 99.6078559028 | 33.3836164443 |
| **47** | 0.0130915176 | -0.0218968359 | | -0.0037308063 | 7.9998293288 | 7.9997979879 | 7.9997797109 | 7.9999344665 | 99.6167534722 | 33.4012361281 |
| **48** | -0.0082828571 | -0.0055621594 | | 0.0257357554 | 7.9998215725 | 7.9998154348 | 7.9998092989 | 7.9999397249 | 99.6115813079 | 33.3891399442 |
| **49** | -0.0109064152 | 0.0203574679 | | -0.0067821987 | 7.9997933291 | 7.9997964402 | 7.9998553647 | 7.9999440327 | 99.6175853588 | 33.3964918925 |
| **50** | -0.0058227383 | -0.0135215585 | | 0.0421614180 | 7.9997836507 | 7.9997838890 | 7.9998218954 | 7.9999303191 | 99.6090494792 | 33.3889758363 |
| **Total** | 0.0541487690 | -0.0246563385 | | -0.0106340964 | 399.9901006010 | 399.9900631748 | 399.9900879268 | 399.9966438950 | 4980.4877025463 | 1669.5360265749 |
| **Average** | 0.0010829750 | -0.0004931267 | | -0.0002126819 | 7.9998020120 | 7.9998012635 | 7.9998017585 | 7.9999328779 | 99.6097540509 | 33.3907205315 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000201\_01\_000384\_000589** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0211427897 | -0.0204730459 | | 0.0481055814 | 7.9997708529 | 7.9998018394 | 7.9997905635 | 7.9999203232 | 99.6136429398 | 33.3756240922 |
| **2** | 0.0038496517 | -0.0001961058 | | 0.0519391263 | 7.9997995932 | 7.9998029094 | 7.9998095610 | 7.9999374710 | 99.6088324653 | 33.3701988868 |
| **3** | 0.0187015978 | 0.0170974361 | | -0.0428972954 | 7.9998262215 | 7.9997875565 | 7.9997778420 | 7.9999289043 | 99.6021412037 | 33.3829513605 |
| **4** | -0.0012481970 | -0.0157209470 | | 0.0093264164 | 7.9997760582 | 7.9998087043 | 7.9998220542 | 7.9999283059 | 99.6122685185 | 33.3924483422 |
| **5** | 0.0107329707 | 0.0048826228 | | -0.0500953757 | 7.9998000175 | 7.9997949454 | 7.9998086500 | 7.9999365909 | 99.6084707755 | 33.3629045252 |
| **6** | 0.0065787683 | 0.0324754031 | | -0.0194098233 | 7.9997853729 | 7.9997918695 | 7.9998057345 | 7.9999247189 | 99.6068070023 | 33.3907810231 |
| **7** | -0.0067901782 | -0.0015062332 | | 0.0329855446 | 7.9997718839 | 7.9998079861 | 7.9997881266 | 7.9999340914 | 99.6064091435 | 33.3748636926 |
| **8** | 0.0164050666 | 0.0288753894 | | 0.0036045749 | 7.9997960516 | 7.9997883793 | 7.9998052317 | 7.9999321218 | 99.6095558449 | 33.3982017633 |
| **9** | -0.0183600732 | 0.0096238238 | | 0.0321211012 | 7.9997508217 | 7.9997989841 | 7.9998256967 | 7.9999286827 | 99.6111834491 | 33.3916923396 |
| **10** | 0.0093880595 | -0.0205098739 | | 0.0108887351 | 7.9997636084 | 7.9998097282 | 7.9997938722 | 7.9999313620 | 99.6084346065 | 33.3799402574 |
| **11** | -0.0038218534 | 0.0377649088 | | -0.0241208061 | 7.9998199123 | 7.9998039808 | 7.9998013913 | 7.9999402736 | 99.6055772569 | 33.3977125601 |
| **12** | 0.0187406030 | -0.0087882536 | | -0.0052173008 | 7.9998099185 | 7.9997969228 | 7.9997922764 | 7.9999362129 | 99.6060474537 | 33.3927100354 |
| **13** | 0.0182778574 | 0.0101894742 | | 0.0143337765 | 7.9998075318 | 7.9998039611 | 7.9997968944 | 7.9999304837 | 99.6082537616 | 33.3925535868 |
| **14** | 0.0151261585 | -0.0059735121 | | -0.0844304216 | 7.9997867766 | 7.9998340454 | 7.9998067448 | 7.9999363081 | 99.6117983218 | 33.3995659722 |
| **15** | -0.0398637739 | 0.0074273824 | | -0.0074411408 | 7.9997761155 | 7.9997793231 | 7.9998269567 | 7.9999383206 | 99.6047092014 | 33.3894867409 |
| **16** | -0.0121230033 | -0.0254152924 | | 0.0414246866 | 7.9997848946 | 7.9997750064 | 7.9998115990 | 7.9999221319 | 99.6001880787 | 33.3886524430 |
| **17** | 0.0001562843 | 0.0159208103 | | -0.0058237072 | 7.9998210773 | 7.9997971451 | 7.9997806988 | 7.9999299687 | 99.6164641204 | 33.3885193979 |
| **18** | 0.0005320570 | -0.0141994378 | | 0.0587965167 | 7.9997914232 | 7.9998196589 | 7.9998010052 | 7.9999391013 | 99.6088686343 | 33.4103061740 |
| **19** | -0.0059519747 | -0.0055233126 | | 0.0097046206 | 7.9997745576 | 7.9998088002 | 7.9997949621 | 7.9999341396 | 99.6140769676 | 33.3637646378 |
| **20** | -0.0145493633 | -0.0045221869 | | -0.0120015597 | 7.9997748166 | 7.9997803204 | 7.9997762189 | 7.9999361433 | 99.6142939815 | 33.4039724889 |
| **21** | 0.0092102425 | 0.0026313776 | | -0.0577323514 | 7.9997821548 | 7.9998039144 | 7.9997969024 | 7.9999319664 | 99.6057581019 | 33.3930725763 |
| **22** | 0.0118424274 | 0.0074979489 | | 0.0223982264 | 7.9997971027 | 7.9998156132 | 7.9998161575 | 7.9999358729 | 99.6106047454 | 33.3773428990 |
| **23** | -0.0252326969 | 0.0222545293 | | -0.0365618561 | 7.9997987540 | 7.9997922202 | 7.9998213842 | 7.9999366823 | 99.6101707176 | 33.3875876566 |
| **24** | -0.0024438685 | -0.0200674056 | | 0.0201349319 | 7.9998106683 | 7.9997920563 | 7.9998130900 | 7.9999289094 | 99.6066623264 | 33.3554430771 |
| **25** | 0.0050741780 | -0.0022517191 | | 0.0338825518 | 7.9998048052 | 7.9998105398 | 7.9997568467 | 7.9999158021 | 99.6142939815 | 33.4093206756 |
| **26** | 0.0007747309 | 0.0110027206 | | -0.0224387348 | 7.9998048658 | 7.9997837917 | 7.9998028078 | 7.9999413593 | 99.6172598380 | 33.4065973641 |
| **27** | -0.0092100664 | 0.0557253315 | | -0.0412026187 | 7.9998052278 | 7.9998008251 | 7.9998042922 | 7.9999364521 | 99.6057219329 | 33.3830486622 |
| **28** | 0.0082135231 | 0.0302817398 | | 0.0247007339 | 7.9998124954 | 7.9997907040 | 7.9997959307 | 7.9999354905 | 99.6120515046 | 33.4020735464 |
| **29** | 0.0109860900 | -0.0074682513 | | -0.0237294187 | 7.9997900177 | 7.9998190811 | 7.9998114066 | 7.9999323024 | 99.6120153356 | 33.3910825731 |
| **30** | -0.0439573428 | 0.0092750011 | | 0.0082104919 | 7.9997687480 | 7.9998276221 | 7.9997947869 | 7.9999251373 | 99.6036603009 | 33.4036811513 |
| **31** | 0.0050386362 | 0.0187258058 | | -0.0339923034 | 7.9998206449 | 7.9997639967 | 7.9998040195 | 7.9999345860 | 99.6097366898 | 33.4024097052 |
| **32** | -0.0003227020 | -0.0430452451 | | -0.0080172661 | 7.9998026170 | 7.9998100010 | 7.9997952673 | 7.9999357813 | 99.6124493634 | 33.3952726432 |
| **33** | 0.0030690156 | -0.0311024958 | | 0.0104373148 | 7.9997565704 | 7.9997773549 | 7.9997900122 | 7.9999217403 | 99.6043475116 | 33.4047598380 |
| **34** | 0.0034424432 | 0.0109885842 | | -0.0324866537 | 7.9998081966 | 7.9998119057 | 7.9998087000 | 7.9999397044 | 99.6109302662 | 33.4050124535 |
| **35** | -0.0013306454 | 0.0085997149 | | 0.0238144629 | 7.9998239628 | 7.9998033652 | 7.9998177967 | 7.9999434665 | 99.6081452546 | 33.4057623570 |
| **36** | -0.0191819005 | 0.0037082760 | | 0.0063965415 | 7.9997996473 | 7.9997697636 | 7.9998247430 | 7.9999345643 | 99.6055772569 | 33.4146606357 |
| **37** | -0.0098323540 | -0.0056408753 | | 0.0018442622 | 7.9998177109 | 7.9997745920 | 7.9997869485 | 7.9999333201 | 99.6069878472 | 33.3889924315 |
| **38** | 0.0247235614 | -0.0046948191 | | 0.0574745277 | 7.9997924286 | 7.9998300150 | 7.9997884220 | 7.9999290984 | 99.6022135417 | 33.3817146650 |
| **39** | -0.0118998874 | 0.0079021658 | | -0.0218083326 | 7.9998012433 | 7.9997692919 | 7.9998001482 | 7.9999272700 | 99.6062282986 | 33.3995099458 |
| **40** | 0.0202735748 | -0.0200670210 | | -0.0372786362 | 7.9998164756 | 7.9997861306 | 7.9998067725 | 7.9999413873 | 99.6112919560 | 33.4098019358 |
| **41** | 0.0099132345 | -0.0154067671 | | 0.0393407568 | 7.9998101347 | 7.9998281112 | 7.9997951898 | 7.9999307071 | 99.6126663773 | 33.4033095327 |
| **42** | -0.0119566227 | 0.0061801958 | | -0.0238287893 | 7.9997665132 | 7.9997861320 | 7.9998054136 | 7.9999301868 | 99.6072048611 | 33.3862638719 |
| **43** | -0.0087592752 | 0.0043736187 | | 0.0043196526 | 7.9997888297 | 7.9997826816 | 7.9998063705 | 7.9999234130 | 99.6105685764 | 33.3968625182 |
| **44** | -0.0197288022 | -0.0164749147 | | -0.0135362989 | 7.9998162450 | 7.9998297185 | 7.9997949196 | 7.9999414590 | 99.6023582176 | 33.3934206495 |
| **45** | 0.0214778457 | 0.0116264142 | | -0.0304723207 | 7.9998130249 | 7.9998038776 | 7.9998261195 | 7.9999316113 | 99.6081452546 | 33.3745824256 |
| **46** | -0.0138317234 | 0.0128653163 | | 0.0218378786 | 7.9998109808 | 7.9997912133 | 7.9998018258 | 7.9999374374 | 99.6074218750 | 33.4097362643 |
| **47** | -0.0175054105 | 0.0062231828 | | 0.0279989753 | 7.9997966123 | 7.9998048866 | 7.9998059704 | 7.9999371589 | 99.6069878472 | 33.3952125034 |
| **48** | -0.0162256889 | -0.0126571826 | | -0.0389897857 | 7.9997956300 | 7.9997957654 | 7.9998052725 | 7.9999367930 | 99.6146918403 | 33.3972564055 |
| **49** | 0.0089648347 | 0.0067262952 | | 0.0066120593 | 7.9997932967 | 7.9998030661 | 7.9997726059 | 7.9999317855 | 99.6098813657 | 33.3905278402 |
| **50** | -0.0119797245 | -0.0041570725 | | 0.0048042782 | 7.9997884758 | 7.9998373272 | 7.9998308813 | 7.9999392827 | 99.6048538773 | 33.3945793335 |
| **Total** | -0.0434709257 | 0.0949834988 | | -0.0460744710 | 399.9897815859 | 399.9899876302 | 399.9900970839 | 399.9966463839 | 4980.4389105903 | 1669.6057484567 |
| **Average** | -0.0008694183 | 0.0018996677 | | -0.0009214892 | 7.9997956317 | 7.9997997526 | 7.9998019417 | 7.9999329277 | 99.6087782118 | 33.3921149691 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000201\_02\_000590\_000623** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0066064615 | 0.0162558172 | | 0.0212498219 | 7.9998221772 | 7.9998135127 | 7.9998111134 | 7.9999314640 | 99.6077112269 | 33.3961984273 |
| **2** | 0.0101335775 | 0.0303549808 | | 0.0242903245 | 7.9998018224 | 7.9997691313 | 7.9997988117 | 7.9999279038 | 99.6055772569 | 33.3864787582 |
| **3** | -0.0116664519 | 0.0046444949 | | -0.0228847723 | 7.9997908448 | 7.9998089172 | 7.9998095830 | 7.9999277566 | 99.6067708333 | 33.3628648103 |
| **4** | 0.0096857775 | 0.0148031985 | | -0.0004872830 | 7.9997973549 | 7.9998089713 | 7.9998026201 | 7.9999297194 | 99.6019603588 | 33.3671877837 |
| **5** | -0.0451466407 | 0.0065755404 | | 0.0548769988 | 7.9998249960 | 7.9997997260 | 7.9998046010 | 7.9999331178 | 99.6046730324 | 33.3834499251 |
| **6** | 0.0055945592 | 0.0371639276 | | 0.0076071056 | 7.9998121251 | 7.9997994935 | 7.9998153781 | 7.9999351241 | 99.6114728009 | 33.3998702172 |
| **7** | 0.0067467132 | -0.0145299715 | | 0.0165658744 | 7.9998398105 | 7.9997815807 | 7.9998245124 | 7.9999324269 | 99.6128472222 | 33.4010117386 |
| **8** | 0.0179695272 | 0.0050011568 | | -0.0000435298 | 7.9998019568 | 7.9997657409 | 7.9998088183 | 7.9999350125 | 99.6105324074 | 33.3888600955 |
| **9** | 0.0113843843 | -0.0117023604 | | -0.0040299976 | 7.9998480520 | 7.9997724842 | 7.9997838655 | 7.9999340281 | 99.6103153935 | 33.3857670093 |
| **10** | -0.0214914317 | -0.0054562304 | | 0.0262316056 | 7.9998070343 | 7.9998091157 | 7.9998126466 | 7.9999349487 | 99.6082537616 | 33.3771475865 |
| **11** | -0.0059895999 | 0.0191385997 | | 0.0215084593 | 7.9997889810 | 7.9997761114 | 7.9997786078 | 7.9999238567 | 99.6095920139 | 33.4069224594 |
| **12** | 0.0293238875 | -0.0113903730 | | 0.0081526845 | 7.9997939447 | 7.9998341296 | 7.9997908895 | 7.9999373154 | 99.6045283565 | 33.3883744383 |
| **13** | 0.0331177933 | -0.0358828723 | | -0.0066453395 | 7.9997837115 | 7.9997814096 | 7.9998279972 | 7.9999318090 | 99.6018518519 | 33.3751272297 |
| **14** | -0.0029150054 | -0.0158400621 | | 0.0540527351 | 7.9998045299 | 7.9998231099 | 7.9998179657 | 7.9999374094 | 99.6112196181 | 33.3862379153 |
| **15** | 0.0054706315 | -0.0329180218 | | -0.0318239283 | 7.9997880037 | 7.9997950134 | 7.9997964203 | 7.9999324954 | 99.6093750000 | 33.3845558449 |
| **16** | 0.0074760870 | -0.0112033426 | | -0.0048418765 | 7.9998127872 | 7.9998103555 | 7.9997940119 | 7.9999405775 | 99.6082537616 | 33.3753984262 |
| **17** | 0.0185466232 | -0.0015874276 | | 0.0329915879 | 7.9997853491 | 7.9998192434 | 7.9998192710 | 7.9999381939 | 99.6124493634 | 33.3938210614 |
| **18** | -0.0009342463 | 0.0061866981 | | 0.0177286957 | 7.9998297430 | 7.9998090089 | 7.9998078749 | 7.9999473579 | 99.6042751736 | 33.3811270255 |
| **19** | 0.0179004564 | -0.0267698772 | | -0.0460753306 | 7.9998044469 | 7.9998216972 | 7.9997835133 | 7.9999335512 | 99.6156322338 | 33.3685213553 |
| **20** | -0.0290703927 | 0.0135782959 | | -0.0062266986 | 7.9997949299 | 7.9997814132 | 7.9998256620 | 7.9999287929 | 99.6080367477 | 33.3858963666 |
| **21** | -0.0024934340 | 0.0011330286 | | 0.0190800139 | 7.9997874178 | 7.9997946882 | 7.9998105357 | 7.9999337433 | 99.6099537037 | 33.4061602158 |
| **22** | 0.0164420898 | 0.0005485317 | | 0.0090664266 | 7.9997893373 | 7.9998102130 | 7.9997795813 | 7.9999239697 | 99.6147280093 | 33.3977558211 |
| **23** | 0.0047244203 | -0.0217024312 | | 0.0113552867 | 7.9998073865 | 7.9997977101 | 7.9998068785 | 7.9999373828 | 99.6026114005 | 33.3846137153 |
| **24** | -0.0175643782 | 0.0034150255 | | -0.0290290772 | 7.9998048750 | 7.9998242481 | 7.9998163355 | 7.9999446875 | 99.6088686343 | 33.4190451673 |
| **25** | 0.0108444115 | -0.0139165300 | | -0.0403898145 | 7.9998374570 | 7.9998100801 | 7.9997739142 | 7.9999366797 | 99.6094111690 | 33.3880443786 |
| **26** | 0.0158411008 | 0.0115835230 | | -0.0029355124 | 7.9997740283 | 7.9998106559 | 7.9997855115 | 7.9999250579 | 99.6144386574 | 33.4130693423 |
| **27** | -0.0024492174 | -0.0077689383 | | 0.0562620768 | 7.9997944266 | 7.9998039825 | 7.9997571453 | 7.9999294013 | 99.6104239005 | 33.4039384475 |
| **28** | -0.0033735357 | 0.0125425651 | | 0.0173045782 | 7.9997973857 | 7.9998045967 | 7.9998061462 | 7.9999444646 | 99.6075303819 | 33.3997951843 |
