# ENCRYPTION METRICS

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **1** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0382165143 | -0.0089273025 | | -0.0458020336 | 7.9999773255 | 7.9999787194 | 7.9999773381 | 7.9999929147 | 99.6104721258 | 33.4366117718 |
| **2** | 0.0072595125 | -0.0369280177 | | 0.0167436053 | 7.9999780791 | 7.9999786645 | 7.9999744981 | 7.9999910977 | 99.6109061535 | 33.4375904303 |
| **3** | -0.0205988319 | 0.0179445358 | | 0.0123826209 | 7.9999793614 | 7.9999753897 | 7.9999777724 | 7.9999923040 | 99.6096201453 | 33.4425178591 |
| **4** | 0.0092369439 | 0.0341185731 | | -0.0353394473 | 7.9999785634 | 7.9999783367 | 7.9999767454 | 7.9999927962 | 99.6071244856 | 33.4425356678 |
| **5** | -0.0048483842 | -0.0018069628 | | 0.0246508054 | 7.9999772766 | 7.9999766123 | 7.9999786704 | 7.9999916238 | 99.6098773470 | 33.4477348604 |
| **6** | -0.0074398152 | -0.0008950789 | | 0.0621347612 | 7.9999790823 | 7.9999787221 | 7.9999770484 | 7.9999926260 | 99.6090092914 | 33.4382795952 |
| **7** | -0.0157906293 | -0.0025204738 | | -0.0600086570 | 7.9999762353 | 7.9999765982 | 7.9999792391 | 7.9999928330 | 99.6095839763 | 33.4396026865 |
| **8** | -0.0072379285 | -0.0185052349 | | -0.0172047798 | 7.9999805188 | 7.9999784871 | 7.9999756180 | 7.9999924270 | 99.6091137796 | 33.4478283482 |
| **9** | -0.0209429026 | -0.0094720497 | | 0.0357671445 | 7.9999785964 | 7.9999809682 | 7.9999806867 | 7.9999930927 | 99.6096000514 | 33.4428861524 |
| **10** | -0.0167227721 | 0.0076024672 | | 0.0009424904 | 7.9999762145 | 7.9999766670 | 7.9999768278 | 7.9999922123 | 99.6085390947 | 33.4377860738 |
| **11** | -0.0061714321 | -0.0057930527 | | -0.0592408902 | 7.9999806201 | 7.9999761902 | 7.9999832213 | 7.9999930786 | 99.6090856481 | 33.4351003969 |
| **12** | 0.0337494619 | 0.0144403261 | | 0.0331371783 | 7.9999777191 | 7.9999761701 | 7.9999778157 | 7.9999931522 | 99.6106610082 | 33.4429017389 |
| **13** | -0.0152808864 | -0.0077303449 | | 0.0093878228 | 7.9999763217 | 7.9999759655 | 7.9999753089 | 7.9999907762 | 99.6116335520 | 33.4327987416 |
| **14** | 0.0290516690 | -0.0377607169 | | -0.0246390107 | 7.9999771167 | 7.9999776021 | 7.9999771693 | 7.9999927747 | 99.6086275077 | 33.4491211647 |
| **15** | 0.0237797600 | -0.0306780745 | | -0.0402457626 | 7.9999754164 | 7.9999795552 | 7.9999782337 | 7.9999921040 | 99.6107614776 | 33.4354988861 |
| **16** | -0.0028684303 | -0.0118981681 | | -0.0166483606 | 7.9999792105 | 7.9999787642 | 7.9999770230 | 7.9999927301 | 99.6102309992 | 33.4368239001 |
| **17** | -0.0197565501 | 0.0297925779 | | 0.0424823344 | 7.9999754295 | 7.9999792360 | 7.9999817189 | 7.9999923322 | 99.6093589249 | 33.4432635075 |
| **18** | -0.0102319636 | 0.0015334492 | | 0.0252923536 | 7.9999797560 | 7.9999763778 | 7.9999790633 | 7.9999926617 | 99.6110427919 | 33.4408284131 |
| **19** | -0.0542901599 | -0.0125249372 | | -0.0088534815 | 7.9999771098 | 7.9999735800 | 7.9999800688 | 7.9999917785 | 99.6105042760 | 33.4349492594 |
| **20** | -0.0258145686 | 0.0041159441 | | -0.0503328601 | 7.9999802133 | 7.9999781403 | 7.9999777094 | 7.9999937766 | 99.6071124293 | 33.4324929837 |
| **21** | -0.0117708199 | -0.0068676160 | | -0.0133845531 | 7.9999790619 | 7.9999707306 | 7.9999768763 | 7.9999916457 | 99.6084346065 | 33.4289074793 |
| **22** | -0.0263615617 | -0.0064660618 | | -0.0531363754 | 7.9999793894 | 7.9999784472 | 7.9999783427 | 7.9999929881 | 99.6097969715 | 33.4325335339 |
| **23** | 0.0097261901 | -0.0084220240 | | 0.0626094226 | 7.9999777686 | 7.9999775194 | 7.9999765684 | 7.9999924379 | 99.6098532343 | 33.4372000260 |
| **24** | -0.0299328855 | -0.0227744683 | | -0.0148763630 | 7.9999762561 | 7.9999740256 | 7.9999726682 | 7.9999913932 | 99.6100380980 | 33.4400758777 |
| **25** | 0.0106949710 | 0.0192596797 | | -0.0396485111 | 7.9999768328 | 7.9999762814 | 7.9999779338 | 7.9999918912 | 99.6095759388 | 33.4336878209 |
| **26** | -0.0291634036 | -0.0036103325 | | 0.0398468595 | 7.9999770563 | 7.9999775628 | 7.9999762968 | 7.9999923215 | 99.6078599216 | 33.4446972806 |
| **27** | 0.0276842404 | -0.0068443954 | | -0.0105353224 | 7.9999795759 | 7.9999755128 | 7.9999752668 | 7.9999917146 | 99.6086234889 | 33.4393279599 |
| **28** | 0.0184854929 | -0.0236727371 | | 0.0359535704 | 7.9999757401 | 7.9999805691 | 7.9999765640 | 7.9999924970 | 99.6065940072 | 33.4383910335 |
| **29** | 0.0422757583 | -0.0082157854 | | -0.0174172879 | 7.9999788980 | 7.9999735812 | 7.9999800698 | 7.9999921967 | 99.6096482767 | 33.4440523223 |
| **30** | 0.0011276295 | -0.0458083835 | | 0.0115983634 | 7.9999795728 | 7.9999763201 | 7.9999755719 | 7.9999913639 | 99.6106449331 | 33.4464896073 |
| **31** | 0.0053523716 | -0.0060348152 | | 0.0398876584 | 7.9999792515 | 7.9999791116 | 7.9999743489 | 7.9999925181 | 99.6096121078 | 33.4450090588 |
| **32** | -0.0229795690 | -0.0248341797 | | 0.0207214397 | 7.9999782128 | 7.9999780163 | 7.9999789672 | 7.9999931477 | 99.6083783436 | 33.4325822320 |
| **33** | 0.0027913193 | -0.0021835502 | | -0.0153294980 | 7.9999787023 | 7.9999756733 | 7.9999765885 | 7.9999920620 | 99.6093589249 | 33.4371446299 |
| **34** | 0.0045540454 | -0.0002729332 | | -0.0433508786 | 7.9999759521 | 7.9999764772 | 7.9999783793 | 7.9999916102 | 99.6079402971 | 33.4462321062 |
| **35** | 0.0229298485 | -0.0195040545 | | 0.0165594108 | 7.9999756074 | 7.9999772959 | 7.9999772483 | 7.9999912409 | 99.6081050669 | 33.4382902016 |
| **36** | -0.0115887847 | -0.0390110526 | | -0.0245293423 | 7.9999794313 | 7.9999763765 | 7.9999764651 | 7.9999931036 | 99.6104681070 | 33.4339225016 |
| **37** | -0.0041577618 | 0.0037452611 | | 0.0183249978 | 7.9999790567 | 7.9999782228 | 7.9999804965 | 7.9999929902 | 99.6100099666 | 33.4379007429 |
| **38** | -0.0134140735 | -0.0067410318 | | -0.0316940670 | 7.9999763870 | 7.9999789070 | 7.9999733681 | 7.9999923963 | 99.6063126929 | 33.4316928218 |
| **39** | -0.0114522480 | -0.0071329226 | | -0.0038118265 | 7.9999776496 | 7.9999808118 | 7.9999757909 | 7.9999922571 | 99.6093187371 | 33.4388766750 |
| **40** | 0.0059226689 | 0.0033163073 | | -0.0391697935 | 7.9999742259 | 7.9999776934 | 7.9999760229 | 7.9999919746 | 99.6094714506 | 33.4421148941 |
| **41** | 0.0009754705 | -0.0146146802 | | 0.0032937117 | 7.9999744379 | 7.9999768964 | 7.9999782893 | 7.9999923171 | 99.6087520898 | 33.4353854936 |
| **42** | -0.0148588877 | 0.0251348262 | | -0.0335543590 | 7.9999799017 | 7.9999770951 | 7.9999800753 | 7.9999924060 | 99.6067386831 | 33.4369956515 |
| **43** | -0.0059603060 | 0.0184723292 | | -0.0328287276 | 7.9999759409 | 7.9999801114 | 7.9999760567 | 7.9999938995 | 99.6103917503 | 33.4401702795 |
| **44** | -0.0188120434 | -0.0270022677 | | 0.0487064707 | 7.9999752287 | 7.9999805308 | 7.9999808828 | 7.9999931192 | 99.6123408565 | 33.4437783363 |
| **45** | 0.0100111554 | 0.0222513378 | | -0.0501342979 | 7.9999760411 | 7.9999781325 | 7.9999749539 | 7.9999919307 | 99.6103917503 | 33.4386210651 |
| **46** | 0.0277219408 | 0.0287180654 | | 0.0040658080 | 7.9999773320 | 7.9999778196 | 7.9999787804 | 7.9999928910 | 99.6107896091 | 33.4384657355 |
| **47** | -0.0060417812 | 0.0003506905 | | -0.0127937649 | 7.9999739947 | 7.9999799549 | 7.9999769411 | 7.9999932432 | 99.6092664931 | 33.4470706435 |
| **48** | 0.0138506930 | -0.0189668734 | | 0.0145044749 | 7.9999726984 | 7.9999778252 | 7.9999762419 | 7.9999923610 | 99.6109664352 | 33.4412912973 |
| **49** | 0.0184430493 | -0.0006231834 | | 0.0374568603 | 7.9999791172 | 7.9999763099 | 7.9999792223 | 7.9999930410 | 99.6101023984 | 33.4437089455 |
| **50** | -0.0069901307 | -0.0139896714 | | -0.0131657162 | 7.9999781141 | 7.9999798316 | 7.9999781458 | 7.9999927126 | 99.6101867927 | 33.4382690834 |
| **Total** | -0.1540718339 | -0.2682370640 | | -0.1912258031 | 399.9988776016 | 399.9988743902 | 399.9988752007 | 399.9996207639 | 4980.4728370949 | 1671.9700377740 |
| **Average** | -0.0030814269 | -0.0053646898 | | -0.0038244974 | 7.9999775520 | 7.9999774878 | 7.9999775040 | 7.9999924153 | 99.6094567419 | 33.4394007555 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **2** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0237494441 | 0.0063642101 | | 0.0034155495 | 7.9999795179 | 7.9999780969 | 7.9999770040 | 7.9999934429 | 99.6119108475 | 33.4444182673 |
| **2** | -0.0212188080 | 0.0110643218 | | -0.0304954575 | 7.9999769883 | 7.9999825089 | 7.9999744229 | 7.9999935176 | 99.6089128408 | 33.4426464284 |
| **3** | -0.0089011317 | 0.0159766284 | | 0.0208958157 | 7.9999774780 | 7.9999805226 | 7.9999781218 | 7.9999926815 | 99.6092062114 | 33.4327390589 |
| **4** | -0.0061503076 | -0.0021936492 | | 0.0087829295 | 7.9999784850 | 7.9999779049 | 7.9999755358 | 7.9999926532 | 99.6099858539 | 33.4353565426 |
| **5** | -0.0082498628 | -0.0208002592 | | -0.0501735318 | 7.9999759904 | 7.9999767327 | 7.9999821412 | 7.9999922944 | 99.6087882587 | 33.4388685901 |
| **6** | 0.0268258447 | -0.0131382782 | | 0.0688732161 | 7.9999752701 | 7.9999783571 | 7.9999742938 | 7.9999920716 | 99.6109463413 | 33.4456343330 |
| **7** | 0.0151954361 | -0.0269388402 | | -0.0062854000 | 7.9999789120 | 7.9999786759 | 7.9999808833 | 7.9999936593 | 99.6085190008 | 33.4400990605 |
| **8** | 0.0023050515 | 0.0615464722 | | 0.0309962505 | 7.9999772263 | 7.9999778676 | 7.9999755872 | 7.9999916415 | 99.6085109632 | 33.4452890966 |
| **9** | 0.0275819995 | 0.0210939395 | | 0.0005349570 | 7.9999766907 | 7.9999743664 | 7.9999779187 | 7.9999925559 | 99.6093629437 | 33.4364671589 |
| **10** | -0.0084866289 | -0.0082729092 | | 0.0192632703 | 7.9999703493 | 7.9999754405 | 7.9999741935 | 7.9999909824 | 99.6087922775 | 33.4422524151 |
| **11** | 0.0171597623 | 0.0279888471 | | 0.0492438865 | 7.9999787813 | 7.9999801266 | 7.9999769520 | 7.9999935287 | 99.6089208783 | 33.4384156032 |
| **12** | -0.0293992669 | 0.0230820743 | | -0.0111220122 | 7.9999766269 | 7.9999799311 | 7.9999799223 | 7.9999923476 | 99.6101908115 | 33.4366374289 |
| **13** | -0.0097708878 | 0.0120640400 | | -0.0152306249 | 7.9999785214 | 7.9999752341 | 7.9999787655 | 7.9999929574 | 99.6105203511 | 33.4287624251 |
| **14** | -0.0626999062 | 0.0009987764 | | -0.0113833751 | 7.9999771112 | 7.9999794932 | 7.9999780970 | 7.9999930489 | 99.6100421168 | 33.4337815450 |
| **15** | -0.0191284684 | -0.0047336929 | | -0.0157705371 | 7.9999812248 | 7.9999797657 | 7.9999781417 | 7.9999945493 | 99.6086757330 | 33.4402902754 |
| **16** | 0.0159186785 | -0.0049160007 | | 0.0582427212 | 7.9999789065 | 7.9999756740 | 7.9999773491 | 7.9999925085 | 99.6112798997 | 33.4335935136 |
| **17** | 0.0043915797 | 0.0044897467 | | -0.0039848960 | 7.9999750393 | 7.9999822827 | 7.9999784998 | 7.9999928230 | 99.6090374228 | 33.4350558121 |
| **18** | -0.0063712780 | 0.0039961417 | | -0.0462555853 | 7.9999789622 | 7.9999752538 | 7.9999750100 | 7.9999913637 | 99.6103194123 | 33.4383493170 |
| **19** | 0.0172315784 | 0.0074739251 | | 0.0190864892 | 7.9999773723 | 7.9999790061 | 7.9999786881 | 7.9999927334 | 99.6110146605 | 33.4309262128 |
| **20** | 0.0277358943 | 0.0016274123 | | -0.0341994991 | 7.9999779012 | 7.9999791537 | 7.9999783169 | 7.9999923452 | 99.6107855903 | 33.4340446409 |
| **21** | -0.0152010077 | 0.0031189967 | | -0.0184060936 | 7.9999771369 | 7.9999785766 | 7.9999766474 | 7.9999922357 | 99.6094473380 | 33.4412167529 |
| **22** | -0.0218074462 | 0.0092165160 | | 0.0277173679 | 7.9999771581 | 7.9999795580 | 7.9999805360 | 7.9999932397 | 99.6074459877 | 33.4374974627 |
| **23** | 0.0134027252 | 0.0040786091 | | -0.0684990194 | 7.9999803937 | 7.9999770719 | 7.9999771398 | 7.9999927992 | 99.6103153935 | 33.4366940700 |