| **29** | 0.0167134399 | 0.0152324722 | | -0.0263606457 | 7.9997954529 | 7.9997968151 | 7.9997893595 | 7.9999333963 | 99.6103153935 | 33.3856280070 |
| **30** | 0.0025927060 | -0.0090102896 | | 0.0270969773 | 7.9997899605 | 7.9998160173 | 7.9997982710 | 7.9999278424 | 99.6090133102 | 33.3636454929 |
| **31** | 0.0043094769 | -0.0356958859 | | -0.0076342506 | 7.9997846472 | 7.9998161905 | 7.9998086141 | 7.9999359749 | 99.6103877315 | 33.3805010893 |
| **32** | 0.0087644195 | 0.0197855672 | | -0.0714882038 | 7.9997928493 | 7.9998201726 | 7.9997804682 | 7.9999346735 | 99.6043836806 | 33.4147592139 |
| **33** | 0.0125083315 | -0.0015304963 | | 0.0185514996 | 7.9997915364 | 7.9997650955 | 7.9997674274 | 7.9999259778 | 99.6070601852 | 33.4195521004 |
| **34** | -0.0099295134 | 0.0189950014 | | -0.0059451244 | 7.9997934678 | 7.9998122277 | 7.9998085974 | 7.9999337559 | 99.6189959491 | 33.3618093852 |
| **35** | -0.0028307203 | 0.0048836726 | | 0.0265797496 | 7.9997824121 | 7.9998007211 | 7.9998115985 | 7.9999319498 | 99.6074942130 | 33.4040082323 |
| **36** | 0.0002326849 | -0.0145868973 | | -0.0284976080 | 7.9997901968 | 7.9997533509 | 7.9997754859 | 7.9999195498 | 99.6106409144 | 33.4191914034 |
| **37** | 0.0123685733 | -0.0283910191 | | 0.0330163602 | 7.9998213304 | 7.9997935987 | 7.9998070944 | 7.9999324627 | 99.6102430556 | 33.3954110782 |
| **38** | -0.0267786869 | 0.0186594007 | | -0.0260440391 | 7.9998177930 | 7.9997859589 | 7.9998108067 | 7.9999384223 | 99.6078197338 | 33.3840530251 |
| **39** | -0.0204575546 | -0.0169542469 | | 0.0148370133 | 7.9998178473 | 7.9997846370 | 7.9997957334 | 7.9999313884 | 99.6049262153 | 33.3945915316 |
| **40** | 0.0016347378 | -0.0005100682 | | 0.0670877646 | 7.9997832065 | 7.9998076021 | 7.9998132242 | 7.9999361422 | 99.6073133681 | 33.3827343466 |
| **41** | 0.0038820746 | -0.0404251299 | | -0.0323390928 | 7.9998059880 | 7.9997919814 | 7.9997747267 | 7.9999282423 | 99.6107494213 | 33.3811319898 |
| **42** | 0.0249381716 | -0.0102045151 | | -0.0107149652 | 7.9998035731 | 7.9998024677 | 7.9997650884 | 7.9999353785 | 99.6127748843 | 33.4013863358 |
| **43** | -0.0244704462 | -0.0553741695 | | 0.0172077184 | 7.9997892391 | 7.9998026745 | 7.9997993006 | 7.9999286404 | 99.6121238426 | 33.3982474355 |
| **44** | 0.0129407459 | 0.0296683981 | | 0.0233237273 | 7.9998041601 | 7.9997819367 | 7.9997852646 | 7.9999290271 | 99.6152705440 | 33.3911512232 |
| **45** | 0.0071267255 | 0.0001229887 | | -0.0193073664 | 7.9998017402 | 7.9997958180 | 7.9998249925 | 7.9999331125 | 99.6110026042 | 33.3787117885 |
| **46** | 0.0239186180 | 0.0217263364 | | -0.0427299502 | 7.9997846711 | 7.9997969080 | 7.9997899186 | 7.9999341334 | 99.6100983796 | 33.3813470180 |
| **47** | -0.0490996068 | 0.0445234793 | | -0.0231550637 | 7.9997985120 | 7.9998037712 | 7.9998148806 | 7.9999298242 | 99.6082175926 | 33.3944864288 |
| **48** | 0.0238978017 | -0.0084547455 | | -0.0110795030 | 7.9997982157 | 7.9997605062 | 7.9998110067 | 7.9999226632 | 99.6081452546 | 33.3756991251 |
| **49** | -0.0110923045 | 0.0200691639 | | -0.0437362580 | 7.9998150679 | 7.9998292311 | 7.9998033219 | 7.9999332178 | 99.6108940972 | 33.3823265591 |
| **50** | 0.0073336778 | 0.0237538964 | | 0.0134054512 | 7.9998101969 | 7.9997881673 | 7.9998107590 | 7.9999330015 | 99.6103153935 | 33.3994849821 |
| **Total** | 0.1032175201 | -0.0314601405 | | 0.0949853053 | 399.9900969793 | 399.9899421896 | 399.9899961519 | 399.9966370251 | 4980.4614800347 | 1669.4970985384 |
| **Average** | 0.0020643475 | -0.0006292027 | | 0.0018997038 | 7.9998019396 | 7.9997988438 | 7.9997999230 | 7.9999327405 | 99.6092296007 | 33.3899419708 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000201\_03\_000640\_000672** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0003133046 | 0.0097504443 | | 0.0493447515 | 7.9997984603 | 7.9997997006 | 7.9997941101 | 7.9999304652 | 99.6164641204 | 33.3913322100 |
| **2** | -0.0085357328 | 0.0132130988 | | -0.0464154594 | 7.9998092182 | 7.9997847202 | 7.9998038196 | 7.9999271588 | 99.6117621528 | 33.4239081223 |
| **3** | 0.0044939873 | -0.0161798998 | | -0.0026497694 | 7.9997865576 | 7.9998113399 | 7.9998072440 | 7.9999422696 | 99.6073495370 | 33.3768393700 |
| **4** | 0.0142402382 | 0.0102533258 | | -0.0349989474 | 7.9998166942 | 7.9998214388 | 7.9997697653 | 7.9999328501 | 99.6077473958 | 33.3738051471 |
| **5** | 0.0204064251 | -0.0073615527 | | -0.0351867880 | 7.9998117151 | 7.9997934510 | 7.9998082182 | 7.9999418320 | 99.6072048611 | 33.3983926788 |
| **6** | 0.0062745715 | 0.0218734946 | | -0.0637901481 | 7.9997947689 | 7.9998010731 | 7.9997992508 | 7.9999336791 | 99.6143663194 | 33.3779729484 |
| **7** | -0.0120364304 | -0.0591358467 | | 0.0108570914 | 7.9998093067 | 7.9997550090 | 7.9997543130 | 7.9999290759 | 99.6124493634 | 33.3730977953 |
| **8** | 0.0241440997 | -0.0108679177 | | -0.0098925133 | 7.9998110144 | 7.9998234797 | 7.9997499509 | 7.9999376554 | 99.6071325231 | 33.3781459922 |
| **9** | 0.0053771807 | -0.0050993627 | | 0.0214523526 | 7.9998365816 | 7.9998054324 | 7.9998437214 | 7.9999415268 | 99.6103877315 | 33.4008405388 |
| **10** | -0.0493764869 | 0.0042342176 | | -0.0467480778 | 7.9998156766 | 7.9997898564 | 7.9997822508 | 7.9999342243 | 99.6064814815 | 33.3948674088 |
| **11** | 0.0148664779 | 0.0045407903 | | -0.0591162741 | 7.9998103733 | 7.9998024638 | 7.9998090274 | 7.9999403895 | 99.6082537616 | 33.4024546682 |
| **12** | 0.0006416404 | 0.0168681323 | | -0.1063746204 | 7.9997839865 | 7.9998255616 | 7.9997736804 | 7.9999276789 | 99.6104600694 | 33.3737360714 |
| **13** | -0.0177127964 | -0.0376428573 | | 0.0454771741 | 7.9997841233 | 7.9998060376 | 7.9998031915 | 7.9999329787 | 99.6077112269 | 33.3812136892 |
| **14** | 0.0053839989 | 0.0233423404 | | -0.0057797475 | 7.9998251496 | 7.9997930634 | 7.9998133869 | 7.9999368913 | 99.6089048032 | 33.3936172386 |
| **15** | -0.0106995875 | 0.0091108507 | | 0.0383794565 | 7.9998268508 | 7.9997992415 | 7.9998016753 | 7.9999359739 | 99.6094835069 | 33.3947715255 |
| **16** | -0.0096429062 | 0.0178370282 | | -0.0695992453 | 7.9998064132 | 7.9998006483 | 7.9997866734 | 7.9999365226 | 99.6132089120 | 33.3714890557 |
| **17** | 0.0115821439 | -0.0170982044 | | -0.0153295475 | 7.9998085702 | 7.9998173157 | 7.9997975724 | 7.9999380444 | 99.6138599537 | 33.3714762902 |
| **18** | 0.0065224240 | 0.0361318855 | | 0.0285738077 | 7.9998147502 | 7.9998202621 | 7.9998127848 | 7.9999471583 | 99.6097005208 | 33.3940207709 |
| **19** | -0.0134563401 | 0.0084499412 | | 0.0074610288 | 7.9997838128 | 7.9998157109 | 7.9998552846 | 7.9999368655 | 99.6009114583 | 33.3973142758 |
| **20** | -0.0139395145 | 0.0023899037 | | 0.0196108246 | 7.9998086661 | 7.9998263876 | 7.9998212686 | 7.9999428261 | 99.6114366319 | 33.3921303388 |
| **21** | -0.0143856615 | -0.0173738001 | | 0.0180970509 | 7.9997934369 | 7.9998237158 | 7.9997774148 | 7.9999331809 | 99.6119791667 | 33.4019400758 |
| **22** | -0.0187726270 | 0.0000814940 | | -0.0091896103 | 7.9998022126 | 7.9998018330 | 7.9997897091 | 7.9999338788 | 99.6066623264 | 33.3900525372 |
| **23** | 0.0103745899 | 0.0144647667 | | 0.0239985450 | 7.9998282059 | 7.9998090201 | 7.9998290816 | 7.9999346767 | 99.6060836227 | 33.4113647195 |
| **24** | -0.0163615897 | 0.0214187507 | | -0.0044927057 | 7.9998100168 | 7.9997725864 | 7.9997783462 | 7.9999306759 | 99.6146918403 | 33.3781454248 |
| **25** | -0.0103549747 | -0.0291776894 | | -0.0304269346 | 7.9997935020 | 7.9998034421 | 7.9997752474 | 7.9999330460 | 99.6128110532 | 33.3841646525 |
| **26** | -0.0206462840 | 0.0221292699 | | -0.0272586632 | 7.9998048248 | 7.9997907876 | 7.9998322953 | 7.9999387902 | 99.6095558449 | 33.3862433052 |
| **27** | 0.0128100258 | 0.0220931848 | | -0.0059966160 | 7.9997947789 | 7.9998036658 | 7.9997716239 | 7.9999212150 | 99.6045283565 | 33.4242405932 |
| **28** | -0.0586675261 | -0.0181729567 | | 0.0752527271 | 7.9998035002 | 7.9997981524 | 7.9997917958 | 7.9999439423 | 99.6084346065 | 33.4219952796 |
| **29** | -0.0018096930 | -0.0013820319 | | -0.0046024640 | 7.9997947030 | 7.9997845031 | 7.9997791278 | 7.9999187933 | 99.6076750579 | 33.3631696226 |
| **30** | -0.0077790478 | -0.0033929003 | | -0.0304497802 | 7.9997815246 | 7.9997842461 | 7.9998166502 | 7.9999286828 | 99.6146195023 | 33.3998329135 |
| **31** | 0.0093553218 | -0.0342940634 | | 0.0083409023 | 7.9997835440 | 7.9998231231 | 7.9997822837 | 7.9999373220 | 99.6092664931 | 33.3872432712 |
| **32** | -0.0044981564 | -0.0191279766 | | 0.0458865313 | 7.9997812938 | 7.9997806385 | 7.9997618974 | 7.9999231083 | 99.6117621528 | 33.3927517361 |
| **33** | 0.0015415998 | -0.0204528957 | | -0.0031154006 | 7.9997858858 | 7.9997742903 | 7.9998014201 | 7.9999220596 | 99.6049262153 | 33.4235496948 |
| **34** | -0.0263284405 | -0.0024521820 | | 0.0042224297 | 7.9997949108 | 7.9997773793 | 7.9997773411 | 7.9999357578 | 99.6100983796 | 33.3981650270 |
| **35** | 0.0137497358 | 0.0044893450 | | 0.0214085686 | 7.9997838147 | 7.9998223568 | 7.9998164184 | 7.9999386910 | 99.6083984375 | 33.3861201888 |
| **36** | 0.0034317676 | -0.0474927253 | | 0.0237091997 | 7.9998073394 | 7.9997653632 | 7.9998046116 | 7.9999205015 | 99.6062644676 | 33.4239601772 |
| **37** | -0.0064588861 | -0.0255765860 | | -0.0460749831 | 7.9997998948 | 7.9997683967 | 7.9997998125 | 7.9999339490 | 99.6138237847 | 33.3883406806 |
| **38** | -0.0250084639 | 0.0102058671 | | -0.0399184550 | 7.9998255784 | 7.9998130476 | 7.9998127561 | 7.9999406550 | 99.6086154514 | 33.3866908077 |
| **39** | 0.0059147887 | -0.0115198929 | | -0.0703696672 | 7.9997955486 | 7.9997885732 | 7.9997920710 | 7.9999355180 | 99.6042751736 | 33.3929996709 |
| **40** | 0.0137080547 | -0.0385146021 | | -0.0221066193 | 7.9998111669 | 7.9998140416 | 7.9998143761 | 7.9999367119 | 99.6077473958 | 33.3933137028 |
| **41** | -0.0107272233 | -0.0013075232 | | 0.0669530227 | 7.9997852686 | 7.9998053068 | 7.9997949127 | 7.9999304181 | 99.6137876157 | 33.3940793505 |
| **42** | 0.0160161594 | 0.0298373911 | | 0.0358735224 | 7.9998000219 | 7.9998057555 | 7.9998348993 | 7.9999386806 | 99.6135706019 | 33.4003554489 |
| **43** | -0.0244297054 | -0.0112784496 | | 0.0224840036 | 7.9998202805 | 7.9997762414 | 7.9998011877 | 7.9999350093 | 99.6085431134 | 33.3902045888 |
| **44** | 0.0205411054 | -0.0289599740 | | -0.0475145443 | 7.9998214264 | 7.9998010304 | 7.9997718642 | 7.9999348606 | 99.6094835069 | 33.4001981493 |
| **45** | -0.0179252500 | 0.0143559927 | | -0.0230905061 | 7.9997751646 | 7.9998117843 | 7.9998090105 | 7.9999267494 | 99.6085069444 | 33.3882408258 |
| **46** | -0.0104514139 | 0.0224172976 | | -0.0156753414 | 7.9998410666 | 7.9997869727 | 7.9997893243 | 7.9999297118 | 99.6091941551 | 33.3915289409 |
| **47** | -0.0098972475 | -0.0373041549 | | 0.0210982600 | 7.9997752537 | 7.9997796445 | 7.9997939822 | 7.9999250284 | 99.6096281829 | 33.3833068094 |
| **48** | 0.0115890397 | 0.0033140101 | | -0.0141881160 | 7.9998114496 | 7.9997851246 | 7.9997992628 | 7.9999362463 | 99.6125217014 | 33.3698858479 |
| **49** | -0.0160408759 | 0.0075624857 | | -0.0212253857 | 7.9997765629 | 7.9997829127 | 7.9998104446 | 7.9999333270 | 99.6107494213 | 33.4130351591 |
| **50** | -0.0171112241 | 0.0315888859 | | 0.0266503402 | 7.9998121038 | 7.9998352865 | 7.9997894583 | 7.9999364570 | 99.6066984954 | 33.4105355279 |
| **Total** | -0.2204020137 | -0.1192118507 | | -0.2964453403 | 399.9901369712 | 399.9899614157 | 399.9898858161 | 399.9966937108 | 4980.4801793981 | 1669.6370808653 |
| **Average** | -0.0044080117 | -0.0023842325 | | -0.0059288373 | 7.9998027394 | 7.9997992283 | 7.9997977163 | 7.9999338742 | 99.6096035880 | 33.3927416173 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000203\_08\_001702\_001734** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0050109307 | 0.0107922361 | | 0.0249938989 | 7.9997955660 | 7.9997859134 | 7.9998217771 | 7.9999376214 | 99.6052879051 | 33.3685531273 |
| **2** | -0.0099445898 | 0.0068367092 | | 0.0289421366 | 7.9998188095 | 7.9998056298 | 7.9998221237 | 7.9999404034 | 99.6109302662 | 33.3920358740 |
| **3** | 0.0380283933 | -0.0172136917 | | 0.0093539678 | 7.9998013193 | 7.9997945507 | 7.9998082188 | 7.9999398141 | 99.6065176505 | 33.4120058324 |
| **4** | 0.0018713933 | -0.0087341285 | | -0.0259918694 | 7.9998508341 | 7.9998290435 | 7.9997897073 | 7.9999383071 | 99.6077835648 | 33.3961892077 |
| **5** | -0.0249417451 | 0.0068178743 | | -0.0018046217 | 7.9998376728 | 7.9997980587 | 7.9997713612 | 7.9999347893 | 99.6111472801 | 33.4096199562 |
| **6** | -0.0049413887 | 0.0156121477 | | -0.0029855385 | 7.9998185495 | 7.9997994662 | 7.9997933507 | 7.9999266305 | 99.6082899306 | 33.3809420672 |
| **7** | -0.0386074949 | 0.0125096705 | | 0.0139305858 | 7.9997774198 | 7.9998072490 | 7.9998261072 | 7.9999309175 | 99.6127748843 | 33.3885164193 |
| **8** | 0.0033888748 | 0.0027209504 | | -0.0018871573 | 7.9997713874 | 7.9998059183 | 7.9997956713 | 7.9999306357 | 99.6110387731 | 33.3834425495 |
| **9** | -0.0076509808 | -0.0156067957 | | -0.0101309765 | 7.9998102400 | 7.9998031125 | 7.9998021290 | 7.9999391050 | 99.6093026620 | 33.3658061286 |
| **10** | 0.0116927643 | 0.0036094917 | | -0.0252919120 | 7.9998164706 | 7.9997977089 | 7.9997902230 | 7.9999292034 | 99.6100983796 | 33.4151766465 |