| **24** | -0.0009386919 | -0.0222742959 | | -0.0124820902 | 7.9999748465 | 7.9999793481 | 7.9999800344 | 7.9999928023 | 99.6076388889 | 33.4411661951 |
| **25** | 0.0039354822 | -0.0127954315 | | 0.0073784313 | 7.9999733581 | 7.9999752281 | 7.9999795291 | 7.9999915525 | 99.6114205568 | 33.4449628508 |
| **26** | -0.0066329619 | 0.0017704300 | | 0.0058515190 | 7.9999768316 | 7.9999770572 | 7.9999819005 | 7.9999936148 | 99.6111151299 | 33.4419152161 |
| **27** | -0.0433155315 | -0.0091930361 | | -0.0454610179 | 7.9999761295 | 7.9999741925 | 7.9999744062 | 7.9999920936 | 99.6110910172 | 33.4308314485 |
| **28** | 0.0077837748 | 0.0020280720 | | -0.0141572485 | 7.9999797138 | 7.9999756218 | 7.9999804728 | 7.9999929691 | 99.6101345486 | 33.4364834862 |
| **29** | 0.0029102285 | 0.0137703478 | | -0.0739268620 | 7.9999768614 | 7.9999802504 | 7.9999767477 | 7.9999923424 | 99.6113723315 | 33.4393455164 |
| **30** | -0.0060873783 | -0.0163535213 | | 0.0309966433 | 7.9999770411 | 7.9999784889 | 7.9999778104 | 7.9999930324 | 99.6099295910 | 33.4332461180 |
| **31** | 0.0009090197 | -0.0170558146 | | -0.0147136910 | 7.9999745265 | 7.9999729575 | 7.9999778694 | 7.9999917968 | 99.6088605967 | 33.4393801094 |
| **32** | -0.0158594363 | -0.0232461698 | | -0.0644387255 | 7.9999807196 | 7.9999760890 | 7.9999756235 | 7.9999929901 | 99.6081251608 | 33.4390296406 |
| **33** | 0.0226073173 | -0.0206645434 | | -0.0158216681 | 7.9999802373 | 7.9999790896 | 7.9999769776 | 7.9999929079 | 99.6093629437 | 33.4345811238 |
| **34** | -0.0100977017 | 0.0120117237 | | 0.0032202553 | 7.9999790822 | 7.9999781453 | 7.9999772063 | 7.9999926691 | 99.6084466628 | 33.4409598665 |
| **35** | -0.0241757595 | 0.0250752044 | | -0.0004490714 | 7.9999736860 | 7.9999770825 | 7.9999797124 | 7.9999926019 | 99.6084788130 | 33.4369533835 |
| **36** | -0.0137232196 | 0.0039304781 | | -0.0066398636 | 7.9999798619 | 7.9999776470 | 7.9999789052 | 7.9999935576 | 99.6077634709 | 33.4442178485 |
| **37** | -0.0214465705 | 0.0061231622 | | 0.0073269237 | 7.9999768007 | 7.9999806425 | 7.9999807294 | 7.9999927259 | 99.6096362204 | 33.4312354694 |
| **38** | -0.0287729229 | 0.0283916405 | | 0.0275717046 | 7.9999745457 | 7.9999825575 | 7.9999813328 | 7.9999934397 | 99.6101104360 | 33.4429165217 |
| **39** | -0.0386390569 | -0.0113450736 | | 0.0328794541 | 7.9999759768 | 7.9999777537 | 7.9999778725 | 7.9999919342 | 99.6096362204 | 33.4414930240 |
| **40** | 0.0028687939 | 0.0316049600 | | -0.0280759775 | 7.9999755251 | 7.9999752184 | 7.9999774884 | 7.9999920196 | 99.6081532922 | 33.4398117259 |
| **41** | -0.0132882024 | -0.0038714127 | | 0.0544190577 | 7.9999789298 | 7.9999797341 | 7.9999795253 | 7.9999928376 | 99.6084386253 | 33.4419032071 |
| **42** | 0.0321637576 | -0.0036053241 | | -0.0378101431 | 7.9999766327 | 7.9999782431 | 7.9999810871 | 7.9999922705 | 99.6076951517 | 33.4305225386 |
| **43** | 0.0065942035 | 0.0121216267 | | -0.0611243478 | 7.9999784657 | 7.9999765682 | 7.9999792119 | 7.9999931965 | 99.6125498328 | 33.4370541523 |
| **44** | 0.0064032151 | -0.0173629795 | | -0.0052305580 | 7.9999747121 | 7.9999788776 | 7.9999761571 | 7.9999925335 | 99.6092906057 | 33.4460740974 |
| **45** | -0.0114873169 | -0.0224381884 | | -0.0083616097 | 7.9999788980 | 7.9999746298 | 7.9999773494 | 7.9999919943 | 99.6094151878 | 33.4400652870 |
| **46** | -0.0170723820 | -0.0014932387 | | -0.0397697927 | 7.9999792961 | 7.9999774793 | 7.9999811069 | 7.9999928404 | 99.6088766718 | 33.4401958420 |
| **47** | -0.0185355181 | -0.0050748591 | | -0.0116547695 | 7.9999784745 | 7.9999783420 | 7.9999781493 | 7.9999919058 | 99.6082457240 | 33.4422268367 |
| **48** | 0.0157189279 | 0.0113141463 | | 0.0341380104 | 7.9999824109 | 7.9999754560 | 7.9999802739 | 7.9999934517 | 99.6090534979 | 33.4378276327 |
| **49** | -0.0054148453 | -0.0291355771 | | 0.0276916920 | 7.9999780791 | 7.9999802232 | 7.9999804650 | 7.9999928376 | 99.6087802212 | 33.4355608383 |
| **50** | -0.0160742074 | 0.0063799278 | | 0.0160031199 | 7.9999804827 | 7.9999774327 | 7.9999803365 | 7.9999931728 | 99.6078960905 | 33.4333700066 |
| **Total** | -0.2155539885 | 0.0717992817 | | -0.1973942041 | 399.9988741697 | 399.9988959570 | 399.9989124490 | 399.9996340709 | 4980.4744486240 | 1671.9123659942 |
| **Average** | -0.0043110531 | 0.0014359846 | | -0.0039478636 | 7.9999774834 | 7.9999779191 | 7.9999782490 | 7.9999926814 | 99.6094889725 | 33.4382473199 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **3** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0162601398 | 0.0197710601 | | -0.0118968657 | 7.9999797508 | 7.9999765174 | 7.9999785371 | 7.9999922637 | 99.6102189429 | 33.4469988256 |
| **2** | -0.0002533737 | 0.0198779442 | | -0.0666474834 | 7.9999756432 | 7.9999745168 | 7.9999788764 | 7.9999931058 | 99.6092785494 | 33.4426158542 |
| **3** | -0.0040220062 | -0.0002696502 | | -0.0396528773 | 7.9999775716 | 7.9999781091 | 7.9999799716 | 7.9999931225 | 99.6097527649 | 33.4394457179 |
| **4** | 0.0089588692 | 0.0064183327 | | 0.0564558405 | 7.9999794417 | 7.9999756278 | 7.9999772320 | 7.9999922518 | 99.6098974408 | 33.4417507458 |
| **5** | 0.0179844626 | 0.0499350616 | | -0.0284680940 | 7.9999822384 | 7.9999770477 | 7.9999797157 | 7.9999939578 | 99.6067306456 | 33.4397928140 |
| **6** | 0.0038714424 | -0.0254027900 | | 0.0060910065 | 7.9999748928 | 7.9999759685 | 7.9999770756 | 7.9999921765 | 99.6079001093 | 33.4304622097 |
| **7** | -0.0189570494 | 0.0191190661 | | 0.0115363068 | 7.9999791954 | 7.9999762717 | 7.9999786062 | 7.9999916088 | 99.6106811021 | 33.4426167998 |
| **8** | -0.0093843760 | -0.0077416377 | | 0.0245037792 | 7.9999778840 | 7.9999772911 | 7.9999749100 | 7.9999917603 | 99.6083341371 | 33.4410489257 |
| **9** | -0.0087141576 | 0.0301686214 | | 0.0117355791 | 7.9999762839 | 7.9999765061 | 7.9999772363 | 7.9999923267 | 99.6085752636 | 33.4462324845 |
| **10** | 0.0108990221 | -0.0108088339 | | 0.0009482449 | 7.9999763516 | 7.9999743906 | 7.9999800646 | 7.9999915539 | 99.6095317323 | 33.4361005520 |
| **11** | -0.0190957665 | 0.0505397320 | | 0.0598978586 | 7.9999767942 | 7.9999805071 | 7.9999758413 | 7.9999931620 | 99.6096723894 | 33.4324189594 |
| **12** | -0.0069089905 | -0.0288066192 | | -0.0294169132 | 7.9999782139 | 7.9999744269 | 7.9999797995 | 7.9999926915 | 99.6085431134 | 33.4294056341 |
| **13** | 0.0027675294 | 0.0095432422 | | -0.0271542989 | 7.9999781679 | 7.9999770417 | 7.9999768309 | 7.9999922180 | 99.6103354874 | 33.4349092293 |
| **14** | 0.0239752092 | 0.0284352216 | | -0.0061629643 | 7.9999774384 | 7.9999793911 | 7.9999791755 | 7.9999930404 | 99.6100340792 | 33.4385673396 |
| **15** | -0.0106458475 | -0.0012110662 | | -0.0085648330 | 7.9999814654 | 7.9999776960 | 7.9999781733 | 7.9999926233 | 99.6096201453 | 33.4430658625 |
| **16** | 0.0065936804 | 0.0014280547 | | -0.0126377258 | 7.9999811270 | 7.9999798806 | 7.9999802170 | 7.9999932744 | 99.6112035430 | 33.4395280476 |
| **17** | -0.0106145867 | -0.0084163689 | | -0.0380721603 | 7.9999777393 | 7.9999773175 | 7.9999760811 | 7.9999916860 | 99.6106168017 | 33.4417893733 |
| **18** | 0.0329006862 | 0.0062940137 | | -0.0159405655 | 7.9999756637 | 7.9999781394 | 7.9999770331 | 7.9999914026 | 99.6106811021 | 33.4394564976 |
| **19** | 0.0211977365 | -0.0015179588 | | 0.0086559211 | 7.9999835710 | 7.9999773657 | 7.9999781303 | 7.9999937001 | 99.6087721836 | 33.4442685639 |
| **20** | 0.0013028669 | 0.0182701449 | | 0.0067884229 | 7.9999774256 | 7.9999773169 | 7.9999783426 | 7.9999932454 | 99.6116496271 | 33.4413682686 |
| **21** | 0.0034966586 | -0.0016290557 | | -0.0232351301 | 7.9999791311 | 7.9999795490 | 7.9999793919 | 7.9999927584 | 99.6102551119 | 33.4421107966 |
| **22** | 0.0410909864 | -0.0053968362 | | 0.0098542407 | 7.9999752827 | 7.9999775625 | 7.9999804945 | 7.9999924322 | 99.6085069444 | 33.4449209137 |
| **23** | -0.0154409872 | -0.0288757225 | | 0.0261029844 | 7.9999783594 | 7.9999795397 | 7.9999808458 | 7.9999937445 | 99.6095839763 | 33.4469647527 |
| **24** | -0.0253331047 | 0.0091607745 | | -0.0549324078 | 7.9999755234 | 7.9999755504 | 7.9999825396 | 7.9999921582 | 99.6090695730 | 33.4468182171 |
| **25** | -0.0417307413 | -0.0027642155 | | -0.0557490503 | 7.9999740685 | 7.9999788985 | 7.9999792091 | 7.9999919890 | 99.6094955633 | 33.4403332684 |
| **26** | -0.0129966271 | 0.0175273622 | | -0.0304243346 | 7.9999780660 | 7.9999775733 | 7.9999789193 | 7.9999921735 | 99.6098451968 | 33.4416824423 |
| **27** | -0.0115730179 | -0.0177421772 | | 0.0406866984 | 7.9999804706 | 7.9999781758 | 7.9999791209 | 7.9999925094 | 99.6101506237 | 33.4380989394 |
| **28** | -0.0121090027 | -0.0101024389 | | -0.0007456872 | 7.9999780905 | 7.9999806039 | 7.9999779197 | 7.9999923614 | 99.6096482767 | 33.4466078696 |
| **29** | -0.0231896407 | -0.0129971308 | | 0.0092484595 | 7.9999792251 | 7.9999768453 | 7.9999781802 | 7.9999925720 | 99.6090173290 | 33.4356420176 |
| **30** | -0.0114373024 | -0.0137942334 | | -0.0730792542 | 7.9999725107 | 7.9999810673 | 7.9999793267 | 7.9999925272 | 99.6078559028 | 33.4278613998 |
| **31** | -0.0276228675 | -0.0148810314 | | 0.0162103450 | 7.9999750490 | 7.9999797550 | 7.9999771416 | 7.9999930023 | 99.6087279771 | 33.4388994480 |
| **32** | -0.0107151600 | 0.0164658654 | | -0.0300964646 | 7.9999791709 | 7.9999775560 | 7.9999808974 | 7.9999937004 | 99.6090334041 | 33.4479416619 |
| **33** | -0.0168727637 | 0.0049849332 | | -0.0123628184 | 7.9999784962 | 7.9999769100 | 7.9999775774 | 7.9999928227 | 99.6099938915 | 33.4389808795 |
| **34** | -0.0015468578 | 0.0205221159 | | 0.0127658351 | 7.9999780858 | 7.9999764750 | 7.9999813437 | 7.9999928688 | 99.6096000514 | 33.4353017139 |
| **35** | -0.0006929724 | 0.0320832359 | | -0.0223396993 | 7.9999756679 | 7.9999743456 | 7.9999770727 | 7.9999927830 | 99.6087962963 | 33.4501679691 |
| **36** | 0.0116415883 | -0.0235003171 | | 0.0088091236 | 7.9999761853 | 7.9999794023 | 7.9999777542 | 7.9999924593 | 99.6103877315 | 33.4436530451 |
| **37** | 0.0120153635 | -0.0340431443 | | -0.0144355237 | 7.9999751614 | 7.9999799334 | 7.9999773551 | 7.9999916798 | 99.6089891975 | 33.4393002539 |
| **38** | -0.0129404570 | -0.0231638696 | | -0.0296184175 | 7.9999786250 | 7.9999795502 | 7.9999788433 | 7.9999922029 | 99.6102510931 | 33.4372149979 |
| **39** | 0.0176249895 | -0.0027518334 | | -0.0181954511 | 7.9999796846 | 7.9999767612 | 7.9999785973 | 7.9999931004 | 99.6098492155 | 33.4353828144 |
| **40** | 0.0092849818 | -0.0093130151 | | 0.0275741354 | 7.9999834344 | 7.9999805802 | 7.9999784708 | 7.9999936218 | 99.6112919560 | 33.4352194788 |
| **41** | 0.0077377031 | -0.0371108261 | | -0.0233323186 | 7.9999745086 | 7.9999766470 | 7.9999736568 | 7.9999911605 | 99.6087922775 | 33.4434233445 |
| **42** | -0.0250631768 | 0.0109563554 | | -0.0592294202 | 7.9999776992 | 7.9999807015 | 7.9999793168 | 7.9999930334 | 99.6114245756 | 33.4367600252 |
| **43** | 0.0327685486 | -0.0120359892 | | -0.0159195297 | 7.9999766155 | 7.9999805074 | 7.9999794399 | 7.9999929520 | 99.6086033951 | 33.4383284825 |
| **44** | -0.0031046821 | 0.0023037373 | | 0.0360626422 | 7.9999770246 | 7.9999780251 | 7.9999779685 | 7.9999933276 | 99.6087239583 | 33.4330201052 |
| **45** | -0.0028518394 | 0.0000949511 | | -0.0191037539 | 7.9999765456 | 7.9999775852 | 7.9999771751 | 7.9999913969 | 99.6110548483 | 33.4385528089 |
| **46** | -0.0241734590 | 0.0052024844 | | -0.0243715318 | 7.9999741108 | 7.9999753720 | 7.9999747023 | 7.9999918494 | 99.6096522955 | 33.4367202945 |