| **11** | -0.0012020446 | -0.0176696496 | | -0.0044680354 | 7.9997967480 | 7.9998105650 | 7.9997821237 | 7.9999337039 | 99.6087601273 | 33.3699573348 |
| **12** | 0.0096197884 | 0.0165583800 | | -0.0222295132 | 7.9998115190 | 7.9997936903 | 7.9998292326 | 7.9999426347 | 99.6074218750 | 33.3970266260 |
| **13** | 0.0253029447 | 0.0106088958 | | 0.0284441832 | 7.9998071993 | 7.9997857940 | 7.9998069031 | 7.9999400144 | 99.6115813079 | 33.3851355415 |
| **14** | -0.0049752671 | -0.0408777323 | | -0.0092881782 | 7.9998156944 | 7.9997933852 | 7.9997812546 | 7.9999246949 | 99.6049262153 | 33.3899617602 |
| **15** | 0.0079310210 | -0.0291250778 | | 0.0237168830 | 7.9997794391 | 7.9997682050 | 7.9998096073 | 7.9999220444 | 99.6124855324 | 33.3893385190 |
| **16** | -0.0156163732 | 0.0118356777 | | -0.0297352245 | 7.9998092192 | 7.9998206307 | 7.9997814010 | 7.9999413157 | 99.6101345486 | 33.3781930828 |
| **17** | -0.0015354682 | -0.0295523505 | | -0.0062406447 | 7.9997881305 | 7.9997926417 | 7.9997793804 | 7.9999303546 | 99.6064091435 | 33.3897996380 |
| **18** | -0.0035518606 | -0.0076367980 | | 0.0197180985 | 7.9998072768 | 7.9997792722 | 7.9997851080 | 7.9999335571 | 99.6039496528 | 33.4222517248 |
| **19** | 0.0019320354 | 0.0013265673 | | 0.0089187422 | 7.9998023706 | 7.9998060153 | 7.9998200696 | 7.9999321674 | 99.6049623843 | 33.3760131570 |
| **20** | -0.0214009843 | -0.0089480333 | | -0.0315146472 | 7.9997852078 | 7.9998033598 | 7.9998084284 | 7.9999337927 | 99.6129557292 | 33.3880910437 |
| **21** | 0.0165309420 | -0.0041090539 | | -0.0118001850 | 7.9998051530 | 7.9997777079 | 7.9998209713 | 7.9999319051 | 99.6038773148 | 33.3682166848 |
| **22** | 0.0283220887 | 0.0043868050 | | -0.0434407503 | 7.9997979928 | 7.9998126764 | 7.9997947821 | 7.9999375551 | 99.6049985532 | 33.3997022796 |
| **23** | 0.0098483060 | -0.0242003045 | | -0.0707993404 | 7.9997761564 | 7.9998243368 | 7.9997737650 | 7.9999279623 | 99.6077473958 | 33.3870245552 |
| **24** | 0.0088839057 | 0.0273215430 | | 0.0061946869 | 7.9998062279 | 7.9998200495 | 7.9998093254 | 7.9999422223 | 99.6139684606 | 33.3861848675 |
| **25** | 0.0081302694 | 0.0092782563 | | -0.0497449999 | 7.9998392164 | 7.9997723149 | 7.9998366353 | 7.9999417783 | 99.6073495370 | 33.3711710523 |
| **26** | -0.0049342980 | -0.0342845846 | | 0.0231419166 | 7.9998141842 | 7.9998214322 | 7.9998090615 | 7.9999361487 | 99.6102430556 | 33.3973025032 |
| **27** | 0.0171075195 | -0.0016471175 | | -0.0035213640 | 7.9998173726 | 7.9997823813 | 7.9997998883 | 7.9999345789 | 99.6131004051 | 33.3847524340 |
| **28** | -0.0363929478 | -0.0146149538 | | -0.0166676692 | 7.9998005474 | 7.9998021232 | 7.9997960794 | 7.9999278129 | 99.6040581597 | 33.3786971791 |
| **29** | -0.0140208347 | 0.0043666517 | | 0.0447008865 | 7.9998169429 | 7.9997990147 | 7.9997904562 | 7.9999274197 | 99.6136067708 | 33.3838259407 |
| **30** | -0.0020151158 | 0.0330466225 | | 0.0504306976 | 7.9998212664 | 7.9997929745 | 7.9997899352 | 7.9999219253 | 99.6078920718 | 33.3927045037 |
| **31** | 0.0058210626 | 0.0151094129 | | 0.0387775756 | 7.9998237137 | 7.9997810600 | 7.9997828347 | 7.9999301023 | 99.6104600694 | 33.3891212214 |
| **32** | -0.0163056971 | 0.0106681970 | | 0.0368451005 | 7.9998195627 | 7.9998016208 | 7.9998030253 | 7.9999385223 | 99.6053964120 | 33.3864615956 |
| **33** | 0.0170252065 | 0.0072263672 | | 0.0270846990 | 7.9997739416 | 7.9998080400 | 7.9998316126 | 7.9999385163 | 99.6043836806 | 33.3795191369 |
| **34** | -0.0087146661 | -0.0307632184 | | -0.0172208278 | 7.9998079058 | 7.9997890571 | 7.9998091664 | 7.9999256185 | 99.6124493634 | 33.3641551210 |
| **35** | -0.0035663890 | -0.0424812958 | | -0.0350693186 | 7.9998028728 | 7.9998009979 | 7.9998159864 | 7.9999418710 | 99.6116536458 | 33.3828776042 |
| **36** | 0.0119784552 | -0.0074987578 | | 0.0208851243 | 7.9998054562 | 7.9997748365 | 7.9997914198 | 7.9999310454 | 99.6031177662 | 33.3769003608 |
| **37** | 0.0111586943 | 0.0293498287 | | 0.0334895189 | 7.9998096163 | 7.9998232960 | 7.9998210201 | 7.9999402075 | 99.6114004630 | 33.3883135893 |
| **38** | 0.0096077585 | -0.0020402458 | | -0.0363222331 | 7.9997720192 | 7.9998080458 | 7.9998270497 | 7.9999368681 | 99.6078920718 | 33.3972735680 |
| **39** | 0.0040552807 | 0.0162174952 | | 0.0078366064 | 7.9998235196 | 7.9998146807 | 7.9997978073 | 7.9999378441 | 99.6035879630 | 33.3848971099 |
| **40** | -0.0155805758 | 0.0144579795 | | -0.0455208694 | 7.9997962808 | 7.9997854346 | 7.9997930167 | 7.9999336762 | 99.6094473380 | 33.3721866206 |
| **41** | -0.0081634140 | 0.0149228096 | | 0.0874258444 | 7.9998109463 | 7.9998026306 | 7.9997994640 | 7.9999367430 | 99.6075665509 | 33.3932552651 |
| **42** | 0.0068747741 | -0.0013920448 | | -0.0346432635 | 7.9998042277 | 7.9998167488 | 7.9998033436 | 7.9999461109 | 99.6179832176 | 33.3845528663 |
| **43** | -0.0049719476 | -0.0009710386 | | 0.0127899727 | 7.9998111206 | 7.9997979184 | 7.9998158351 | 7.9999307329 | 99.6028284144 | 33.4016735600 |
| **44** | 0.0117435408 | -0.0229609022 | | 0.0018841923 | 7.9998068948 | 7.9997602078 | 7.9998333530 | 7.9999300104 | 99.6157769097 | 33.3961072247 |
| **45** | 0.0301757008 | -0.0036168986 | | -0.0054337553 | 7.9998031328 | 7.9997968859 | 7.9997959431 | 7.9999344257 | 99.6076027199 | 33.3903607537 |
| **46** | -0.0292480643 | -0.0135125900 | | -0.0087540360 | 7.9998261372 | 7.9998132015 | 7.9998035077 | 7.9999371901 | 99.6072048611 | 33.3970179739 |
| **47** | -0.0217102417 | 0.0244994068 | | 0.0376396773 | 7.9997598201 | 7.9998106693 | 7.9998075675 | 7.9999404827 | 99.6087239583 | 33.4080836964 |
| **48** | -0.0117170986 | 0.0162799681 | | -0.0071675738 | 7.9997836006 | 7.9997901410 | 7.9997996380 | 7.9999276349 | 99.6063006366 | 33.3863040123 |
| **49** | -0.0175047481 | -0.0318133071 | | 0.0019069623 | 7.9998148989 | 7.9998034685 | 7.9997950353 | 7.9999379363 | 99.6075303819 | 33.3799055068 |
| **50** | -0.0285629840 | -0.0008481363 | | 0.0153545180 | 7.9997693442 | 7.9997951386 | 7.9997711060 | 7.9999218916 | 99.6084346065 | 33.3926559947 |
| **Total** | -0.0557355691 | -0.0857587626 | | 0.0467319704 | 399.9902211456 | 399.9899593018 | 399.9901228100 | 399.9967084458 | 4980.4333405671 | 1669.3992610180 |
| **Average** | -0.0011147109 | -0.0017151736 | | 0.0009346391 | 7.9998044229 | 7.9997991860 | 7.9998024562 | 7.9999341689 | 99.6086668113 | 33.3879852204 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000207\_03\_000556\_000590** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0361734542 | 0.0145139466 | | -0.0028833164 | 7.9997899475 | 7.9998036362 | 7.9998257717 | 7.9999327859 | 99.6077835648 | 33.3580300812 |
| **2** | 0.0079322790 | 0.0073219939 | | 0.0260306497 | 7.9998183683 | 7.9997880409 | 7.9997729138 | 7.9999360782 | 99.6026475694 | 33.3638006649 |
| **3** | 0.0362616925 | -0.0159780271 | | -0.0316968526 | 7.9997875997 | 7.9998126842 | 7.9997822524 | 7.9999271090 | 99.6051070602 | 33.3947008896 |
| **4** | -0.0457728196 | 0.0146999003 | | -0.0248423632 | 7.9997921299 | 7.9997748223 | 7.9997850806 | 7.9999224832 | 99.6104600694 | 33.3866954884 |
| **5** | -0.0062369647 | -0.0007692547 | | 0.0521648839 | 7.9998102876 | 7.9997865141 | 7.9997783553 | 7.9999354993 | 99.6081090856 | 33.3999839722 |
| **6** | 0.0146677708 | -0.0256168018 | | -0.0043617918 | 7.9997790566 | 7.9997986804 | 7.9998064521 | 7.9999229915 | 99.6078197338 | 33.3974459025 |
| **7** | 0.0473912452 | -0.0201786857 | | 0.0094537891 | 7.9998080660 | 7.9998056205 | 7.9997900625 | 7.9999302575 | 99.6061197917 | 33.3681400917 |
| **8** | -0.0036842353 | -0.0252007448 | | -0.0015001030 | 7.9998127335 | 7.9998123101 | 7.9998009134 | 7.9999333201 | 99.6142216435 | 33.3875682246 |
| **9** | 0.0066833708 | -0.0150466262 | | -0.0481745428 | 7.9997861072 | 7.9997670340 | 7.9998113268 | 7.9999314095 | 99.6065538194 | 33.3957126282 |
| **10** | 0.0012690708 | -0.0103218759 | | -0.0208982935 | 7.9997906671 | 7.9998131762 | 7.9998154174 | 7.9999365400 | 99.6116898148 | 33.3889487450 |
| **11** | 0.0073525675 | 0.0066024780 | | -0.0088308271 | 7.9997979371 | 7.9998425694 | 7.9998112161 | 7.9999399800 | 99.6032986111 | 33.3861675631 |
| **12** | -0.0143055921 | 0.0097018280 | | -0.0242836099 | 7.9997722001 | 7.9997983347 | 7.9998220235 | 7.9999337933 | 99.6127025463 | 33.3947472710 |
| **13** | 0.0184538346 | -0.0160653918 | | -0.0142078108 | 7.9998293292 | 7.9997935321 | 7.9998201529 | 7.9999363450 | 99.6115089699 | 33.4218262073 |
| **14** | -0.0639284980 | -0.0124408908 | | 0.0108045929 | 7.9998011451 | 7.9998205717 | 7.9998153880 | 7.9999363772 | 99.6074580440 | 33.3795453772 |
| **15** | -0.0104995506 | 0.0077494947 | | -0.0603341020 | 7.9997690245 | 7.9997867152 | 7.9997988076 | 7.9999295057 | 99.6157407407 | 33.4016410789 |
| **16** | -0.0141600690 | -0.0212303023 | | 0.0213198881 | 7.9997946866 | 7.9997742489 | 7.9997875138 | 7.9999216710 | 99.6114004630 | 33.4087194195 |
| **17** | 0.0023150591 | -0.0312980251 | | 0.0044220048 | 7.9997531731 | 7.9998114197 | 7.9997867826 | 7.9999247262 | 99.6092664931 | 33.3960709139 |
| **18** | 0.0021619082 | 0.0039483429 | | -0.0343899242 | 7.9998295719 | 7.9998080895 | 7.9998063451 | 7.9999411326 | 99.6053964120 | 33.4166653901 |
| **19** | 0.0151610386 | -0.0130032049 | | -0.0076977931 | 7.9998266340 | 7.9997725994 | 7.9997701937 | 7.9999316336 | 99.6176938657 | 33.3938655989 |
| **20** | -0.0088445230 | -0.0115186988 | | -0.0118694347 | 7.9998239333 | 7.9998016170 | 7.9998133770 | 7.9999360825 | 99.6123408565 | 33.3846890319 |
| **21** | -0.0204576054 | -0.0178219796 | | -0.0197953014 | 7.9997740540 | 7.9998098537 | 7.9997535844 | 7.9999353577 | 99.6100983796 | 33.3799360022 |
| **22** | -0.0323693464 | -0.0016269490 | | -0.0277980816 | 7.9998068482 | 7.9998126629 | 7.9998202731 | 7.9999260483 | 99.6100260417 | 33.4036086715 |
| **23** | 0.0006933772 | -0.0421980156 | | -0.0573044581 | 7.9997977241 | 7.9997615824 | 7.9998142594 | 7.9999345188 | 99.6136067708 | 33.4083604246 |
| **24** | 0.0136665091 | 0.0134175172 | | 0.0071136878 | 7.9997955535 | 7.9997845706 | 7.9997638625 | 7.9999379952 | 99.6024667245 | 33.3897264490 |
| **25** | 0.0064410780 | 0.0204397464 | | 0.0595005920 | 7.9998059565 | 7.9997656247 | 7.9997870767 | 7.9999297677 | 99.6111472801 | 33.4027058653 |
| **26** | -0.0201036165 | -0.0362345618 | | -0.0259859913 | 7.9997978852 | 7.9998022532 | 7.9997832923 | 7.9999366238 | 99.6038773148 | 33.3858607650 |
| **27** | 0.0171820728 | 0.0020794276 | | 0.0327016536 | 7.9997985976 | 7.9997947033 | 7.9998184314 | 7.9999388224 | 99.6121238426 | 33.3930687466 |
| **28** | 0.0085162376 | -0.0029671875 | | -0.0420157963 | 7.9997946379 | 7.9998141928 | 7.9997774859 | 7.9999317093 | 99.6068793403 | 33.3711757330 |
| **29** | 0.0076209560 | -0.0006714083 | | -0.0521486945 | 7.9998188483 | 7.9997786480 | 7.9997853604 | 7.9999155168 | 99.6060112847 | 33.3942691313 |
| **30** | 0.0115398269 | -0.0226999678 | | 0.0035283940 | 7.9998131064 | 7.9997886268 | 7.9998290007 | 7.9999331372 | 99.6092303241 | 33.4044045309 |
| **31** | 0.0196960640 | 0.0092967397 | | -0.0055006722 | 7.9998210315 | 7.9997883339 | 7.9998015863 | 7.9999327852 | 99.6066261574 | 33.3960412695 |
| **32** | -0.0275468889 | -0.0277699611 | | 0.0198549635 | 7.9997789723 | 7.9997767263 | 7.9997817677 | 7.9999410636 | 99.6129195602 | 33.3968574119 |
| **33** | -0.0249477178 | 0.0189358318 | | -0.0349567500 | 7.9998135502 | 7.9998223737 | 7.9997918619 | 7.9999326837 | 99.6051432292 | 33.4022116978 |
| **34** | -0.0038478721 | -0.0045271235 | | 0.0489563291 | 7.9998062772 | 7.9998293555 | 7.9997923305 | 7.9999371568 | 99.6049985532 | 33.3669944569 |
| **35** | -0.0060108541 | -0.0132609116 | | -0.0225125505 | 7.9998058248 | 7.9998213339 | 7.9997900192 | 7.9999290414 | 99.6075303819 | 33.3899138185 |
| **36** | -0.0011969007 | -0.0024699509 | | -0.0041978905 | 7.9997754736 | 7.9998106199 | 7.9998221020 | 7.9999215226 | 99.6075665509 | 33.4036890943 |
| **37** | 0.0190932659 | -0.0322734865 | | -0.0059032791 | 7.9998110043 | 7.9997862432 | 7.9997958418 | 7.9999344633 | 99.6112919560 | 33.3873427004 |
| **38** | 0.0065142347 | -0.0097880475 | | -0.0384051122 | 7.9998155942 | 7.9997936420 | 7.9997876528 | 7.9999383730 | 99.6084707755 | 33.4002126169 |
| **39** | -0.0072570966 | -0.0019098882 | | 0.0364828722 | 7.9997909252 | 7.9998098431 | 7.9997812322 | 7.9999220238 | 99.6085792824 | 33.4018575254 |
| **40** | 0.0105449937 | -0.0041217660 | | -0.0533849398 | 7.9997800395 | 7.9998249653 | 7.9997814315 | 7.9999281826 | 99.6152343750 | 33.3719039352 |
| **41** | -0.0180033574 | -0.0392560482 | | 0.0057660686 | 7.9997966294 | 7.9998077936 | 7.9997606193 | 7.9999348963 | 99.6036964699 | 33.4212189940 |
| **42** | -0.0083994836 | -0.0195098786 | | -0.0275135128 | 7.9997918869 | 7.9998085727 | 7.9997833423 | 7.9999307371 | 99.6024305556 | 33.3753445273 |
| **43** | -0.0020560534 | -0.0241580106 | | -0.0585702535 | 7.9997951680 | 7.9997715448 | 7.9998304852 | 7.9999318175 | 99.6095196759 | 33.3930162661 |
| **44** | 0.0115171162 | -0.0064486871 | | 0.0227101235 | 7.9998072703 | 7.9998168786 | 7.9997886590 | 7.9999351410 | 99.6067708333 | 33.4060402199 |
| **45** | 0.0057943314 | -0.0170013321 | | 0.0103399451 | 7.9998281683 | 7.9997860131 | 7.9998098587 | 7.9999369100 | 99.6096281829 | 33.3857494213 |
| **46** | -0.0114194092 | 0.0056773485 | | 0.0150889093 | 7.9998223144 | 7.9998182445 | 7.9998170549 | 7.9999363893 | 99.6114728009 | 33.3953550517 |