| **47** | -0.0042651744 | 0.0226360396 | | 0.0311594232 | 7.9999721768 | 7.9999784233 | 7.9999794241 | 7.9999918828 | 99.6114728009 | 33.4352056416 |
| **48** | -0.0113252297 | 0.0008694168 | | 0.0240598667 | 7.9999785872 | 7.9999784757 | 7.9999772444 | 7.9999929756 | 99.6106127829 | 33.4310723228 |
| **49** | 0.0074898319 | 0.0172775412 | | -0.0123581905 | 7.9999772994 | 7.9999754861 | 7.9999802767 | 7.9999929883 | 99.6083944187 | 33.4351525937 |
| **50** | 0.0113133046 | 0.0324272191 | | -0.0066380931 | 7.9999793910 | 7.9999744031 | 7.9999747776 | 7.9999928770 | 99.6106690458 | 33.4427581189 |
| **Total** | -0.1149258964 | 0.1180357660 | | -0.3816351439 | 399.9988811072 | 399.9988835907 | 399.9989168335 | 399.9996290822 | 4980.4817788709 | 1671.9759393226 |
| **Average** | -0.0022985139 | 0.0023607109 | | -0.0076325547 | 7.9999776221 | 7.9999776718 | 7.9999783367 | 7.9999925816 | 99.6096355774 | 33.4395187865 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **4** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0060259822 | -0.0017652802 | | -0.0234418558 | 7.9999770919 | 7.9999828462 | 7.9999777960 | 7.9999935185 | 99.6097567837 | 33.4395036197 |
| **2** | -0.0121476018 | -0.0211003008 | | -0.0485188640 | 7.9999721427 | 7.9999783382 | 7.9999779311 | 7.9999924650 | 99.6102028678 | 33.4331016470 |
| **3** | 0.0024084166 | 0.0021533604 | | -0.0102300970 | 7.9999789319 | 7.9999750981 | 7.9999772008 | 7.9999925386 | 99.6076630015 | 33.4383847296 |
| **4** | -0.0005601258 | 0.0071172233 | | 0.0196879463 | 7.9999771619 | 7.9999786030 | 7.9999796039 | 7.9999926235 | 99.6089530285 | 33.4424579400 |
| **5** | 0.0090937890 | 0.0088793826 | | 0.0282039491 | 7.9999788794 | 7.9999814891 | 7.9999758303 | 7.9999939613 | 99.6105967078 | 33.4439367549 |
| **6** | 0.0075058113 | -0.0054772619 | | -0.0181186109 | 7.9999762663 | 7.9999809376 | 7.9999786445 | 7.9999927922 | 99.6076871142 | 33.4475125985 |
| **7** | 0.0240063925 | -0.0327889367 | | 0.0264976316 | 7.9999789106 | 7.9999795334 | 7.9999744799 | 7.9999936531 | 99.6070481289 | 33.4438950699 |
| **8** | -0.0003622099 | 0.0059351796 | | -0.0215093549 | 7.9999792547 | 7.9999747684 | 7.9999829569 | 7.9999935739 | 99.6088646155 | 33.4434316027 |
| **9** | -0.0189916586 | -0.0067912804 | | -0.0018842445 | 7.9999757899 | 7.9999776766 | 7.9999784457 | 7.9999922519 | 99.6093950939 | 33.4458224905 |
| **10** | 0.0013266452 | 0.0086377718 | | 0.0666203163 | 7.9999763724 | 7.9999762005 | 7.9999771797 | 7.9999924792 | 99.6086596579 | 33.4372440907 |
| **11** | 0.0134133757 | 0.0006651550 | | 0.0425475580 | 7.9999803107 | 7.9999771771 | 7.9999785122 | 7.9999927312 | 99.6094593943 | 33.4360178755 |
| **12** | 0.0093333865 | 0.0075632142 | | -0.0428151753 | 7.9999804739 | 7.9999784316 | 7.9999784843 | 7.9999924294 | 99.6097085584 | 33.4425496153 |
| **13** | -0.0180979007 | -0.0284683902 | | 0.0123064805 | 7.9999775349 | 7.9999813767 | 7.9999792761 | 7.9999931185 | 99.6101144547 | 33.4311252919 |
| **14** | -0.0126715940 | 0.0145878316 | | 0.0346836104 | 7.9999740887 | 7.9999805769 | 7.9999794464 | 7.9999937355 | 99.6100260417 | 33.4397958714 |
| **15** | 0.0219335900 | 0.0146601744 | | 0.0135616575 | 7.9999817205 | 7.9999777714 | 7.9999780696 | 7.9999939053 | 99.6083260995 | 33.4452311159 |
| **16** | 0.0107904471 | -0.0009521196 | | -0.0312331104 | 7.9999744506 | 7.9999787805 | 7.9999799285 | 7.9999925750 | 99.6108780221 | 33.4488442316 |
| **17** | 0.0217400758 | -0.0218306911 | | 0.0291876141 | 7.9999763823 | 7.9999771845 | 7.9999816546 | 7.9999924631 | 99.6097808963 | 33.4373852206 |
| **18** | 0.0022881289 | 0.0494366746 | | 0.0010449325 | 7.9999781156 | 7.9999727438 | 7.9999783087 | 7.9999911518 | 99.6060876415 | 33.4434011230 |
| **19** | 0.0039213051 | 0.0176388018 | | -0.0331601948 | 7.9999765653 | 7.9999774194 | 7.9999773967 | 7.9999911952 | 99.6101265111 | 33.4434189159 |
| **20** | 0.0274511458 | -0.0151755792 | | -0.0148507354 | 7.9999772486 | 7.9999783535 | 7.9999801729 | 7.9999932922 | 99.6110789609 | 33.4474277944 |
| **21** | -0.0219978987 | -0.0155676736 | | 0.0532212434 | 7.9999814269 | 7.9999787073 | 7.9999762737 | 7.9999929859 | 99.6113683128 | 33.4478164967 |
| **22** | -0.0121917856 | -0.0002790921 | | 0.0188976239 | 7.9999786359 | 7.9999743012 | 7.9999754029 | 7.9999916887 | 99.6089248971 | 33.4353545254 |
| **23** | 0.0396325279 | -0.0244148798 | | -0.0107032043 | 7.9999799451 | 7.9999801752 | 7.9999749154 | 7.9999933336 | 99.6085431134 | 33.4384265563 |
| **24** | -0.0246755277 | 0.0053543992 | | -0.0089298665 | 7.9999757443 | 7.9999797135 | 7.9999798183 | 7.9999933838 | 99.6093830376 | 33.4304987884 |
| **25** | 0.0139085758 | -0.0165822307 | | -0.0404840588 | 7.9999799862 | 7.9999772887 | 7.9999763000 | 7.9999928006 | 99.6073937436 | 33.4352691382 |
| **26** | 0.0110604302 | 0.0195199301 | | -0.0361752374 | 7.9999797781 | 7.9999778651 | 7.9999761834 | 7.9999933193 | 99.6091740612 | 33.4403165944 |
| **27** | 0.0178455994 | 0.0042221163 | | 0.0012727330 | 7.9999766506 | 7.9999759667 | 7.9999766864 | 7.9999919528 | 99.6100823045 | 33.4434488282 |
| **28** | 0.0118941992 | 0.0224084136 | | 0.0062575306 | 7.9999762089 | 7.9999787475 | 7.9999803008 | 7.9999924082 | 99.6121358989 | 33.4391610782 |
| **29** | 0.0221829119 | -0.0176851776 | | 0.0016995645 | 7.9999795517 | 7.9999753256 | 7.9999788968 | 7.9999925975 | 99.6079845036 | 33.4402358722 |
| **30** | -0.0249185839 | 0.0242658278 | | -0.0288968436 | 7.9999783848 | 7.9999744690 | 7.9999776240 | 7.9999930016 | 99.6081211420 | 33.4401813429 |
| **31** | -0.0199687110 | 0.0143393982 | | 0.0298989598 | 7.9999798763 | 7.9999792327 | 7.9999768584 | 7.9999922573 | 99.6094995820 | 33.4475992780 |
| **32** | 0.0310347831 | 0.0153410219 | | -0.0025212768 | 7.9999785496 | 7.9999777642 | 7.9999786342 | 7.9999929427 | 99.6074660815 | 33.4357420142 |