| **47** | 0.0181129037 | 0.0217558500 | | -0.0234015313 | 7.9998362629 | 7.9997927824 | 7.9998174912 | 7.9999383745 | 99.6040581597 | 33.4070720997 |
| **48** | -0.0052176016 | 0.0277920241 | | 0.0479916191 | 7.9997554302 | 7.9998178943 | 7.9998192171 | 7.9999381811 | 99.6035156250 | 33.3731308438 |
| **49** | -0.0076840316 | 0.0180028473 | | -0.0131632566 | 7.9997851053 | 7.9998240901 | 7.9998082302 | 7.9999371587 | 99.6078920718 | 33.3652498355 |
| **50** | 0.0248236333 | 0.0101889612 | | 0.0273171836 | 7.9997818350 | 7.9998131412 | 7.9997963712 | 7.9999327810 | 99.6082175926 | 33.3869140625 |
| **Total** | 0.0136298039 | -0.3332594132 | | -0.3469806872 | 399.9899745733 | 399.9900053268 | 399.9898901283 | 399.9966289009 | 4980.4283492477 | 1669.5841967081 |
| **Average** | 0.0002725961 | -0.0066650896 | | -0.0069395023 | 7.9997994915 | 7.9998001065 | 7.9997978026 | 7.9999325780 | 99.6085669850 | 33.3916839342 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000207\_04\_000902\_000934** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0077209685 | 0.0179267307 | | -0.0813228292 | 7.9997579349 | 7.9998125149 | 7.9998082096 | 7.9999290882 | 99.6097366898 | 33.3849226409 |
| **2** | -0.0155891448 | 0.0326188798 | | 0.0526807131 | 7.9997777061 | 7.9998055299 | 7.9998143805 | 7.9999285477 | 99.6049623843 | 33.3997398670 |
| **3** | 0.0358145726 | -0.0194856984 | | -0.0298960292 | 7.9998104199 | 7.9998298098 | 7.9997947018 | 7.9999363486 | 99.6089048032 | 33.3957327694 |
| **4** | 0.0250635044 | -0.0034349819 | | -0.0337020781 | 7.9997987120 | 7.9997955687 | 7.9997735284 | 7.9999402560 | 99.6054325810 | 33.3705686615 |
| **5** | -0.0089736687 | -0.0270388349 | | 0.0169065555 | 7.9998003034 | 7.9998081941 | 7.9998060183 | 7.9999374507 | 99.6100622106 | 33.4112640137 |
| **6** | -0.0138104984 | -0.0158889847 | | 0.0447861703 | 7.9997792297 | 7.9997923423 | 7.9998112200 | 7.9999364393 | 99.6106770833 | 33.4150316869 |
| **7** | 0.0071162416 | 0.0003108129 | | -0.0237448770 | 7.9997807989 | 7.9998313545 | 7.9998004544 | 7.9999289596 | 99.6040581597 | 33.3914839778 |
| **8** | 0.0139626783 | -0.0101870092 | | -0.0335251029 | 7.9998086535 | 7.9997838216 | 7.9998075607 | 7.9999257682 | 99.6067346644 | 33.3809532725 |
| **9** | 0.0126959884 | -0.0227940059 | | -0.0207096464 | 7.9997927018 | 7.9997849511 | 7.9997827416 | 7.9999292161 | 99.6103153935 | 33.4250225524 |
| **10** | -0.0021125000 | 0.0110299140 | | 0.0554994027 | 7.9997817050 | 7.9998052797 | 7.9997946755 | 7.9999333208 | 99.6121238426 | 33.3807973913 |
| **11** | 0.0109681992 | 0.0020230648 | | -0.0329549142 | 7.9998036296 | 7.9997942994 | 7.9997767664 | 7.9999402089 | 99.6025390625 | 33.3841891907 |
| **12** | 0.0092249721 | -0.0045560284 | | 0.0116230253 | 7.9998025175 | 7.9997937553 | 7.9998131887 | 7.9999313947 | 99.6107494213 | 33.3923365729 |
| **13** | -0.0379441705 | -0.0188697242 | | -0.0069113713 | 7.9998101770 | 7.9998006252 | 7.9998066781 | 7.9999366573 | 99.6072410301 | 33.3865235793 |
| **14** | -0.0017927187 | 0.0221265971 | | 0.0021200910 | 7.9997639690 | 7.9998099933 | 7.9998080781 | 7.9999231455 | 99.6124493634 | 33.3963062250 |
| **15** | -0.0209718401 | -0.0063900172 | | 0.0147928459 | 7.9997907873 | 7.9997882786 | 7.9998195100 | 7.9999288963 | 99.6065899884 | 33.3960270856 |
| **16** | 0.0083164705 | -0.0055841668 | | 0.0092548258 | 7.9997997915 | 7.9997865647 | 7.9998194629 | 7.9999235481 | 99.6132089120 | 33.4179731470 |
| **17** | 0.0318315950 | -0.0083150710 | | -0.0078985106 | 7.9998043660 | 7.9998268358 | 7.9997928245 | 7.9999327662 | 99.6157045718 | 33.3820416043 |
| **18** | -0.0318362853 | 0.0280178308 | | -0.0131128091 | 7.9998101571 | 7.9997956951 | 7.9997918299 | 7.9999285148 | 99.6106770833 | 33.3965801164 |
| **19** | -0.0103686364 | -0.0043660749 | | -0.0158916783 | 7.9998046616 | 7.9998122547 | 7.9998224446 | 7.9999368299 | 99.6187427662 | 33.3917842513 |
| **20** | 0.0063559186 | -0.0117683546 | | 0.0116711584 | 7.9998136532 | 7.9998088168 | 7.9997985805 | 7.9999238744 | 99.6080005787 | 33.3892263242 |
| **21** | 0.0017737074 | 0.0129896093 | | -0.0343750917 | 7.9997953749 | 7.9998181548 | 7.9998096300 | 7.9999379628 | 99.6057581019 | 33.3729359568 |
| **22** | 0.0119909862 | -0.0247098049 | | -0.0515872162 | 7.9998004665 | 7.9997919726 | 7.9998168922 | 7.9999367907 | 99.6075303819 | 33.3689464472 |
| **23** | 0.0016172943 | -0.0083945460 | | 0.0333554227 | 7.9998094093 | 7.9998054448 | 7.9997673560 | 7.9999216712 | 99.6134620949 | 33.3913734852 |
| **24** | -0.0091045842 | -0.0078107430 | | -0.0331045966 | 7.9998017920 | 7.9998018558 | 7.9998013167 | 7.9999412938 | 99.6049623843 | 33.3379564384 |
| **25** | -0.0005685744 | -0.0202169868 | | -0.0074217459 | 7.9998271560 | 7.9997922988 | 7.9998459740 | 7.9999358807 | 99.6046730324 | 33.3879545945 |
| **26** | -0.0030124106 | 0.0258533519 | | -0.0125948356 | 7.9997877603 | 7.9997985228 | 7.9997513476 | 7.9999241914 | 99.6100983796 | 33.3850849049 |
| **27** | -0.0274428206 | 0.0039070877 | | 0.0503684399 | 7.9997936084 | 7.9998213893 | 7.9997960564 | 7.9999399611 | 99.6059389468 | 33.3875513458 |
| **28** | 0.0026482787 | 0.0096639134 | | -0.0232482591 | 7.9998042289 | 7.9997838151 | 7.9998216527 | 7.9999318571 | 99.6125217014 | 33.3849278890 |
| **29** | -0.0171426659 | 0.0021276848 | | -0.0018149989 | 7.9997952482 | 7.9998277180 | 7.9997947034 | 7.9999421883 | 99.6075665509 | 33.3860997640 |
| **30** | 0.0037084334 | 0.0138214397 | | 0.0309926222 | 7.9997753987 | 7.9998180718 | 7.9998029686 | 7.9999286014 | 99.6057219329 | 33.3962120438 |
| **31** | 0.0241980530 | 0.0138953977 | | 0.0190625510 | 7.9998096396 | 7.9998178637 | 7.9998102247 | 7.9999310872 | 99.6090494792 | 33.3713948745 |
| **32** | -0.0177109698 | 0.0037365160 | | 0.0016780125 | 7.9998082515 | 7.9998029061 | 7.9997898197 | 7.9999348471 | 99.6086154514 | 33.3969606708 |
| **33** | -0.0013767770 | 0.0204055016 | | -0.0377175501 | 7.9997747741 | 7.9998137077 | 7.9997804043 | 7.9999279314 | 99.6132812500 | 33.3984233161 |
| **34** | 0.0348666935 | -0.0142338197 | | 0.0371753247 | 7.9998148071 | 7.9998179117 | 7.9998034757 | 7.9999422684 | 99.6093388310 | 33.3917354587 |
| **35** | 0.0045924959 | -0.0209318360 | | 0.0279528480 | 7.9998070947 | 7.9997945166 | 7.9998181243 | 7.9999366442 | 99.6057942708 | 33.3819755072 |
| **36** | 0.0300543378 | -0.0041026328 | | 0.0089313307 | 7.9998094329 | 7.9998288084 | 7.9997959818 | 7.9999303857 | 99.6118344907 | 33.4013247776 |
| **37** | -0.0150586986 | -0.0023578396 | | -0.0259346935 | 7.9998054667 | 7.9998204832 | 7.9998239536 | 7.9999296692 | 99.6131365741 | 33.3738061399 |
| **38** | -0.0109801922 | 0.0240460635 | | -0.0019606277 | 7.9997853522 | 7.9997814501 | 7.9997661050 | 7.9999230035 | 99.6017433449 | 33.3835480778 |
| **39** | 0.0195992200 | 0.0109262508 | | -0.0031195166 | 7.9998150932 | 7.9997562353 | 7.9997807140 | 7.9999324502 | 99.6130642361 | 33.3934995121 |
| **40** | -0.0079758277 | 0.0024758183 | | -0.0487912457 | 7.9997766437 | 7.9997715578 | 7.9997644561 | 7.9999182816 | 99.6124855324 | 33.4056707289 |
| **41** | 0.0042196600 | 0.0084106474 | | 0.0447479593 | 7.9998206745 | 7.9997801876 | 7.9998168390 | 7.9999344769 | 99.6075303819 | 33.3989170581 |
| **42** | 0.0245327562 | -0.0005809702 | | 0.0173836275 | 7.9997879454 | 7.9998273706 | 7.9998046607 | 7.9999300544 | 99.6059027778 | 33.3838337418 |
| **43** | 0.0130516060 | -0.0018328003 | | -0.0103374306 | 7.9997913034 | 7.9998167014 | 7.9998244129 | 7.9999385930 | 99.6106409144 | 33.3802857775 |
| **44** | -0.0062138530 | -0.0078032562 | | -0.0136586420 | 7.9998000201 | 7.9998024931 | 7.9997892923 | 7.9999242197 | 99.6103515625 | 33.3965677764 |
| **45** | 0.0036847276 | 0.0033323351 | | -0.0437333622 | 7.9997939231 | 7.9998156203 | 7.9998283748 | 7.9999389734 | 99.6053964120 | 33.3806090289 |
| **46** | -0.0046987178 | -0.0075511003 | | 0.0415561113 | 7.9998159457 | 7.9998238597 | 7.9997793605 | 7.9999340948 | 99.6139684606 | 33.4016315757 |
| **47** | -0.0123625468 | 0.0089301583 | | 0.0327668505 | 7.9998004500 | 7.9997771852 | 7.9998066743 | 7.9999366402 | 99.6134620949 | 33.3694562171 |
| **48** | -0.0261687211 | 0.0088487402 | | -0.0041730233 | 7.9998216139 | 7.9998011741 | 7.9998208297 | 7.9999365717 | 99.6109302662 | 33.3813885768 |
| **49** | -0.0071754105 | -0.0008648325 | | 0.0014146108 | 7.9997962345 | 7.9997948583 | 7.9998196131 | 7.9999346110 | 99.6047092014 | 33.3966738721 |
| **50** | -0.0064650080 | -0.0299435347 | | -0.0384086070 | 7.9997838956 | 7.9998241960 | 7.9997882519 | 7.9999309090 | 99.6095558449 | 33.4236265716 |
| **Total** | 0.0327521182 | -0.0225893094 | | -0.1249307900 | 399.9899008798 | 399.9901948159 | 399.9900623202 | 399.9966173423 | 4980.4579354745 | 1669.4988770594 |
| **Average** | 0.0006550423 | -0.0004517862 | | -0.0024986106 | 7.9997980176 | 7.9998038963 | 7.9998012464 | 7.9999323468 | 99.6091587095 | 33.3899775412 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VIRAT\_S\_000205\_05\_001092\_001124** | | | | | | | |
| **Resolution** | | | **720p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0270607014 | -0.0297929403 | | -0.0457743106 | 7.9998127667 | 7.9998056898 | 7.9998302971 | 7.9999375621 | 99.6117259838 | 33.3968671988 |
| **2** | 0.0154452151 | -0.0039479710 | | -0.0013007940 | 7.9998170419 | 7.9997876044 | 7.9997949652 | 7.9999236682 | 99.6068070023 | 33.3901384917 |
| **3** | 0.0023844765 | -0.0294249909 | | -0.0224067335 | 7.9998297629 | 7.9998039596 | 7.9998056304 | 7.9999354225 | 99.6124855324 | 33.3812858853 |
| **4** | -0.0086696665 | 0.0063639684 | | -0.0091250006 | 7.9997854691 | 7.9998002491 | 7.9998067917 | 7.9999281078 | 99.6139322917 | 33.3858729632 |
| **5** | 0.0247377146 | 0.0171671726 | | 0.0323386432 | 7.9998085635 | 7.9997967776 | 7.9998086676 | 7.9999358831 | 99.6099175347 | 33.4023158077 |
| **6** | 0.0035169199 | -0.0021832720 | | 0.0246149494 | 7.9998212071 | 7.9997784840 | 7.9997826343 | 7.9999299473 | 99.6032986111 | 33.4092941517 |
| **7** | -0.0212319223 | -0.0068040543 | | -0.0194647388 | 7.9998202798 | 7.9998006749 | 7.9998119955 | 7.9999398375 | 99.6033709491 | 33.4158888208 |
| **8** | -0.0063686389 | 0.0056996103 | | 0.0432266523 | 7.9998052717 | 7.9997695720 | 7.9997877397 | 7.9999331582 | 99.6131365741 | 33.4003310526 |
| **9** | -0.0218273888 | 0.0066662534 | | 0.0456327476 | 7.9997801263 | 7.9998163818 | 7.9998212201 | 7.9999403423 | 99.6099537037 | 33.3951265489 |
| **10** | 0.0028269561 | -0.0097442364 | | -0.0051572086 | 7.9998013814 | 7.9998107875 | 7.9998333283 | 7.9999474906 | 99.6148726852 | 33.3677808131 |
| **11** | 0.0141165286 | -0.0041759208 | | 0.0322578894 | 7.9998054718 | 7.9998543401 | 7.9997975179 | 7.9999486120 | 99.6047453704 | 33.3768223493 |
| **12** | -0.0412178078 | 0.0038424227 | | -0.0157220363 | 7.9997763780 | 7.9998188705 | 7.9998042584 | 7.9999332372 | 99.6119068287 | 33.3988220259 |
| **13** | 0.0209308156 | 0.0237722752 | | 0.0624887104 | 7.9998328963 | 7.9997424810 | 7.9998201141 | 7.9999280398 | 99.5993200231 | 33.3653372084 |
| **14** | 0.0064769122 | 0.0219128024 | | -0.0186756051 | 7.9997849462 | 7.9997798465 | 7.9997921678 | 7.9999326293 | 99.6043113426 | 33.3890559754 |
| **15** | -0.0157807380 | 0.0097422444 | | -0.0171959024 | 7.9997807493 | 7.9997816183 | 7.9998014723 | 7.9999282781 | 99.6042028356 | 33.3950841390 |
| **16** | -0.0043080558 | 0.0193690919 | | -0.0007291282 | 7.9998068842 | 7.9997898983 | 7.9997833206 | 7.9999243156 | 99.6037688079 | 33.3908127950 |
| **17** | -0.0024916443 | 0.0087317001 | | 0.0146506997 | 7.9997849129 | 7.9997918723 | 7.9997810708 | 7.9999285641 | 99.6120876736 | 33.4041327671 |
| **18** | 0.0013023494 | -0.0003061510 | | 0.0374604755 | 7.9997791392 | 7.9997898348 | 7.9997956251 | 7.9999356654 | 99.6074218750 | 33.3901125352 |
| **19** | 0.0111773281 | -0.0066807635 | | -0.0085783612 | 7.9997679601 | 7.9998098253 | 7.9998009196 | 7.9999280167 | 99.6116536458 | 33.4163046932 |
| **20** | -0.0036350661 | -0.0274401371 | | 0.0019664265 | 7.9998086701 | 7.9997970377 | 7.9998079704 | 7.9999264187 | 99.6124131944 | 33.4185412128 |
| **21** | 0.0256910166 | 0.0048174358 | | 0.0226022232 | 7.9997791809 | 7.9997939799 | 7.9998068122 | 7.9999366044 | 99.6046730324 | 33.3871646923 |
| **22** | -0.0022868119 | -0.0053565897 | | -0.0061672289 | 7.9998020704 | 7.9998133228 | 7.9998031765 | 7.9999362756 | 99.6063368056 | 33.3836696339 |
| **23** | 0.0047386069 | 0.0054901304 | | 0.0209620676 | 7.9997979427 | 7.9998082511 | 7.9997813015 | 7.9999393647 | 99.6028284144 | 33.3770766669 |
| **24** | 0.0385477301 | -0.0173346884 | | -0.0216945338 | 7.9998086444 | 7.9997856107 | 7.9998016070 | 7.9999357274 | 99.6059027778 | 33.3890900168 |
| **25** | -0.0109309386 | 0.0060771980 | | 0.0122393922 | 7.9997893224 | 7.9998198914 | 7.9997797848 | 7.9999312411 | 99.6108579282 | 33.3981586442 |
| **26** | -0.0008827916 | -0.0201770080 | | -0.0432259688 | 7.9997872633 | 7.9998113491 | 7.9998524779 | 7.9999416912 | 99.6141854745 | 33.3809870302 |
| **27** | 0.0048123945 | -0.0155695821 | | -0.0374333711 | 7.9998122807 | 7.9997805394 | 7.9997835360 | 7.9999272253 | 99.6141854745 | 33.4149738165 |
| **28** | -0.0010039356 | 0.0029328834 | | 0.0407777277 | 7.9998175376 | 7.9997722792 | 7.9997928535 | 7.9999312223 | 99.6041304977 | 33.3886442164 |
| **29** | -0.0317187124 | 0.0070533602 | | -0.0464600427 | 7.9998026796 | 7.9998156234 | 7.9998006747 | 7.9999352274 | 99.6065899884 | 33.3981116955 |
| **30** | -0.0077298511 | 0.0112510478 | | -0.0108901291 | 7.9998213268 | 7.9997717655 | 7.9997931840 | 7.9999313235 | 99.6009114583 | 33.3999225558 |
| **31** | 0.0021196761 | 0.0278108375 | | -0.0217792223 | 7.9997811996 | 7.9998018596 | 7.9997801047 | 7.9999257996 | 99.6107132523 | 33.4038434153 |
| **32** | -0.0187343065 | -0.0145797504 | | 0.0149954146 | 7.9998022475 | 7.9998306403 | 7.9998167570 | 7.9999438534 | 99.6153790509 | 33.4063126929 |
| **33** | -0.0146324230 | 0.0077045396 | | 0.0033910595 | 7.9997745676 | 7.9997844761 | 7.9997847985 | 7.9999319851 | 99.6128833912 | 33.3748524873 |
| **34** | 0.0072843498 | -0.0201932898 | | 0.0180753299 | 7.9998132005 | 7.9998088563 | 7.9998264543 | 7.9999407876 | 99.6057942708 | 33.3887920128 |
| **35** | -0.0092347472 | 0.0147099187 | | -0.0354152599 | 7.9997862943 | 7.9997727890 | 7.9997833199 | 7.9999236619 | 99.6082899306 | 33.3725955428 |
| **36** | 0.0010595780 | -0.0044133537 | | 0.0126704586 | 7.9997974592 | 7.9998155145 | 7.9997988219 | 7.9999262334 | 99.6067708333 | 33.3978965255 |
| **37** | -0.0144098608 | -0.0255817329 | | 0.0211048859 | 7.9998141498 | 7.9998035254 | 7.9997880214 | 7.9999302931 | 99.6070240162 | 33.3803949936 |
| **38** | 0.0059723253 | -0.0031795656 | | 0.0521023012 | 7.9997952402 | 7.9997905631 | 7.9998163856 | 7.9999355852 | 99.6097366898 | 33.3775261551 |
| **39** | 0.0000635991 | -0.0178686237 | | 0.0110400303 | 7.9997747745 | 7.9998067922 | 7.9997808475 | 7.9999299935 | 99.6111111111 | 33.3611759316 |
| **40** | -0.0107958983 | -0.0517398105 | | -0.0464917092 | 7.9998155880 | 7.9997966725 | 7.9998121988 | 7.9999322478 | 99.6101345486 | 33.4081442618 |
| **41** | -0.0270012377 | -0.0172602926 | | -0.0297378214 | 7.9998081439 | 7.9997961323 | 7.9997817901 | 7.9999366201 | 99.6093750000 | 33.3929059153 |
| **42** | 0.0113040536 | -0.0200944379 | | -0.0114038309 | 7.9997840199 | 7.9998192829 | 7.9998133208 | 7.9999296848 | 99.6115089699 | 33.4003197054 |
| **43** | 0.0020260578 | -0.0021129163 | | -0.0630115403 | 7.9997989453 | 7.9997993162 | 7.9998047998 | 7.9999328143 | 99.6122323495 | 33.3916907793 |
| **44** | -0.0112512090 | 0.0126737841 | | -0.0208556510 | 7.9998207074 | 7.9998132859 | 7.9998086052 | 7.9999336937 | 99.6083260995 | 33.3724904400 |
| **45** | 0.0117894554 | -0.0089038406 | | 0.0064727307 | 7.9998350066 | 7.9997776935 | 7.9997800761 | 7.9999287100 | 99.6186704282 | 33.4073059924 |
| **46** | -0.0188402668 | -0.0132931053 | | -0.0009766687 | 7.9997978992 | 7.9998046301 | 7.9997991938 | 7.9999366146 | 99.6121961806 | 33.4061285857 |
| **47** | -0.0013491776 | 0.0027787249 | | 0.0173922175 | 7.9997621454 | 7.9997924290 | 7.9997868332 | 7.9999263259 | 99.6087239583 | 33.3892701525 |
| **48** | 0.0059240617 | 0.0344156679 | | 0.0084271593 | 7.9997855392 | 7.9998181383 | 7.9997915911 | 7.9999399174 | 99.6043836806 | 33.3751026915 |
| **49** | 0.0086697857 | -0.0037100554 | | -0.0157072847 | 7.9997830881 | 7.9998031025 | 7.9997864780 | 7.9999331041 | 99.6094111690 | 33.3981623321 |
| **50** | -0.0007324524 | 0.0380355690 | | 0.0209518448 | 7.9998185174 | 7.9997672178 | 7.9997894977 | 7.9999251139 | 99.6089048032 | 33.3844354235 |
| **Total** | -0.1012083434 | -0.0828504417 | | 0.0024619551 | 399.9899768609 | 399.9899013355 | 399.9899930102 | 399.9966541384 | 4980.4435040509 | 1669.5970724400 |
| **Average** | -0.0020241641 | -0.0016570073 | | 0.0000492391 | 7.9997995372 | 7.9997980267 | 7.9997998602 | 7.9999330828 | 99.6088700810 | 33.3919414488 |

# DECRYPTION METRICS

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VIRAT\_S\_000200\_00\_000100\_000171** | |
| **Resolution** | | **720p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0003513278 | | 34.5428752076 |
| **2** | 0.0002526856 | | 35.9741950855 |
| **3** | 0.0002495132 | | 36.0290652769 |
| **4** | 0.0002503117 | | 36.0151886738 |
| **5** | 0.0002497555 | | 36.0248487645 |
| **6** | 0.0002513199 | | 35.9977313234 |
| **7** | 0.0002507957 | | 36.0067985458 |
| **8** | 0.0002511275 | | 36.0010579616 |
| **9** | 0.0002504995 | | 36.0119322026 |
| **10** | 0.0002522865 | | 35.9810605075 |
| **11** | 0.0002508081 | | 36.0065835631 |
| **12** | 0.0002521622 | | 35.9832001264 |
| **13** | 0.0002244692 | | 36.4884315710 |
| **14** | 0.0002331203 | | 36.3241993392 |
| **15** | 0.0002330444 | | 36.3256125854 |
| **16** | 0.0002365276 | | 36.2611810175 |
| **17** | 0.0002367968 | | 36.2562413938 |
| **18** | 0.0002387752 | | 36.2201082179 |
| **19** | 0.0002382864 | | 36.2290083390 |
| **20** | 0.0002402067 | | 36.1941479824 |
| **21** | 0.0002404932 | | 36.1889718732 |
| **22** | 0.0002430235 | | 36.1435170904 |
| **23** | 0.0002431244 | | 36.1417150211 |
| **24** | 0.0002395201 | | 36.2065811476 |
| **25** | 0.0002045187 | | 36.8926696404 |
| **26** | 0.0002203329 | | 36.5692064427 |
| **27** | 0.0002194486 | | 36.5866714241 |
| **28** | 0.0002288374 | | 36.4047300653 |
| **29** | 0.0002254213 | | 36.4700506912 |
| **30** | 0.0002331043 | | 36.3244977865 |
| **31** | 0.0002297690 | | 36.3870864118 |
| **32** | 0.0002363931 | | 36.2636518649 |
| **33** | 0.0002325560 | | 36.3347245259 |
| **34** | 0.0002390924 | | 36.2143430386 |
| **35** | 0.0002352656 | | 36.2844160121 |
| **36** | 0.0002417979 | | 36.1654744806 |
| **37** | 0.0002258183 | | 36.4624091868 |
| **38** | 0.0002378297 | | 36.2373382902 |
| **39** | 0.0002348532 | | 36.2920342878 |
| **40** | 0.0002411688 | | 36.1767880718 |
| **41** | 0.0002376993 | | 36.2397216203 |
| **42** | 0.0002439985 | | 36.1261292874 |
| **43** | 0.0002391809 | | 36.2127348492 |
| **44** | 0.0002448761 | | 36.1105355591 |
| **45** | 0.0002395411 | | 36.2061999316 |
| **46** | 0.0002461725 | | 36.0876038303 |
| **47** | 0.0002411646 | | 36.1768635973 |
| **48** | 0.0002464631 | | 36.0824816343 |
| **49** | 0.0002300833 | | 36.3811485369 |
| **50** | 0.0002418776 | | 36.1640438754 |
| **Total** | 0.0120572452 | | 1809.4078077596 |
| **Average** | 0.0002411449 | | 36.1881561552 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VIRAT\_S\_000200\_01\_000226\_000268** | |
| **Resolution** | | **720p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0003528647 | | 34.5239180593 |
| **2** | 0.0002568005 | | 35.9040415859 |
| **3** | 0.0002466488 | | 36.0792099814 |
| **4** | 0.0002553659 | | 35.9283717675 |
| **5** | 0.0002494897 | | 36.0294734720 |
| **6** | 0.0002569241 | | 35.9019517919 |
| **7** | 0.0002522948 | | 35.9809173611 |
| **8** | 0.0002613176 | | 35.8283129109 |
| **9** | 0.0002571164 | | 35.8987024348 |
| **10** | 0.0002628657 | | 35.8026615217 |
| **11** | 0.0002585576 | | 35.8744267262 |
| **12** | 0.0002647294 | | 35.7719783405 |
| **13** | 0.0002303527 | | 36.3760671813 |
| **14** | 0.0002412020 | | 36.1761909249 |
| **15** | 0.0002377006 | | 36.2396976362 |
| **16** | 0.0002466350 | | 36.0794525861 |
| **17** | 0.0002418050 | | 36.1653468038 |
| **18** | 0.0002500670 | | 36.0194366754 |
| **19** | 0.0002443139 | | 36.1205183912 |
| **20** | 0.0002506175 | | 36.0098853757 |
| **21** | 0.0002450166 | | 36.1080441965 |
| **22** | 0.0002527621 | | 35.9728800142 |
| **23** | 0.0002461803 | | 36.0874661564 |
| **24** | 0.0002504549 | | 36.0127041347 |
| **25** | 0.0002333973 | | 36.3190413088 |
| **26** | 0.0002460335 | | 36.0900580613 |
| **27** | 0.0002410099 | | 36.1796510498 |
| **28** | 0.0002464019 | | 36.0835594327 |
| **29** | 0.0002395201 | | 36.2065800382 |
| **30** | 0.0002442814 | | 36.1210959659 |
| **31** | 0.0002382087 | | 36.2304233922 |
| **32** | 0.0002387190 | | 36.2211302547 |
| **33** | 0.0002303788 | | 36.3755746397 |
| **34** | 0.0002377780 | | 36.2382836222 |
| **35** | 0.0002346866 | | 36.2951167382 |
| **36** | 0.0002423047 | | 36.1563823499 |
| **37** | 0.0002207506 | | 36.5609813041 |
| **38** | 0.0002346523 | | 36.2957516714 |
| **39** | 0.0002309114 | | 36.3655463726 |
| **40** | 0.0002409960 | | 36.1799017367 |
| **41** | 0.0002358300 | | 36.2740095443 |
| **42** | 0.0002434872 | | 36.1352393912 |
| **43** | 0.0002383667 | | 36.2275439869 |
| **44** | 0.0002476447 | | 36.0617092832 |
| **45** | 0.0002414531 | | 36.1716722181 |
| **46** | 0.0002475459 | | 36.0634428333 |
| **47** | 0.0002429916 | | 36.1440879894 |
| **48** | 0.0002475972 | | 36.0625435800 |
| **49** | 0.0002313745 | | 36.3568449369 |
| **50** | 0.0002430771 | | 36.1425597629 |
| **Total** | 0.0123314809 | | 1804.4503874942 |
| **Average** | 0.0002466296 | | 36.0890077499 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000200\_05\_001525\_001575** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | | 0.0003422265 | | 34.6568633933 |
| **2** | | 0.0002579317 | | 35.8849532544 |
| **3** | | 0.0002475720 | | 36.0629844992 |
| **4** | | 0.0002550524 | | 35.9337066248 |
| **5** | | 0.0002479344 | | 36.0566321342 |
| **6** | | 0.0002562609 | | 35.9131763986 |
| **7** | | 0.0002491895 | | 36.0347029431 |
| **8** | | 0.0002568092 | | 35.9038947474 |
| **9** | | 0.0002505116 | | 36.0117215942 |
| **10** | | 0.0002580301 | | 35.8832958597 |
| **11** | | 0.0002510341 | | 36.0026721972 |
| **12** | | 0.0002594171 | | 35.8600147241 |
| **13** | | 0.0002287959 | | 36.4055184841 |
| **14** | | 0.0002429130 | | 36.1454926429 |
| **15** | | 0.0002373840 | | 36.2454862145 |
| **16** | | 0.0002461083 | | 36.0887369840 |
| **17** | | 0.0002399569 | | 36.1986683017 |
| **18** | | 0.0002486777 | | 36.0436311360 |
| **19** | | 0.0002417679 | | 36.1660131024 |
| **20** | | 0.0002498764 | | 36.0227471180 |
| **21** | | 0.0002422101 | | 36.1580774158 |
| **22** | | 0.0002501706 | | 36.0176375552 |
| **23** | | 0.0002429476 | | 36.1448744281 |
| **24** | | 0.0002505750 | | 36.0106228164 |
| **25** | | 0.0002344555 | | 36.2993952726 |
| **26** | | 0.0002472420 | | 36.0687777805 |
| **27** | | 0.0002403234 | | 36.1920396065 |
| **28** | | 0.0002500193 | | 36.0202645326 |
| **29** | | 0.0002429007 | | 36.1457129225 |
| **30** | | 0.0002512796 | | 35.9984284409 |
| **31** | | 0.0002385420 | | 36.2243510258 |
| **32** | | 0.0002396954 | | 36.2034029511 |
| **33** | | 0.0002304008 | | 36.3751595304 |
| **34** | | 0.0002395933 | | 36.2052539949 |
| **35** | | 0.0002346057 | | 36.2966139415 |
| **36** | | 0.0002436911 | | 36.1316034052 |
| **37** | | 0.0002247790 | | 36.4824420473 |
| **38** | | 0.0002388593 | | 36.2185776868 |
| **39** | | 0.0002330961 | | 36.3246502305 |
| **40** | | 0.0002430690 | | 36.1427043623 |
| **41** | | 0.0002374552 | | 36.2441830327 |
| **42** | | 0.0002459870 | | 36.0908781815 |
| **43** | | 0.0002390805 | | 36.2145583508 |
| **44** | | 0.0002472008 | | 36.0695021301 |
| **45** | | 0.0002409147 | | 36.1813673565 |
| **46** | | 0.0002492745 | | 36.0332208608 |
| **47** | | 0.0002417071 | | 36.1671052381 |
| **48** | | 0.0002497238 | | 36.0254006951 |
| **49** | | 0.0002324439 | | 36.3368192628 |
| **50** | | 0.0002466895 | | 36.0784932158 |
| **Total** | | 0.0123163820 | | 1804.6230306252 |
| **Average** | | 0.0002463276 | | 36.0924606125 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VIRAT\_S\_000201\_01\_000384\_000589** | |
| **Resolution** | | **720p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0003339930 | | 34.7626262523 |
| **2** | 0.0002265905 | | 36.4475836485 |
| **3** | 0.0002217929 | | 36.5405243645 |
| **4** | 0.0002223249 | | 36.5301195440 |
| **5** | 0.0002215681 | | 36.5449269205 |
| **6** | 0.0002234825 | | 36.5075650227 |
| **7** | 0.0002236221 | | 36.5048531728 |
| **8** | 0.0002248250 | | 36.4815542267 |
| **9** | 0.0002249726 | | 36.4787043692 |
| **10** | 0.0002267323 | | 36.4448651942 |
| **11** | 0.0002261731 | | 36.4555911591 |
| **12** | 0.0002275907 | | 36.4284547725 |
| **13** | 0.0002004709 | | 36.9794856263 |
| **14** | 0.0002061676 | | 36.8577947964 |
| **15** | 0.0002076373 | | 36.8269460786 |
| **16** | 0.0002109749 | | 36.7576925396 |
| **17** | 0.0002118921 | | 36.7388525830 |
| **18** | 0.0002129732 | | 36.7167512785 |
| **19** | 0.0002133912 | | 36.7082350491 |
| **20** | 0.0002145495 | | 36.6847244151 |
| **21** | 0.0002153272 | | 36.6690100798 |
| **22** | 0.0002168934 | | 36.6375366738 |
| **23** | 0.0002161570 | | 36.6523060140 |
| **24** | 0.0002172198 | | 36.6310065646 |
| **25** | 0.0002082468 | | 36.8142163951 |
| **26** | 0.0002140262 | | 36.6953313766 |
| **27** | 0.0002151522 | | 36.6725428159 |
| **28** | 0.0002173090 | | 36.6292230234 |
| **29** | 0.0002172768 | | 36.6298670417 |
| **30** | 0.0002191684 | | 36.5922207851 |
| **31** | 0.0002209167 | | 36.5577145008 |
| **32** | 0.0002152380 | | 36.6708103757 |
| **33** | 0.0002126218 | | 36.7239214525 |
| **34** | 0.0002118109 | | 36.7405172670 |
| **35** | 0.0002120662 | | 36.7352856786 |
| **36** | 0.0002136246 | | 36.7034883751 |
| **37** | 0.0001927970 | | 37.1489964790 |
| **38** | 0.0001993762 | | 37.0032665583 |
| **39** | 0.0002009781 | | 36.9685120267 |
| **40** | 0.0002044347 | | 36.8944547337 |
| **41** | 0.0002064361 | | 36.8521435735 |
| **42** | 0.0002079588 | | 36.8202261570 |
| **43** | 0.0002079511 | | 36.8203885541 |
| **44** | 0.0002102947 | | 36.7717160017 |
| **45** | 0.0002100619 | | 36.7765270665 |
| **46** | 0.0002110673 | | 36.7557897200 |