| **33** | -0.0283109699 | 0.0411053938 | | 0.0190312734 | 7.9999765022 | 7.9999767380 | 7.9999763681 | 7.9999918174 | 99.6072611240 | 33.4410243560 |
| **34** | -0.0185207033 | -0.0018852249 | | 0.0398693112 | 7.9999757406 | 7.9999789921 | 7.9999792214 | 7.9999930722 | 99.6077875836 | 33.4364196901 |
| **35** | -0.0152545768 | 0.0087887457 | | 0.0364901994 | 7.9999802440 | 7.9999782293 | 7.9999759061 | 7.9999918221 | 99.6123850630 | 33.4381956265 |
| **36** | -0.0096810013 | 0.0156069660 | | 0.0388208014 | 7.9999767897 | 7.9999798494 | 7.9999777601 | 7.9999929498 | 99.6119510352 | 33.4407857983 |
| **37** | -0.0192072443 | 0.0071290034 | | 0.0294102594 | 7.9999776580 | 7.9999791225 | 7.9999753083 | 7.9999929446 | 99.6073133681 | 33.4306651972 |
| **38** | -0.0010157218 | 0.0019870614 | | -0.0151065136 | 7.9999759384 | 7.9999806249 | 7.9999779811 | 7.9999920265 | 99.6104922197 | 33.4390958007 |
| **39** | -0.0182285933 | -0.0024324540 | | 0.0258319675 | 7.9999810281 | 7.9999773320 | 7.9999781248 | 7.9999930192 | 99.6100782858 | 33.4338500061 |
| **40** | 0.0031776699 | -0.0156506366 | | -0.0138218470 | 7.9999798889 | 7.9999789819 | 7.9999776095 | 7.9999928821 | 99.6105123135 | 33.4437987927 |
| **41** | 0.0108283314 | -0.0124131387 | | -0.0209180213 | 7.9999766576 | 7.9999756842 | 7.9999798904 | 7.9999927079 | 99.6087842400 | 33.4494956043 |
| **42** | -0.0018097572 | 0.0335050811 | | -0.0026236340 | 7.9999781733 | 7.9999743881 | 7.9999768503 | 7.9999929403 | 99.6107132523 | 33.4393683840 |
| **43** | -0.0055064416 | -0.0432981686 | | -0.0718212537 | 7.9999757039 | 7.9999759040 | 7.9999799176 | 7.9999918811 | 99.6090133102 | 33.4459199025 |
| **44** | 0.0189221664 | -0.0119790522 | | -0.0457807018 | 7.9999778177 | 7.9999816651 | 7.9999767336 | 7.9999932803 | 99.6076911330 | 33.4404693079 |
| **45** | 0.0011713453 | 0.0153810651 | | 0.0195055077 | 7.9999735611 | 7.9999797337 | 7.9999778230 | 7.9999926484 | 99.6089128408 | 33.4404416650 |
| **46** | 0.0106778091 | -0.0026031673 | | 0.0409326863 | 7.9999799308 | 7.9999770914 | 7.9999751899 | 7.9999922507 | 99.6092504180 | 33.4381007676 |
| **47** | 0.0153693341 | -0.0250821123 | | 0.0120653346 | 7.9999781230 | 7.9999768076 | 7.9999773245 | 7.9999933692 | 99.6094754694 | 33.4310278484 |
| **48** | -0.0138708113 | -0.0251888490 | | -0.0233241991 | 7.9999763463 | 7.9999742411 | 7.9999764228 | 7.9999915141 | 99.6076469264 | 33.4389779796 |
| **49** | -0.0073648419 | -0.0103526664 | | -0.0139604859 | 7.9999787051 | 7.9999744449 | 7.9999778138 | 7.9999928252 | 99.6074138374 | 33.4384688402 |
| **50** | 0.0089516678 | 0.0188835855 | | -0.0257828054 | 7.9999754395 | 7.9999773025 | 7.9999786652 | 7.9999927532 | 99.6110669046 | 33.4444955853 |
| **Total** | 0.0604896182 | 0.0253484144 | | 0.0409345002 | 399.9988866795 | 399.9988919960 | 399.9988941234 | 399.9996358306 | 4980.4622395833 | 1672.0151392647 |
| **Average** | 0.0012097918 | 0.0005069682 | | 0.0008186898 | 7.9999777336 | 7.9999778399 | 7.9999778825 | 7.9999927166 | 99.6092447917 | 33.4403027853 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **5** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0054257814 | -0.0242529692 | | 0.0242272317 | 7.9999767959 | 7.9999769138 | 7.9999749770 | 7.9999922628 | 99.6095076196 | 33.4397811832 |
| **2** | -0.0205867547 | 0.0127322419 | | -0.0005241359 | 7.9999797973 | 7.9999778059 | 7.9999785272 | 7.9999914830 | 99.6074258938 | 33.4448720422 |
| **3** | 0.0288325417 | 0.0175017939 | | -0.0120677457 | 7.9999779221 | 7.9999800326 | 7.9999776835 | 7.9999931123 | 99.6083662873 | 33.4353419805 |
| **4** | -0.0160054939 | 0.0207799105 | | -0.0428232279 | 7.9999789698 | 7.9999764915 | 7.9999754895 | 7.9999925201 | 99.6111593364 | 33.4503594834 |
| **5** | 0.0198308700 | 0.0286316938 | | 0.0093662974 | 7.9999777049 | 7.9999755492 | 7.9999803725 | 7.9999930027 | 99.6095437886 | 33.4304553856 |
| **6** | -0.0072066452 | 0.0001806944 | | -0.0271604263 | 7.9999776758 | 7.9999785766 | 7.9999797108 | 7.9999934491 | 99.6082095550 | 33.4445874656 |
| **7** | 0.0123042437 | 0.0018049780 | | 0.0073984927 | 7.9999786830 | 7.9999786188 | 7.9999762258 | 7.9999924765 | 99.6118425283 | 33.4423393625 |
| **8** | 0.0210721481 | 0.0112384105 | | 0.0076020590 | 7.9999767519 | 7.9999796595 | 7.9999762713 | 7.9999924997 | 99.6123448753 | 33.4442764912 |
| **9** | 0.0102251224 | 0.0222764057 | | -0.0139020217 | 7.9999789772 | 7.9999798454 | 7.9999808078 | 7.9999932718 | 99.6093026620 | 33.4416089539 |
| **10** | 0.0164970191 | -0.0140334916 | | 0.0121847974 | 7.9999796264 | 7.9999780961 | 7.9999820939 | 7.9999928854 | 99.6095317323 | 33.4327070663 |
| **11** | 0.0142167060 | 0.0372514642 | | 0.0121968632 | 7.9999772532 | 7.9999795543 | 7.9999772668 | 7.9999923410 | 99.6085712449 | 33.4437028306 |
| **12** | -0.0298290329 | 0.0149560073 | | -0.0187218698 | 7.9999776304 | 7.9999771415 | 7.9999787301 | 7.9999925535 | 99.6092463992 | 33.4383041807 |
| **13** | -0.0179476669 | -0.0121340828 | | 0.0125620120 | 7.9999756279 | 7.9999777465 | 7.9999777597 | 7.9999927197 | 99.6080769354 | 33.4442728979 |
| **14** | 0.0125056143 | -0.0234241625 | | -0.0489347340 | 7.9999768307 | 7.9999774701 | 7.9999759656 | 7.9999925954 | 99.6076670203 | 33.4417287922 |
| **15** | 0.0266884292 | 0.0178088502 | | 0.0517343705 | 7.9999787039 | 7.9999755856 | 7.9999781961 | 7.9999929748 | 99.6079764660 | 33.4352587052 |
| **16** | 0.0043696925 | -0.0007474192 | | 0.0251491554 | 7.9999773384 | 7.9999791384 | 7.9999804822 | 7.9999921280 | 99.6109985854 | 33.4456723302 |
| **17** | -0.0147816126 | 0.0170110791 | | -0.0253931361 | 7.9999813472 | 7.9999796730 | 7.9999786794 | 7.9999938682 | 99.6093388310 | 33.4411781096 |
| **18** | 0.0046510553 | 0.0341434488 | | -0.0050226486 | 7.9999770676 | 7.9999770557 | 7.9999762429 | 7.9999917302 | 99.6064412937 | 33.4415550078 |
| **19** | 0.0127068793 | 0.0081174989 | | -0.0061003378 | 7.9999792529 | 7.9999780013 | 7.9999749935 | 7.9999929217 | 99.6095236947 | 33.4364197846 |
| **20** | 0.0256716294 | -0.0363684652 | | -0.0114542587 | 7.9999783422 | 7.9999796439 | 7.9999793507 | 7.9999932947 | 99.6085431134 | 33.4381047391 |
| **21** | 0.0014101382 | -0.0031975920 | | 0.0035022710 | 7.9999790306 | 7.9999775340 | 7.9999763812 | 7.9999921304 | 99.6089932163 | 33.4341272858 |
| **22** | -0.0034292206 | -0.0126487294 | | -0.0653865072 | 7.9999812220 | 7.9999774245 | 7.9999783790 | 7.9999922021 | 99.6103515625 | 33.4342946403 |
| **23** | 0.0339356001 | 0.0352506201 | | 0.0110560956 | 7.9999771953 | 7.9999785876 | 7.9999787722 | 7.9999926433 | 99.6081814236 | 33.4374022886 |
| **24** | -0.0061195013 | 0.0289128274 | | -0.0415227472 | 7.9999775677 | 7.9999778237 | 7.9999769067 | 7.9999919534 | 99.6120635610 | 33.4417275945 |
| **25** | -0.0061250073 | -0.0449772959 | | -0.0067407694 | 7.9999769919 | 7.9999798216 | 7.9999782804 | 7.9999927895 | 99.6115009324 | 33.4402339337 |
| **26** | 0.0044689416 | 0.0122349980 | | 0.0112793197 | 7.9999749295 | 7.9999740460 | 7.9999774601 | 7.9999907150 | 99.6076911330 | 33.4435098506 |
| **27** | -0.0028091779 | 0.0040576007 | | 0.0158113825 | 7.9999769946 | 7.9999796127 | 7.9999797126 | 7.9999933474 | 99.6087842400 | 33.4473913575 |
| **28** | -0.0291731560 | 0.0314871027 | | -0.0251664629 | 7.9999777321 | 7.9999767689 | 7.9999785654 | 7.9999934688 | 99.6080769354 | 33.4452406191 |
| **29** | -0.0264696352 | -0.0153257729 | | -0.0624461280 | 7.9999799683 | 7.9999750537 | 7.9999805414 | 7.9999933495 | 99.6102912809 | 33.4312844984 |
| **30** | 0.0133822326 | -0.0198574090 | | -0.0025220747 | 7.9999782703 | 7.9999792604 | 7.9999787132 | 7.9999918688 | 99.6098009902 | 33.4504585817 |
| **31** | -0.0064622066 | -0.0106028983 | | -0.0116068019 | 7.9999773357 | 7.9999790653 | 7.9999786263 | 7.9999927272 | 99.6093187371 | 33.4385497515 |
| **32** | 0.0222208799 | -0.0219342864 | | -0.0266296819 | 7.9999777455 | 7.9999764215 | 7.9999809603 | 7.9999923092 | 99.6098733282 | 33.4368026873 |
| **33** | 0.0288310344 | 0.0064969669 | | -0.0082701115 | 7.9999787638 | 7.9999802730 | 7.9999816152 | 7.9999933160 | 99.6124413259 | 33.4378956367 |
| **34** | 0.0054538582 | -0.0289356702 | | 0.0040912804 | 7.9999769561 | 7.9999804789 | 7.9999801070 | 7.9999923176 | 99.6096522955 | 33.4396719671 |
| **35** | 0.0282526068 | 0.0251268666 | | -0.0100558248 | 7.9999791387 | 7.9999811120 | 7.9999770879 | 7.9999932329 | 99.6101827739 | 33.4350907676 |
| **36** | -0.0102105166 | 0.0079923860 | | -0.0373099387 | 7.9999735910 | 7.9999797812 | 7.9999771833 | 7.9999928470 | 99.6108780221 | 33.4379045725 |
| **37** | -0.0023318002 | 0.0100036776 | | 0.0127969564 | 7.9999791357 | 7.9999778092 | 7.9999760088 | 7.9999932368 | 99.6106690458 | 33.4315067604 |
| **38** | -0.0076546640 | 0.0177210585 | | -0.0149480579 | 7.9999779447 | 7.9999772290 | 7.9999794631 | 7.9999922107 | 99.6097728588 | 33.4392296653 |
| **39** | 0.0211829640 | 0.0147851405 | | -0.0485970259 | 7.9999762707 | 7.9999766999 | 7.9999740539 | 7.9999922203 | 99.6092584555 | 33.4381090415 |
| **40** | 0.0119581667 | -0.0171421466 | | 0.0168163582 | 7.9999738438 | 7.9999778507 | 7.9999763067 | 7.9999924819 | 99.6083461934 | 33.4424312900 |
| **41** | -0.0227618871 | 0.0005211837 | | 0.0198275218 | 7.9999801080 | 7.9999738847 | 7.9999760976 | 7.9999919815 | 99.6101506237 | 33.4355270648 |
| **42** | 0.0273312797 | 0.0059028787 | | 0.0436698320 | 7.9999744668 | 7.9999777482 | 7.9999811031 | 7.9999926805 | 99.6091981739 | 33.4405105831 |
| **43** | -0.0228804718 | -0.0014707341 | | 0.0028730428 | 7.9999793954 | 7.9999769918 | 7.9999784050 | 7.9999920054 | 99.6095277135 | 33.4471183960 |
| **44** | 0.0393637241 | -0.0063128738 | | -0.0674380967 | 7.9999761041 | 7.9999769964 | 7.9999789932 | 7.9999932098 | 99.6073053305 | 33.4429118568 |
| **45** | -0.0043434786 | 0.0121317677 | | -0.0071397118 | 7.9999802586 | 7.9999730892 | 7.9999819930 | 7.9999919890 | 99.6104721258 | 33.4442273833 |
| **46** | 0.0332940919 | -0.0092927232 | | -0.0145359239 | 7.9999794613 | 7.9999784675 | 7.9999763415 | 7.9999930426 | 99.6088123714 | 33.4330026117 |
| **47** | 0.0252023860 | -0.0156865218 | | -0.0455463968 | 7.9999784388 | 7.9999779007 | 7.9999768888 | 7.9999917421 | 99.6099537037 | 33.4413552352 |
| **48** | -0.0185188757 | 0.0022349152 | | 0.0434346427 | 7.9999768542 | 7.9999759669 | 7.9999770998 | 7.9999920153 | 99.6097808963 | 33.4406818460 |
| **49** | 0.0111254175 | 0.0227282963 | | -0.0194135992 | 7.9999787884 | 7.9999797152 | 7.9999792759 | 7.9999932585 | 99.6107253086 | 33.4357126219 |
| **50** | 0.0500868220 | -0.0243562010 | | 0.0189365601 | 7.9999819373 | 7.9999780664 | 7.9999790981 | 7.9999920917 | 99.6108016654 | 33.4445564816 |
| **Total** | 0.2859995083 | 0.1393213188 | | -0.3608638603 | 399.9988987394 | 399.9988940805 | 399.9989102469 | 399.9996294749 | 4980.4764740869 | 1672.0009936627 |
| **Average** | 0.0057199278 | 0.0027864192 | | -0.0072171519 | 7.9999779748 | 7.9999778816 | 7.9999782049 | 7.9999925895 | 99.6095294817 | 33.4400198733 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **6** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0494086496 | 0.0219091064 | | -0.0093275223 | 7.9999793979 | 7.9999787828 | 7.9999776920 | 7.9999927122 | 99.6086234889 | 33.4487552512 |
| **2** | 0.0069191957 | 0.0148790941 | | 0.0249789223 | 7.9999786880 | 7.9999767388 | 7.9999762411 | 7.9999921983 | 99.6082055363 | 33.4394633847 |
| **3** | -0.0193310867 | -0.0046756580 | | 0.0248145137 | 7.9999784132 | 7.9999786695 | 7.9999752748 | 7.9999916979 | 99.6083542310 | 33.4419488005 |