| **47** | 0.0002121901 | | 36.7327492614 |
| **48** | 0.0002138130 | | 36.6996585458 |
| **49** | 0.0002066685 | | 36.8472565884 |
| **50** | 0.0002126627 | | 36.7230871504 |
| **Total** | 0.0108214696 | | 1832.9676218497 |
| **Average** | 0.0002164294 | | 36.6593524370 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000201\_02\_000590\_000623** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | | 0.0003520844 | | 34.5335320171 |
| **2** | | 0.0002384493 | | 36.2260386931 |
| **3** | | 0.0002210289 | | 36.5555088515 |
| **4** | | 0.0002309607 | | 36.3646183255 |
| **5** | | 0.0002206393 | | 36.5631712321 |
| **6** | | 0.0002314403 | | 36.3556095741 |
| **7** | | 0.0002228021 | | 36.5208072091 |
| **8** | | 0.0002343963 | | 36.3004918969 |
| **9** | | 0.0002245989 | | 36.4859241587 |
| **10** | | 0.0002356841 | | 36.2766962789 |
| **11** | | 0.0002267639 | | 36.4442616675 |
| **12** | | 0.0002378287 | | 36.2373572842 |
| **13** | | 0.0002025440 | | 36.9348060757 |
| **14** | | 0.0002189424 | | 36.5967010227 |
| **15** | | 0.0002093414 | | 36.7914487984 |
| **16** | | 0.0002189662 | | 36.5962285972 |
| **17** | | 0.0002103385 | | 36.7708129768 |
| **18** | | 0.0002219186 | | 36.5380631192 |
| **19** | | 0.0002132332 | | 36.7114524940 |
| **20** | | 0.0002237696 | | 36.5019893939 |
| **21** | | 0.0002142302 | | 36.6911921986 |
| **22** | | 0.0002252517 | | 36.4733195385 |
| **23** | | 0.0002150502 | | 36.6746006847 |
| **24** | | 0.0002266160 | | 36.4470944421 |
| **25** | | 0.0002131414 | | 36.7133215884 |
| **26** | | 0.0002283110 | | 36.4147314563 |
| **27** | | 0.0002179634 | | 36.6161635049 |
| **28** | | 0.0002300175 | | 36.3823904516 |
| **29** | | 0.0002208140 | | 36.5597343038 |
| **30** | | 0.0002305045 | | 36.3732067740 |
| **31** | | 0.0002261871 | | 36.4553221208 |
| **32** | | 0.0002282919 | | 36.4150954468 |
| **33** | | 0.0002133610 | | 36.7088486609 |
| **34** | | 0.0002239252 | | 36.4989695643 |
| **35** | | 0.0002129497 | | 36.7172305329 |
| **36** | | 0.0002239353 | | 36.4987736603 |
| **37** | | 0.0001931073 | | 37.1420141687 |
| **38** | | 0.0002085925 | | 36.8070139504 |
| **39** | | 0.0001995210 | | 37.0001149425 |
| **40** | | 0.0002133550 | | 36.7089727523 |
| **41** | | 0.0002034990 | | 36.9143769848 |
| **42** | | 0.0002169321 | | 36.6367616733 |
| **43** | | 0.0002065803 | | 36.8491103429 |
| **44** | | 0.0002204022 | | 36.5678400207 |
| **45** | | 0.0002101034 | | 36.7756690310 |
| **46** | | 0.0002241239 | | 36.4951181558 |
| **47** | | 0.0002131399 | | 36.7133525296 |
| **48** | | 0.0002250101 | | 36.4779797433 |
| **49** | | 0.0002080705 | | 36.8178940247 |
| **50** | | 0.0002248723 | | 36.4806409129 |
| **Total** | | 0.0111135906 | | 1827.3323738282 |
| **Average** | | 0.0002222718 | | 36.5466474766 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000201\_03\_000640\_000672** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | | 0.0003509334 | | 34.5477532828 |
| **2** | | 0.0002383563 | | 36.2277339082 |
| **3** | | 0.0002210449 | | 36.5551949742 |
| **4** | | 0.0002301400 | | 36.3800796426 |
| **5** | | 0.0002204896 | | 36.5661179440 |
| **6** | | 0.0002314158 | | 36.3560691665 |
| **7** | | 0.0002216149 | | 36.5440106476 |
| **8** | | 0.0002315340 | | 36.3538522357 |
| **9** | | 0.0002217932 | | 36.5405173938 |
| **10** | | 0.0002337100 | | 36.3132261730 |
| **11** | | 0.0002227371 | | 36.5220742068 |
| **12** | | 0.0002339056 | | 36.3095934686 |
| **13** | | 0.0002039389 | | 36.9049999685 |
| **14** | | 0.0002205489 | | 36.5649504104 |
| **15** | | 0.0002088774 | | 36.8010846509 |
| **16** | | 0.0002179745 | | 36.6159421834 |
| **17** | | 0.0002072552 | | 36.8349462233 |
| **18** | | 0.0002169301 | | 36.6368016506 |
| **19** | | 0.0002078619 | | 36.8222500487 |
| **20** | | 0.0002164671 | | 36.6460803052 |
| **21** | | 0.0002065104 | | 36.8505797856 |
| **22** | | 0.0002167458 | | 36.6404932804 |
| **23** | | 0.0002073618 | | 36.8327116027 |
| **24** | | 0.0002178417 | | 36.6185899146 |
| **25** | | 0.0002136318 | | 36.7033410333 |
| **26** | | 0.0002271312 | | 36.4372322078 |
| **27** | | 0.0002165551 | | 36.6443159976 |
| **28** | | 0.0002284282 | | 36.4125036319 |
| **29** | | 0.0002178209 | | 36.6190047805 |
| **30** | | 0.0002288106 | | 36.4052379604 |
| **31** | | 0.0002232187 | | 36.5126940265 |
| **32** | | 0.0002247963 | | 36.4821087978 |
| **33** | | 0.0002118130 | | 36.7404748410 |
| **34** | | 0.0002243792 | | 36.4901732809 |
| **35** | | 0.0002145354 | | 36.6850111997 |
| **36** | | 0.0002245082 | | 36.4876783130 |
| **37** | | 0.0001959461 | | 37.0786341695 |
| **38** | | 0.0002129327 | | 36.7175761960 |
| **39** | | 0.0002041672 | | 36.9001394300 |
| **40** | | 0.0002171614 | | 36.6321746411 |
| **41** | | 0.0002082007 | | 36.8151790784 |
| **42** | | 0.0002207088 | | 36.5618039711 |
| **43** | | 0.0002109257 | | 36.7587050760 |
| **44** | | 0.0002241170 | | 36.4952513782 |
| **45** | | 0.0002148108 | | 36.6794378866 |
| **46** | | 0.0002260365 | | 36.4582141675 |
| **47** | | 0.0002158106 | | 36.6592728800 |
| **48** | | 0.0002268990 | | 36.4416747508 |
| **49** | | 0.0002106909 | | 36.7635426729 |
| **50** | | 0.0002264763 | | 36.4497731201 |
| **Total** | | 0.0110765009 | | 1828.0168085567 |
| **Average** | | 0.0002215300 | | 36.5603361711 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000203\_08\_001702\_001734** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | | 0.0004784743 | | 33.2014141730 |
| **2** | | 0.0002924513 | | 35.3394640462 |
| **3** | | 0.0002763343 | | 35.5856516951 |
| **4** | | 0.0002799708 | | 35.5288720988 |
| **5** | | 0.0002726181 | | 35.6444536959 |
| **6** | | 0.0002793844 | | 35.5379791940 |
| **7** | | 0.0002732438 | | 35.6344966939 |
| **8** | | 0.0002782967 | | 35.5549194706 |
| **9** | | 0.0002718630 | | 35.6564985612 |
| **10** | | 0.0002785294 | | 35.5512889120 |
| **11** | | 0.0002736136 | | 35.6286225314 |
| **12** | | 0.0002798720 | | 35.5304051947 |
| **13** | | 0.0002301246 | | 36.3803703029 |
| **14** | | 0.0002421043 | | 36.1599754900 |
| **15** | | 0.0002353186 | | 36.2834383096 |
| **16** | | 0.0002443891 | | 36.1191810979 |
| **17** | | 0.0002407072 | | 36.1851084881 |
| **18** | | 0.0002497758 | | 36.0244965174 |
| **19** | | 0.0002437785 | | 36.1300451792 |
| **20** | | 0.0002511305 | | 36.0010054402 |
| **21** | | 0.0002460404 | | 36.0899360188 |
| **22** | | 0.0002523637 | | 35.9797314864 |
| **23** | | 0.0002462951 | | 36.0854426682 |
| **24** | | 0.0002540751 | | 35.9503786669 |
| **25** | | 0.0002349947 | | 36.2894195683 |
| **26** | | 0.0002480152 | | 36.0552174512 |
| **27** | | 0.0002440553 | | 36.1251181773 |
| **28** | | 0.0002507371 | | 36.0078144638 |
| **29** | | 0.0002484779 | | 36.0471229188 |
| **30** | | 0.0002539661 | | 35.9522428727 |
| **31** | | 0.0002563715 | | 35.9113027827 |
| **32** | | 0.0002529453 | | 35.9697336037 |
| **33** | | 0.0002449250 | | 36.1096691105 |
| **34** | | 0.0002518825 | | 35.9880208119 |
| **35** | | 0.0002453849 | | 36.1015210796 |
| **36** | | 0.0002522333 | | 35.9819765644 |
| **37** | | 0.0002244358 | | 36.4890784011 |
| **38** | | 0.0002360727 | | 36.2695429841 |
| **39** | | 0.0002336531 | | 36.3142850438 |
| **40** | | 0.0002419463 | | 36.1628102294 |
| **41** | | 0.0002359701 | | 36.2714299132 |
| **42** | | 0.0002438297 | | 36.1291335165 |
| **43** | | 0.0002389928 | | 36.2161524583 |
| **44** | | 0.0002467314 | | 36.0777554204 |
| **45** | | 0.0002423562 | | 36.1554584641 |
| **46** | | 0.0002475446 | | 36.0634657659 |
| **47** | | 0.0002448260 | | 36.1114242825 |
| **48** | | 0.0002514069 | | 35.9962286524 |
| **49** | | 0.0002355221 | | 36.2796825215 |
| **50** | | 0.0002449481 | | 36.1092592254 |
| **Total** | | 0.0128229790 | | 1796.9680422162 |
| **Average** | | 0.0002564596 | | 35.9393608443 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000207\_03\_000556\_000590** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | | 0.0003554073 | | 34.4927362519 |
| **2** | | 0.0002576319 | | 35.8900032169 |
| **3** | | 0.0002521900 | | 35.9827219249 |
| **4** | | 0.0002550547 | | 35.9336672243 |
| **5** | | 0.0002539837 | | 35.9519412627 |
| **6** | | 0.0002580477 | | 35.8830001234 |
| **7** | | 0.0002551687 | | 35.9317258642 |
| **8** | | 0.0002580987 | | 35.8821418626 |
| **9** | | 0.0002577516 | | 35.8879863323 |
| **10** | | 0.0002601527 | | 35.8477167891 |
| **11** | | 0.0002569190 | | 35.9020382001 |
| **12** | | 0.0002619279 | | 35.8181822259 |
| **13** | | 0.0002302783 | | 36.3774692958 |
| **14** | | 0.0002369677 | | 36.2531078052 |
| **15** | | 0.0002386697 | | 36.2220268218 |
| **16** | | 0.0002412647 | | 36.1750621590 |
| **17** | | 0.0002416628 | | 36.1679027535 |
| **18** | | 0.0002427243 | | 36.1488675769 |
| **19** | | 0.0002462782 | | 36.0857404521 |
| **20** | | 0.0002443607 | | 36.1196859328 |
| **21** | | 0.0002454783 | | 36.0998689996 |
| **22** | | 0.0002453523 | | 36.1020981023 |
| **23** | | 0.0002440914 | | 36.1244758378 |
| **24** | | 0.0002464433 | | 36.0828305784 |
| **25** | | 0.0002337894 | | 36.3117525777 |
| **26** | | 0.0002422670 | | 36.1570565477 |
| **27** | | 0.0002427330 | | 36.1487114269 |
| **28** | | 0.0002428115 | | 36.1473067270 |
| **29** | | 0.0002447948 | | 36.1119783467 |
| **30** | | 0.0002459089 | | 36.0922580651 |
| **31** | | 0.0002337901 | | 36.3117391451 |
| **32** | | 0.0002342241 | | 36.3036836987 |
| **33** | | 0.0002320135 | | 36.3448681608 |
| **34** | | 0.0002356443 | | 36.2774299097 |
| **35** | | 0.0002354178 | | 36.2816063902 |
| **36** | | 0.0002360246 | | 36.2704269835 |
| **37** | | 0.0002230494 | | 36.5159903757 |
| **38** | | 0.0002284345 | | 36.4123836045 |
| **39** | | 0.0002301317 | | 36.3802354148 |
| **40** | | 0.0002351341 | | 36.2868435097 |
| **41** | | 0.0002373467 | | 36.2461682821 |
| **42** | | 0.0002379876 | | 36.2344571402 |
| **43** | | 0.0002383649 | | 36.2275767208 |
| **44** | | 0.0002422937 | | 36.1565796531 |
| **45** | | 0.0002416248 | | 36.1685844409 |
| **46** | | 0.0002414044 | | 36.1725487251 |
| **47** | | 0.0002425158 | | 36.1526001290 |
| **48** | | 0.0002424994 | | 36.1528933889 |
| **49** | | 0.0002311507 | | 36.3610484697 |
| **50** | | 0.0002403888 | | 36.1908576747 |
| **Total** | | 0.0122576510 | | 1805.7805831020 |
| **Average** | | 0.0002451530 | | 36.1156116620 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000207\_04\_000902\_000934** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | | 0.0003652603 | | 34.3739750753 |
| **2** | | 0.0002598093 | | 35.8534532524 |
| **3** | | 0.0002534972 | | 35.9602691461 |
| **4** | | 0.0002530501 | | 35.9679355732 |
| **5** | | 0.0002508911 | | 36.0051470545 |
| **6** | | 0.0002523481 | | 35.9799992301 |
| **7** | | 0.0002525633 | | 35.9762971779 |
| **8** | | 0.0002519885 | | 35.9861932427 |
| **9** | | 0.0002512536 | | 35.9988776085 |
| **10** | | 0.0002515691 | | 35.9934264206 |
| **11** | | 0.0002526243 | | 35.9752490166 |
| **12** | | 0.0002543186 | | 35.9462187341 |
| **13** | | 0.0002223538 | | 36.5295542456 |
| **14** | | 0.0002277273 | | 36.4258495650 |
| **15** | | 0.0002298950 | | 36.3847056431 |
| **16** | | 0.0002339327 | | 36.3090909564 |
| **17** | | 0.0002335407 | | 36.3163740804 |
| **18** | | 0.0002346714 | | 36.2953989879 |
| **19** | | 0.0002358675 | | 36.2733198132 |
| **20** | | 0.0002355350 | | 36.2794462131 |
| **21** | | 0.0002375292 | | 36.2428290862 |
| **22** | | 0.0002381854 | | 36.2308491340 |
| **23** | | 0.0002375327 | | 36.2427661340 |
| **24** | | 0.0002391460 | | 36.2133685583 |
| **25** | | 0.0002278890 | | 36.4227661247 |
| **26** | | 0.0002340417 | | 36.3070678646 |
| **27** | | 0.0002367822 | | 36.2565085795 |
| **28** | | 0.0002365441 | | 36.2608792304 |
| **29** | | 0.0002366860 | | 36.2582740097 |
| **30** | | 0.0002389375 | | 36.2171571861 |
| **31** | | 0.0002404667 | | 36.1894513337 |
| **32** | | 0.0002333418 | | 36.3200753029 |
| **33** | | 0.0002317352 | | 36.3500790746 |
| **34** | | 0.0002326703 | | 36.3325896842 |
| **35** | | 0.0002319752 | | 36.3455845538 |
| **36** | | 0.0002332711 | | 36.3213907949 |
| **37** | | 0.0002160683 | | 36.6540897824 |
| **38** | | 0.0002235847 | | 36.5055794878 |
| **39** | | 0.0002253775 | | 36.4708937180 |
| **40** | | 0.0002277235 | | 36.4259206378 |
| **41** | | 0.0002298457 | | 36.3856356808 |
| **42** | | 0.0002317367 | | 36.3500514502 |
| **43** | | 0.0002321260 | | 36.3427621502 |
| **44** | | 0.0002343477 | | 36.3013934548 |
| **45** | | 0.0002363986 | | 36.2635513118 |
| **46** | | 0.0002346913 | | 36.2950303788 |
| **47** | | 0.0002372728 | | 36.2475201141 |
| **48** | | 0.0002370139 | | 36.2522609578 |
| **49** | | 0.0002256660 | | 36.4653381793 |
| **50** | | 0.0002321928 | | 36.3415118513 |
| **Total** | | 0.0119934765 | | 1810.6439568433 |
| **Average** | | 0.0002398695 | | 36.2128791369 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000205\_05\_001092\_001124** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | | 0.0005403778 | | 32.6730249714 |
| **2** | | 0.0003232721 | | 34.9043183685 |
| **3** | | 0.0003152170 | | 35.0139040155 |
| **4** | | 0.0003133942 | | 35.0390897807 |
| **5** | | 0.0003066352 | | 35.1337805261 |
| **6** | | 0.0003035125 | | 35.1782337174 |
| **7** | | 0.0003035535 | | 35.1776473310 |
| **8** | | 0.0003180357 | | 34.9752418285 |
| **9** | | 0.0003149650 | | 35.0173773805 |
| **10** | | 0.0003274240 | | 34.8488944177 |
| **11** | | 0.0003138517 | | 35.0327554648 |
| **12** | | 0.0003120176 | | 35.0582094353 |
| **13** | | 0.0002870265 | | 35.4207806064 |
| **14** | | 0.0002874874 | | 35.4138125001 |
| **15** | | 0.0002865875 | | 35.4274272001 |
| **16** | | 0.0002897891 | | 35.3791792026 |
| **17** | | 0.0002846809 | | 35.4564167023 |
| **18** | | 0.0002860603 | | 35.4354241971 |
| **19** | | 0.0002827762 | | 35.4855712840 |
| **20** | | 0.0003060852 | | 35.1415764603 |
| **21** | | 0.0003097939 | | 35.0892716379 |
| **22** | | 0.0003110232 | | 35.0720727090 |
| **23** | | 0.0003050870 | | 35.1557627826 |
| **24** | | 0.0003043976 | | 35.1655877965 |
| **25** | | 0.0002893735 | | 35.3854124225 |
| **26** | | 0.0002833463 | | 35.4768248106 |
| **27** | | 0.0002833383 | | 35.4769465572 |
| **28** | | 0.0002821059 | | 35.4958784508 |
| **29** | | 0.0002778878 | | 35.5613053614 |
| **30** | | 0.0002844562 | | 35.4598458086 |
| **31** | | 0.0002816505 | | 35.5028952781 |
| **32** | | 0.0003050348 | | 35.1565057146 |
| **33** | | 0.0003048422 | | 35.1592489013 |
| **34** | | 0.0003027582 | | 35.1890403986 |
| **35** | | 0.0003000476 | | 35.2280990373 |
| **36** | | 0.0002978197 | | 35.2604653944 |
| **37** | | 0.0002906377 | | 35.3664798732 |
| **38** | | 0.0002865276 | | 35.4283346911 |
| **39** | | 0.0002837080 | | 35.4712835813 |
| **40** | | 0.0002859618 | | 35.4369201746 |
| **41** | | 0.0002848459 | | 35.4539006061 |
| **42** | | 0.0002863020 | | 35.4317560311 |
| **43** | | 0.0002831096 | | 35.4804543772 |
| **44** | | 0.0003018395 | | 35.2022396220 |
| **45** | | 0.0003037554 | | 35.1747593715 |
| **46** | | 0.0003008008 | | 35.2172106702 |
| **47** | | 0.0003005734 | | 35.2204945197 |
| **48** | | 0.0003031117 | | 35.1839733884 |
| **49** | | 0.0002881736 | | 35.4034581276 |
| **50** | | 0.0002902275 | | 35.3726142253 |
| **Total** | | 0.0151152865 | | 1760.8917077106 |
| **Average** | | 0.0003023057 | | 35.2178341542 |

# PROCESSING TIME

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VIRAT\_S\_000200\_00\_000100\_000171** | |
| **Resolution** | | **720p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 6.2647862434 | | 6.1920726299 |
| **2** | 6.1823506355 | | 6.1464869976 |
| **3** | 6.1953253746 | | 6.1344802380 |
| **4** | 6.1905076504 | | 6.1243534088 |
| **5** | 6.2002298832 | | 6.1410250664 |
| **6** | 6.2367544174 | | 6.1483798027 |
| **7** | 6.2100052834 | | 6.1448721886 |
| **8** | 6.2654933929 | | 6.1315438747 |
| **9** | 6.2356514931 | | 6.1530947685 |
| **10** | 6.3064289093 | | 6.1339457035 |
| **11** | 6.3088397980 | | 6.1379261017 |
| **12** | 6.3502585888 | | 6.1342711449 |
| **13** | 6.3317499161 | | 6.1391763687 |
| **14** | 6.3221094608 | | 6.1423184872 |
| **15** | 6.3019175529 | | 6.1448094845 |
| **16** | 6.2318224907 | | 6.1440842152 |
| **17** | 6.2218029499 | | 6.1399192810 |
| **18** | 6.2553787231 | | 6.1338937283 |
| **19** | 6.3041670322 | | 6.1475229263 |
| **20** | 6.1898026466 | | 6.1490101814 |
| **21** | 6.2193589211 | | 6.1503884792 |
| **22** | 6.2170653343 | | 6.1358675957 |
| **23** | 6.2580142021 | | 6.1371860504 |
| **24** | 6.1868546009 | | 6.1311879158 |
| **25** | 6.1823756695 | | 6.1398200989 |
| **26** | 6.2151627541 | | 6.1405930519 |
| **27** | 6.2415590286 | | 6.1284251213 |
| **28** | 6.1821701527 | | 6.1455245018 |
| **29** | 6.1785273552 | | 6.1354641914 |
| **30** | 6.2118675709 | | 6.1307621002 |
| **31** | 6.2492191792 | | 6.1350274086 |
| **32** | 6.1836271286 | | 6.1270942688 |
| **33** | 6.1761362553 | | 6.1338734627 |
| **34** | 6.2155756950 | | 6.1374611855 |
| **35** | 6.2478618622 | | 6.1358489990 |
| **36** | 6.1747334003 | | 6.1409053802 |
| **37** | 6.1871323586 | | 6.1268727779 |
| **38** | 6.2074818611 | | 6.1390652657 |
| **39** | 6.2549293041 | | 6.1358759403 |
| **40** | 6.2188131809 | | 6.1460344791 |
| **41** | 6.2191956043 | | 6.1443574429 |
| **42** | 6.2487726212 | | 6.1267507076 |
| **43** | 6.2960484028 | | 6.1451833248 |
| **44** | 6.1873838902 | | 6.1330349445 |
| **45** | 6.1866846085 | | 6.1441059113 |
| **46** | 6.2085828781 | | 6.1411082745 |
| **47** | 6.2554028034 | | 6.1412928104 |
| **48** | 6.1759762764 | | 6.1459395885 |
| **49** | 6.1705367565 | | 6.1428365707 |
| **50** | 6.2119991779 | | 6.1393070221 |
| **Total** | 311.4744312763 | | 307.0003814697 |
| **Average** | 6.2294886255 | | 6.1400076294 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VIRAT\_S\_000200\_01\_000226\_000268** | |
| **Resolution** | | **720p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 6.3221759796 | | 6.1080827713 |
| **2** | 6.2624318600 | | 6.1617207527 |
| **3** | 6.2963626385 | | 6.0960977077 |
| **4** | 6.2686390877 | | 6.0929839611 |
| **5** | 6.2944967747 | | 6.0831658840 |
| **6** | 6.2688994408 | | 6.1625823975 |
| **7** | 6.2851772308 | | 6.1490519047 |
| **8** | 6.3421630859 | | 6.1450715065 |
| **9** | 6.3171308041 | | 6.1458072662 |
| **10** | 6.3660492897 | | 6.1429264545 |
| **11** | 6.3840773106 | | 6.1596326828 |
| **12** | 6.3719151020 | | 6.1539223194 |
| **13** | 6.3864262104 | | 6.1365063190 |
| **14** | 6.3970165253 | | 6.1422059536 |
| **15** | 6.3864748478 | | 6.0860896111 |
| **16** | 6.2843337059 | | 6.0905346870 |
| **17** | 6.2592256069 | | 6.0986979008 |
| **18** | 6.3483660221 | | 6.1333441734 |
| **19** | 6.3675527573 | | 6.1485102177 |
| **20** | 6.2372131348 | | 6.1462974548 |
| **21** | 6.2459266186 | | 6.1480019093 |
| **22** | 6.2642433643 | | 6.1483335495 |
| **23** | 6.3427369595 | | 6.1454443932 |
| **24** | 6.2333009243 | | 6.1387515068 |
| **25** | 6.2597589493 | | 6.1563425064 |
| **26** | 6.2670764923 | | 6.1549127102 |
| **27** | 6.3492567539 | | 6.1180257797 |
| **28** | 6.2329516411 | | 6.0969812870 |
| **29** | 6.2255344391 | | 6.0906188488 |
| **30** | 6.2753031254 | | 6.0932226181 |
| **31** | 6.3304650784 | | 6.0883395672 |
| **32** | 6.2357754707 | | 6.0848784447 |
| **33** | 6.2366070747 | | 6.1022431850 |
| **34** | 6.2501716614 | | 6.0878334045 |
| **35** | 6.3408522606 | | 6.0958135128 |
| **36** | 6.2259216309 | | 6.0853509903 |
| **37** | 6.2465031147 | | 6.1004569530 |
| **38** | 6.2574894428 | | 6.0983901024 |
| **39** | 6.3463265896 | | 6.1019568443 |
| **40** | 6.2326040268 | | 6.0814054012 |
| **41** | 6.2343440056 | | 6.0993602276 |
| **42** | 6.2581350803 | | 6.0832836628 |
| **43** | 6.3592402935 | | 6.0901038647 |
| **44** | 6.2287254333 | | 6.1004798412 |
| **45** | 6.3074419498 | | 6.0880863667 |
| **46** | 6.3120880127 | | 6.0913226604 |
| **47** | 6.3918812275 | | 6.0895936489 |
| **48** | 6.2803575993 | | 6.0923125744 |
| **49** | 6.2985904217 | | 6.0986106396 |
| **50** | 6.2691690922 | | 6.0823302269 |
| **Total** | 314.7849061489 | | 305.7160191536 |
| **Average** | 6.2956981230 | | 6.1143203831 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000200\_05\_001525\_001575** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | | 6.3314955235 | | 6.1406412125 |
| **2** | | 6.1857929230 | | 6.1508946419 |
| **3** | | 6.1991009712 | | 6.2194216251 |
| **4** | | 6.2571938038 | | 6.0978589058 |
| **5** | | 6.2286832333 | | 6.0949378014 |
| **6** | | 6.1912147999 | | 6.0877084732 |
| **7** | | 6.2131953239 | | 6.0884687901 |
| **8** | | 6.2566571236 | | 6.0941424370 |
| **9** | | 6.2202916145 | | 6.0903017521 |
| **10** | | 6.2985434532 | | 6.0836606026 |
| **11** | | 6.2902410030 | | 6.0832922459 |
| **12** | | 6.2921638489 | | 6.0946912766 |
| **13** | | 6.2897670269 | | 6.1053385735 |
| **14** | | 6.2817234993 | | 6.0873460770 |
| **15** | | 6.2764408588 | | 6.0813481808 |
| **16** | | 6.1985771656 | | 6.0927708149 |
| **17** | | 6.1860849857 | | 6.0834233761 |
| **18** | | 6.2961261272 | | 6.1282196045 |
| **19** | | 6.2961692810 | | 6.1838865280 |
| **20** | | 6.2401680946 | | 6.1358807087 |
| **21** | | 6.2507977486 | | 6.1290240288 |
| **22** | | 6.2235941887 | | 6.1343021393 |
| **23** | | 6.2702536583 | | 6.1452646255 |
| **24** | | 6.1930568218 | | 6.1123282909 |
| **25** | | 6.1826789379 | | 6.1489331722 |
| **26** | | 6.2290537357 | | 6.1152725220 |
| **27** | | 6.2627274990 | | 6.1148452759 |
| **28** | | 6.1833574772 | | 6.1397082806 |
| **29** | | 6.1787431240 | | 6.1366932392 |
| **30** | | 6.2121610641 | | 6.1662006378 |
| **31** | | 6.2566499710 | | 6.1616847515 |
| **32** | | 6.1907868385 | | 6.1528463364 |
| **33** | | 6.1819930077 | | 6.1629047394 |
| **34** | | 6.2239663601 | | 6.1456096172 |
| **35** | | 6.2709560394 | | 6.1151640415 |
| **36** | | 6.2326176167 | | 6.1155450344 |
| **37** | | 6.1930689812 | | 6.1216979027 |
| **38** | | 6.2110166550 | | 6.1181151867 |
| **39** | | 6.2664153576 | | 6.1138417721 |
| **40** | | 6.1849710941 | | 6.1134204865 |
| **41** | | 6.1861505508 | | 6.1114666462 |
| **42** | | 6.2117848396 | | 6.1174845695 |
| **43** | | 6.2566297054 | | 6.1120710373 |
| **44** | | 6.1900782585 | | 6.1144478321 |
| **45** | | 6.3667347431 | | 6.1167323589 |
| **46** | | 6.2333836555 | | 6.1173098087 |
| **47** | | 6.2626907825 | | 6.1397137642 |
| **48** | | 6.1932244301 | | 6.1551215649 |
| **49** | | 6.2257640362 | | 6.1509494781 |
| **50** | | 6.2522351742 | | 6.1416826248 |
| **Total** | | 311.8071730137 | | 306.1646153927 |
| **Average** | | 6.2361434603 | | 6.1232923079 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000201\_01\_000384\_000589** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | | 6.2153182030 | | 6.1236865520 |
| **2** | | 6.2097499371 | | 6.1155774593 |
| **3** | | 6.1965873241 | | 6.1291682720 |
| **4** | | 6.1784386635 | | 6.1324744225 |
| **5** | | 6.2023248672 | | 6.1451535225 |
| **6** | | 6.1887383461 | | 6.1451241970 |
| **7** | | 6.1983170509 | | 6.0964355469 |
| **8** | | 6.2625617981 | | 6.0883755684 |
| **9** | | 6.2238161564 | | 6.1108205318 |
| **10** | | 6.3247146606 | | 6.1639101505 |
| **11** | | 6.3541722298 | | 6.1516218185 |
| **12** | | 6.3406193256 | | 6.1587822437 |
| **13** | | 6.3573267460 | | 6.1442406178 |
| **14** | | 6.3329589367 | | 6.1523108482 |
| **15** | | 6.3143303394 | | 6.1625289917 |
| **16** | | 6.2238237858 | | 6.1617193222 |
| **17** | | 6.2350571156 | | 6.1887495518 |
| **18** | | 6.2493376732 | | 6.1247045994 |
| **19** | | 6.3099894524 | | 6.1840324402 |
| **20** | | 6.2322070599 | | 6.1305751801 |
| **21** | | 6.2377090454 | | 6.1466999054 |
| **22** | | 6.2692332268 | | 6.1459422112 |
| **23** | | 6.3236052990 | | 6.1458234787 |
| **24** | | 6.2382013798 | | 6.1324210167 |
| **25** | | 6.2368390560 | | 6.1322479248 |
| **26** | | 6.2480125427 | | 6.1310029030 |
| **27** | | 6.3097212315 | | 6.1405014992 |
| **28** | | 6.2244656086 | | 6.1260714531 |
| **29** | | 6.2264349461 | | 6.1666040421 |
| **30** | | 6.2566177845 | | 6.1666250229 |
| **31** | | 6.3035314083 | | 6.1634197235 |
| **32** | | 6.2327163219 | | 6.1221621037 |
| **33** | | 6.2290558815 | | 6.1302456856 |
| **34** | | 6.2504436970 | | 6.1538753510 |
| **35** | | 6.2977335453 | | 6.1700346470 |
| **36** | | 6.2232999802 | | 6.1613316536 |
| **37** | | 6.2251524925 | | 6.1681897640 |
| **38** | | 6.2623345852 | | 6.1516695023 |
| **39** | | 6.2959752083 | | 6.1200726032 |
| **40** | | 6.2264230251 | | 6.1593768597 |
| **41** | | 6.2291657925 | | 6.1693437099 |
| **42** | | 6.2731745243 | | 6.1522104740 |
| **43** | | 6.3019177914 | | 6.1581039429 |
| **44** | | 6.2357902527 | | 6.1718006134 |
| **45** | | 6.2302515507 | | 6.1466960907 |
| **46** | | 6.2575874329 | | 6.1632471085 |
| **47** | | 6.2902991772 | | 6.1496953964 |
| **48** | | 6.2011325359 | | 6.1570203304 |
| **49** | | 6.2008683681 | | 6.1646087170 |
| **50** | | 6.2599358559 | | 6.1662361622 |
| **Total** | | 312.7480192184 | | 307.3432717323 |
| **Average** | | 6.2549603844 | | 6.1468654346 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000201\_02\_000590\_000623** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | | 6.2795367241 | | 6.1004753113 |
| **2** | | 6.2327923775 | | 6.1346027851 |
| **3** | | 6.2241072655 | | 6.1072127819 |
| **4** | | 6.2305541039 | | 6.1270980835 |
| **5** | | 6.2240548134 | | 6.1307206154 |
| **6** | | 6.1797220707 | | 6.1336619854 |
| **7** | | 6.2255129814 | | 6.1200740337 |
| **8** | | 6.2537944317 | | 6.0880575180 |
| **9** | | 6.2997653484 | | 6.0869221687 |
| **10** | | 6.3720273972 | | 6.0959615707 |
| **11** | | 6.3185267448 | | 6.0908241272 |
| **12** | | 6.2959568501 | | 6.0855224133 |
| **13** | | 6.2935569286 | | 6.0877642632 |
| **14** | | 6.2813417912 | | 6.1023249626 |
| **15** | | 6.2623417377 | | 6.0869631767 |
| **16** | | 6.1828362942 | | 6.0852727890 |
| **17** | | 6.1812026501 | | 6.0885448456 |
| **18** | | 6.2156167030 | | 6.0978684425 |
| **19** | | 6.2551116943 | | 6.0879447460 |
| **20** | | 6.1859378815 | | 6.0899963379 |
| **21** | | 6.1893992424 | | 6.0887405872 |
| **22** | | 6.2114517689 | | 6.0889353752 |
| **23** | | 6.2667965889 | | 6.0930709839 |
| **24** | | 6.1759345531 | | 6.0786406994 |
| **25** | | 6.1956293583 | | 6.1319468021 |
| **26** | | 6.2179977894 | | 6.1366734505 |
| **27** | | 6.2909135818 | | 6.1304903030 |
| **28** | | 6.2278800011 | | 6.1260759830 |
| **29** | | 6.1957972050 | | 6.1441555023 |
| **30** | | 6.2265038490 | | 6.1281461716 |
| **31** | | 6.2604644299 | | 6.1405293941 |
| **32** | | 6.2003264427 | | 6.1197600365 |
| **33** | | 6.2234830856 | | 6.1349413395 |
| **34** | | 6.2437210083 | | 6.1412916183 |
| **35** | | 6.2882597446 | | 6.1250529289 |
| **36** | | 6.2268919945 | | 6.1109533310 |
| **37** | | 6.2314910889 | | 6.1364440918 |
| **38** | | 6.2554018497 | | 6.1333858967 |
| **39** | | 6.2947609425 | | 6.1328208447 |
| **40** | | 6.2272238731 | | 6.1231765747 |
| **41** | | 6.2335917950 | | 6.1282143593 |
| **42** | | 6.2558825016 | | 6.1499955654 |
| **43** | | 6.2961328030 | | 6.1206662655 |
| **44** | | 6.2330176830 | | 6.1347956657 |
| **45** | | 6.2379026413 | | 6.1339106560 |
| **46** | | 6.2625010014 | | 6.1396362782 |
| **47** | | 6.2990989685 | | 6.1314301491 |
| **48** | | 6.2228956223 | | 6.1333830357 |
| **49** | | 6.2182013988 | | 6.1365921497 |
| **50** | | 6.2541410923 | | 6.1390981674 |
| **Total** | | 312.1579906940 | | 305.8207671642 |
| **Average** | | 6.2431598139 | | 6.1164153433 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000201\_03\_000640\_000672** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | | 6.2620098591 | | 6.1741952896 |
| **2** | | 6.2233169079 | | 6.1334862709 |
| **3** | | 6.1997585297 | | 6.1609044075 |
| **4** | | 6.2401967049 | | 6.1543717384 |
| **5** | | 6.2446484566 | | 6.2023119926 |
| **6** | | 6.2626688480 | | 6.1837117672 |
| **7** | | 6.2663185596 | | 6.1651268005 |
| **8** | | 6.3379621506 | | 6.1656529903 |
| **9** | | 6.2846169472 | | 6.1661372185 |
| **10** | | 6.3938601017 | | 6.1641118526 |
| **11** | | 6.3800976276 | | 6.1576116085 |
| **12** | | 6.3910207748 | | 6.1617903709 |
| **13** | | 6.4204821587 | | 6.1533725262 |
| **14** | | 7.5653197765 | | 6.1464731693 |
| **15** | | 8.2032685280 | | 6.1455194950 |
| **16** | | 6.2184872627 | | 6.1588027477 |
| **17** | | 6.2116808891 | | 6.1001741886 |
| **18** | | 6.2473306656 | | 6.1073968410 |
| **19** | | 6.2851381302 | | 6.1068897247 |
| **20** | | 6.2066164017 | | 6.1004753113 |
| **21** | | 6.2130169868 | | 6.1145825386 |
| **22** | | 6.2514574528 | | 6.1079277992 |
| **23** | | 6.2703440189 | | 6.1054933071 |
| **24** | | 6.2107324600 | | 6.1008017063 |
| **25** | | 6.2112936974 | | 6.1250903606 |
| **26** | | 6.2484416962 | | 6.1129755974 |
| **27** | | 6.2789990902 | | 6.1073417664 |
| **28** | | 6.1967356205 | | 6.1043152809 |
| **29** | | 6.1992104053 | | 6.1098091602 |
| **30** | | 6.2536036968 | | 6.0876491070 |
| **31** | | 6.2820289135 | | 6.1104698181 |
| **32** | | 6.2059834003 | | 6.0964405537 |
| **33** | | 6.2052462101 | | 6.1185460091 |
| **34** | | 6.2421357632 | | 6.0934336185 |
| **35** | | 6.3361928463 | | 6.1117410660 |
| **36** | | 6.2216293812 | | 6.1672964096 |
| **37** | | 6.2094588280 | | 6.1524269581 |
| **38** | | 6.2423326969 | | 6.1490080357 |
| **39** | | 6.3325190544 | | 6.1043674946 |
| **40** | | 6.2324430943 | | 6.1056885719 |
| **41** | | 6.2110598087 | | 6.1411142349 |
| **42** | | 6.2531535625 | | 6.1629538536 |
| **43** | | 6.2819297314 | | 6.1743738651 |
| **44** | | 6.2141919136 | | 6.1677846909 |
| **45** | | 6.2211453915 | | 6.1538481712 |
| **46** | | 6.2416310310 | | 6.1141209602 |
| **47** | | 6.2835147381 | | 6.1220293045 |
| **48** | | 6.2149467468 | | 6.1433467865 |
| **49** | | 6.2103476524 | | 6.1408221722 |
| **50** | | 6.2413299084 | | 6.0952968597 |
| **Total** | | 316.0618550777 | | 306.7096123695 |
| **Average** | | 6.3212371016 | | 6.1341922474 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000203\_08\_001702\_001734** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | | 6.2426476479 | | 6.1762971878 |
| **2** | | 6.1925578117 | | 6.1002204418 |
| **3** | | 6.1998829842 | | 6.0988714695 |
| **4** | | 6.2048926353 | | 6.0998871326 |
| **5** | | 6.1920669079 | | 6.1125218868 |
| **6** | | 6.1986644268 | | 6.0979900360 |
| **7** | | 6.2692058086 | | 6.0945627689 |
| **8** | | 6.3237676620 | | 6.1064522266 |
| **9** | | 6.2721567154 | | 6.1426875591 |
| **10** | | 6.3299980164 | | 6.1569397449 |
| **11** | | 6.3126237392 | | 6.1531069279 |
| **12** | | 6.3053789139 | | 6.1343522072 |
| **13** | | 6.3469514847 | | 6.1521680355 |
| **14** | | 6.3316822052 | | 6.1484797001 |
| **15** | | 6.2653627396 | | 6.1459248066 |
| **16** | | 6.2022910118 | | 6.1377687454 |
| **17** | | 6.1895358562 | | 6.1621084213 |
| **18** | | 6.2680974007 | | 6.0927484035 |
| **19** | | 6.2768447399 | | 6.1038577557 |
| **20** | | 6.2119121552 | | 6.0874211788 |
| **21** | | 6.1932175159 | | 6.0940613747 |
| **22** | | 6.2570528984 | | 6.1020531654 |
| **23** | | 6.2702624798 | | 6.1000773907 |
| **24** | | 6.2014117241 | | 6.0809509754 |
| **25** | | 6.2003955841 | | 6.1057658195 |
| **26** | | 6.2458505630 | | 6.0949671268 |
| **27** | | 6.2659113407 | | 6.1025826931 |
| **28** | | 6.2061491013 | | 6.0919303894 |
| **29** | | 6.1937754154 | | 6.0983672142 |
| **30** | | 6.2494208813 | | 6.1042375565 |
| **31** | | 6.2559411526 | | 6.0936288834 |
| **32** | | 6.2062144279 | | 6.0894358158 |
| **33** | | 6.1992485523 | | 6.0994718075 |
| **34** | | 6.2557499409 | | 6.0957620144 |
| **35** | | 6.2693817616 | | 6.1032590866 |
| **36** | | 6.2096068859 | | 6.0863909721 |
| **37** | | 6.2131257057 | | 6.1085493565 |
| **38** | | 6.2585411072 | | 6.0975356102 |
| **39** | | 6.2781958580 | | 6.1053545475 |
| **40** | | 6.2189886570 | | 6.0936169624 |
| **41** | | 6.2098927498 | | 6.0965487957 |
| **42** | | 6.2524957657 | | 6.1071379185 |
| **43** | | 6.2636673450 | | 6.0958240032 |
| **44** | | 6.2125403881 | | 6.1034913063 |
| **45** | | 6.1966538429 | | 6.0971000195 |
| **46** | | 6.3092720509 | | 6.0940907001 |
| **47** | | 6.2961752415 | | 6.1054375172 |
| **48** | | 6.2544221878 | | 6.0936560631 |
| **49** | | 6.2551863194 | | 6.1123037338 |
| **50** | | 6.2908201218 | | 6.0888147354 |
| **Total** | | 312.3260884285 | | 305.4467701912 |
| **Average** | | 6.2465217686 | | 6.1089354038 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000207\_03\_000556\_000590** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | | 6.2702372074 | | 6.1051816940 |
| **2** | | 6.2236726284 | | 6.0930731297 |
| **3** | | 6.2216520309 | | 6.1288905144 |
| **4** | | 6.2291967869 | | 6.1004750729 |
| **5** | | 6.1832382679 | | 6.0874745846 |
| **6** | | 6.1822381020 | | 6.1067740917 |
| **7** | | 6.2079579830 | | 6.0918641090 |
| **8** | | 6.2727179527 | | 6.1003267765 |
| **9** | | 6.2720677853 | | 6.1067686081 |
| **10** | | 6.3278393745 | | 6.1050567627 |
| **11** | | 6.3036248684 | | 6.0998554230 |
| **12** | | 6.2789547443 | | 6.1043777466 |
| **13** | | 6.2915775776 | | 6.0983669758 |
| **14** | | 6.2693319321 | | 6.1059131622 |
| **15** | | 6.2492527962 | | 6.1006078720 |
| **16** | | 6.1801638603 | | 6.0946798325 |
| **17** | | 6.1908788681 | | 6.1008424759 |
| **18** | | 6.2149162292 | | 6.1050047874 |
| **19** | | 6.2463662624 | | 6.0981867313 |
| **20** | | 6.1745936871 | | 6.0990676880 |
| **21** | | 6.1817705631 | | 6.1032297611 |
| **22** | | 6.2098770142 | | 6.1012830734 |
| **23** | | 6.2579395771 | | 6.1037399769 |
| **24** | | 6.1872053146 | | 6.0953712463 |
| **25** | | 6.1756346226 | | 6.1041054726 |
| **26** | | 6.2169425488 | | 6.1044504642 |
| **27** | | 6.2443704605 | | 6.1003875732 |
| **28** | | 6.1830096245 | | 6.0973706245 |
| **29** | | 6.1806170940 | | 6.1019623280 |
| **30** | | 6.2093465328 | | 6.0959324837 |
| **31** | | 6.2454662323 | | 6.0994586945 |
| **32** | | 6.1772236824 | | 6.0977382660 |
| **33** | | 6.1794478893 | | 6.1096966267 |
| **34** | | 6.2155754566 | | 6.1022343636 |
| **35** | | 6.2449054718 | | 6.0981328487 |
| **36** | | 6.2288086414 | | 6.1034257412 |
| **37** | | 6.1836843491 | | 6.1064114571 |
| **38** | | 6.2090063095 | | 6.1088709831 |
| **39** | | 6.2486181259 | | 6.1018540859 |
| **40** | | 6.1949224472 | | 6.0979323387 |
| **41** | | 6.2345271111 | | 6.0961956978 |
| **42** | | 6.2605223656 | | 6.1059844494 |
| **43** | | 6.3014166355 | | 6.1036140919 |
| **44** | | 6.2329134941 | | 6.1103601456 |
| **45** | | 6.2267899513 | | 6.0812246799 |
| **46** | | 6.2531340122 | | 6.0927419662 |
| **47** | | 6.3117260933 | | 6.0882441998 |
| **48** | | 6.2549026012 | | 6.0922858715 |
| **49** | | 6.2284657955 | | 6.0953128338 |
| **50** | | 6.2535903454 | | 6.0956923962 |
| **Total** | | 311.5228393078 | | 305.0280327797 |
| **Average** | | 6.2304567862 | | 6.1005606556 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000207\_04\_000902\_000934** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | | 6.3021204472 | | 6.1629712582 |
| **2** | | 6.2560524940 | | 6.0993778706 |
| **3** | | 6.2881782055 | | 6.1510348320 |
| **4** | | 6.2322387695 | | 6.1469717026 |
| **5** | | 6.2626478672 | | 6.1645879745 |
| **6** | | 6.2328948975 | | 6.0935108662 |
| **7** | | 6.2511322498 | | 6.0999176502 |
| **8** | | 6.3148107529 | | 6.1020715237 |
| **9** | | 6.2789468765 | | 6.1039934158 |
| **10** | | 6.4381475449 | | 6.0908796787 |
| **11** | | 6.3958070278 | | 6.1247305870 |
| **12** | | 6.3884243965 | | 6.0877959728 |
| **13** | | 6.4091017246 | | 6.0941772461 |
| **14** | | 6.4226691723 | | 6.1026713848 |
| **15** | | 6.3341193199 | | 6.0896837711 |
| **16** | | 6.2605021000 | | 6.0968875885 |
| **17** | | 6.2626373768 | | 6.0981693268 |
| **18** | | 6.2756612301 | | 6.1024355888 |
| **19** | | 6.4142453671 | | 6.0956091881 |
| **20** | | 6.2890443802 | | 6.0975522995 |
| **21** | | 6.2089588642 | | 6.1154839993 |
| **22** | | 6.2556295395 | | 6.0997710228 |
| **23** | | 6.2881653309 | | 6.1002388000 |
| **24** | | 6.2396070957 | | 6.0911953449 |
| **25** | | 6.2563352585 | | 6.0977809429 |
| **26** | | 6.2801258564 | | 6.0970139503 |
| **27** | | 6.3247098923 | | 6.1455967426 |
| **28** | | 6.2428023815 | | 6.1065995693 |
| **29** | | 6.2438290119 | | 6.0951089859 |
| **30** | | 6.2764382362 | | 6.0947554111 |
| **31** | | 6.3244521618 | | 6.0887427330 |
| **32** | | 6.2380089760 | | 6.1049711704 |
| **33** | | 6.2473480701 | | 6.0930492878 |
| **34** | | 6.2860722542 | | 6.0963983536 |
| **35** | | 6.3173453808 | | 6.0968704224 |
| **36** | | 6.2379910946 | | 6.1092751026 |
| **37** | | 6.2344293594 | | 6.0912652016 |
| **38** | | 6.2867946625 | | 6.0972788334 |
| **39** | | 6.3148121834 | | 6.0924727917 |
| **40** | | 6.2437498569 | | 6.1030020714 |
| **41** | | 6.2326455116 | | 6.0950665474 |
| **42** | | 6.2812278271 | | 6.1123819351 |
| **43** | | 6.3130333424 | | 6.0961010456 |
| **44** | | 6.2461633682 | | 6.0963194370 |
| **45** | | 6.2341127396 | | 6.0949199200 |
| **46** | | 6.2731726170 | | 6.0900478363 |
| **47** | | 6.3187520504 | | 6.0992090702 |
| **48** | | 6.2415847778 | | 6.0875985622 |
| **49** | | 6.2457876205 | | 6.1003026962 |
| **50** | | 6.2680768967 | | 6.1040530205 |
| **Total** | | 314.3115444183 | | 305.1979005337 |
| **Average** | | 6.2862308884 | | 6.1039580107 |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | | **VIRAT\_S\_000205\_05\_001092\_001124** | |
| **Resolution** | | | **720p** | |
| **Frame Number** | | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | | 6.2619857788 | | 6.2097694874 |
| **2** | | 6.2075886726 | | 6.1563851833 |
| **3** | | 6.2051551342 | | 6.1036796570 |
| **4** | | 6.1948034763 | | 6.1042461395 |
| **5** | | 6.1906719208 | | 6.1085922718 |
| **6** | | 6.2005023956 | | 6.1007058620 |
| **7** | | 6.2090008259 | | 6.0995824337 |
| **8** | | 6.2547473907 | | 6.1035723686 |
| **9** | | 6.2070262432 | | 6.1025824547 |
| **10** | | 6.2932090759 | | 6.1048979759 |
| **11** | | 6.2906994820 | | 6.1054525375 |
| **12** | | 6.2966947556 | | 6.1448073387 |
| **13** | | 6.2825117111 | | 6.1023316383 |
| **14** | | 6.2804503441 | | 6.0937111378 |
| **15** | | 6.2729346752 | | 6.1046223640 |
| **16** | | 6.1956505775 | | 6.0994162560 |
| **17** | | 6.1943564415 | | 6.0949470997 |
| **18** | | 6.2220854759 | | 6.1086642742 |
| **19** | | 6.2815508842 | | 6.0963215828 |
| **20** | | 6.1976165771 | | 6.1024308205 |
| **21** | | 6.1903505325 | | 6.1040563583 |
| **22** | | 6.2665312290 | | 6.0998041630 |
| **23** | | 6.3074278831 | | 6.0992283821 |
| **24** | | 6.2441430092 | | 6.1025443077 |
| **25** | | 6.2424669266 | | 6.1005127430 |
| **26** | | 6.2629184723 | | 6.1022579670 |
| **27** | | 6.3231353760 | | 6.1032264233 |
| **28** | | 6.2348573208 | | 6.1006264687 |
| **29** | | 6.2503216267 | | 6.0992686749 |
| **30** | | 6.2559127808 | | 6.1018097401 |
| **31** | | 6.3267612457 | | 6.0935676098 |
| **32** | | 6.2435894012 | | 6.1048915386 |
| **33** | | 6.2263941765 | | 6.0974705219 |
| **34** | | 6.2468769550 | | 6.0983593464 |
| **35** | | 6.3169052601 | | 6.0985898972 |
| **36** | | 6.2627632618 | | 6.1091191769 |
| **37** | | 6.2427949905 | | 6.1006989479 |
| **38** | | 6.2749135494 | | 6.1015765667 |
| **39** | | 6.3140437603 | | 6.1051471233 |
| **40** | | 6.2708101273 | | 6.0941271782 |
| **41** | | 6.2447879314 | | 6.1035923958 |
| **42** | | 6.2610700130 | | 6.0987834930 |
| **43** | | 6.3084032536 | | 6.1026084423 |
| **44** | | 6.2475349903 | | 6.0982987881 |
| **45** | | 6.2466394901 | | 6.0959310532 |
| **46** | | 6.2672882080 | | 6.1043539047 |
| **47** | | 6.3090980053 | | 6.0986804962 |
| **48** | | 6.2415359020 | | 6.0983273983 |
| **49** | | 6.2526502609 | | 6.1093630791 |
| **50** | | 6.2574260235 | | 6.1048910618 |
| **Total** | | 312.6795938015 | | 305.2784321308 |
| **Average** | | 6.2535918760 | | 6.1055686426 |