| **4** | -0.0269428039 | -0.0188363422 | | -0.0585286098 | 7.9999780372 | 7.9999716768 | 7.9999801155 | 7.9999926631 | 99.6102510931 | 33.4417313611 |
| **5** | -0.0146319530 | -0.0029720179 | | 0.0744951986 | 7.9999809090 | 7.9999777837 | 7.9999797529 | 7.9999935455 | 99.6080688979 | 33.4379483220 |
| **6** | -0.0086030107 | -0.0147470027 | | -0.0271994737 | 7.9999792079 | 7.9999784533 | 7.9999825054 | 7.9999939357 | 99.6071928048 | 33.4409427827 |
| **7** | -0.0085119073 | 0.0082730741 | | -0.0110462143 | 7.9999761514 | 7.9999794403 | 7.9999788525 | 7.9999942476 | 99.6078438465 | 33.4367023124 |
| **8** | -0.0064288086 | -0.0301306279 | | -0.0069897771 | 7.9999746909 | 7.9999745169 | 7.9999793487 | 7.9999912708 | 99.6094151878 | 33.4494900883 |
| **9** | 0.0318597569 | 0.0068840006 | | 0.0115867165 | 7.9999782193 | 7.9999795569 | 7.9999807459 | 7.9999927815 | 99.6095357510 | 33.4441298137 |
| **10** | 0.0001518340 | -0.0273162969 | | 0.0265327304 | 7.9999760803 | 7.9999788986 | 7.9999771680 | 7.9999914593 | 99.6073857060 | 33.4322693979 |
| **11** | -0.0089771314 | 0.0188589873 | | -0.0307211718 | 7.9999780731 | 7.9999791383 | 7.9999754438 | 7.9999926527 | 99.6086516204 | 33.4309463066 |
| **12** | 0.0082399422 | -0.0191949845 | | -0.0286415590 | 7.9999805122 | 7.9999785637 | 7.9999770146 | 7.9999918465 | 99.6084024563 | 33.4375155550 |
| **13** | 0.0055251125 | -0.0018154455 | | 0.0174200225 | 7.9999793837 | 7.9999791041 | 7.9999782758 | 7.9999929756 | 99.6093629437 | 33.4392424781 |
| **14** | 0.0012757460 | 0.0236003670 | | 0.0167441695 | 7.9999759767 | 7.9999756102 | 7.9999783562 | 7.9999926623 | 99.6103997878 | 33.4428120808 |
| **15** | 0.0116116881 | 0.0284847149 | | 0.0145779043 | 7.9999783145 | 7.9999778585 | 7.9999808964 | 7.9999931621 | 99.6094312629 | 33.4405477134 |
| **16** | -0.0107650660 | -0.0051698929 | | 0.0465537021 | 7.9999736151 | 7.9999788556 | 7.9999794824 | 7.9999921175 | 99.6106409144 | 33.4375234665 |
| **17** | -0.0095112384 | 0.0215098490 | | 0.0110003843 | 7.9999778049 | 7.9999803551 | 7.9999718580 | 7.9999919112 | 99.6081131044 | 33.4367796148 |
| **18** | 0.0019833452 | 0.0059544130 | | -0.0821962745 | 7.9999789333 | 7.9999770623 | 7.9999741209 | 7.9999926366 | 99.6082457240 | 33.4342108133 |
| **19** | 0.0154600422 | 0.0085258397 | | -0.0708982697 | 7.9999802156 | 7.9999762939 | 7.9999731028 | 7.9999928830 | 99.6096281829 | 33.4378593258 |
| **20** | 0.0597903160 | -0.0053671982 | | -0.0042748145 | 7.9999780302 | 7.9999786712 | 7.9999762049 | 7.9999923968 | 99.6110468107 | 33.4417507300 |
| **21** | -0.0142081425 | 0.0171385282 | | 0.0030173254 | 7.9999767452 | 7.9999795826 | 7.9999762814 | 7.9999925142 | 99.6095679012 | 33.4394125433 |
| **22** | 0.0252700007 | 0.0046354288 | | -0.0343787674 | 7.9999757447 | 7.9999796302 | 7.9999773508 | 7.9999928085 | 99.6091620049 | 33.4360196091 |
| **23** | -0.0095140804 | -0.0328422616 | | -0.0175644591 | 7.9999777482 | 7.9999790172 | 7.9999791677 | 7.9999927798 | 99.6098411780 | 33.4418498598 |
| **24** | -0.0282592974 | 0.0246598712 | | -0.0096123968 | 7.9999791264 | 7.9999779165 | 7.9999769590 | 7.9999924815 | 99.6082698367 | 33.4393783443 |
| **25** | 0.0083258419 | 0.0063002417 | | -0.0229855083 | 7.9999771180 | 7.9999764072 | 7.9999768330 | 7.9999922588 | 99.6077273020 | 33.4357457650 |
| **26** | -0.0130205892 | -0.0138537411 | | 0.0074092187 | 7.9999782860 | 7.9999757682 | 7.9999774084 | 7.9999920870 | 99.6095437886 | 33.4365687788 |
| **27** | 0.0359338120 | -0.0182831676 | | -0.0249630312 | 7.9999754549 | 7.9999791205 | 7.9999808638 | 7.9999930657 | 99.6073334619 | 33.4416759020 |
| **28** | -0.0330335853 | -0.0049829859 | | -0.0179603718 | 7.9999791420 | 7.9999779356 | 7.9999783467 | 7.9999924124 | 99.6115451389 | 33.4453789595 |
| **29** | -0.0241509703 | 0.0008772081 | | -0.0010489452 | 7.9999789580 | 7.9999790431 | 7.9999778156 | 7.9999926290 | 99.6098693094 | 33.4462998580 |
| **30** | -0.0183477180 | -0.0249565850 | | -0.0051369884 | 7.9999749834 | 7.9999790688 | 7.9999729633 | 7.9999912731 | 99.6092865869 | 33.4403790037 |
| **31** | -0.0362002844 | -0.0174246861 | | -0.0487375921 | 7.9999760311 | 7.9999773388 | 7.9999791498 | 7.9999930325 | 99.6067668146 | 33.4345105982 |
| **32** | 0.0119996581 | 0.0170635474 | | 0.0234364359 | 7.9999782443 | 7.9999791085 | 7.9999785567 | 7.9999936646 | 99.6092946245 | 33.4388812769 |
| **33** | 0.0028953125 | 0.0044063381 | | 0.0101703291 | 7.9999766345 | 7.9999766318 | 7.9999757002 | 7.9999920607 | 99.6106328768 | 33.4424842117 |
| **34** | -0.0363748050 | 0.0056888702 | | -0.0082231963 | 7.9999726617 | 7.9999782145 | 7.9999791937 | 7.9999921832 | 99.6089168596 | 33.4429987411 |
| **35** | -0.0073543921 | 0.0168589669 | | 0.0001343659 | 7.9999796491 | 7.9999801492 | 7.9999776216 | 7.9999932615 | 99.6106529707 | 33.4402519631 |
| **36** | -0.0202553273 | 0.0186535954 | | -0.0194081671 | 7.9999734772 | 7.9999755628 | 7.9999758256 | 7.9999914924 | 99.6109342850 | 33.4452601141 |
| **37** | -0.0333135157 | 0.0243790957 | | -0.0055238947 | 7.9999782687 | 7.9999761467 | 7.9999759698 | 7.9999925832 | 99.6085551698 | 33.4413496089 |
| **38** | 0.0156493076 | 0.0138617811 | | -0.0342466330 | 7.9999761623 | 7.9999753652 | 7.9999768590 | 7.9999916294 | 99.6093790188 | 33.4437262341 |
| **39** | -0.0252815693 | -0.0139619273 | | 0.0165120907 | 7.9999784984 | 7.9999793299 | 7.9999811436 | 7.9999943658 | 99.6104600694 | 33.4408408634 |
| **40** | -0.0366516339 | 0.0117677620 | | 0.0460707738 | 7.9999762806 | 7.9999776521 | 7.9999772063 | 7.9999921643 | 99.6106650270 | 33.4511741444 |
| **41** | 0.0042071323 | -0.0016311672 | | -0.0110362898 | 7.9999774548 | 7.9999762776 | 7.9999782655 | 7.9999919101 | 99.6107333462 | 33.4385797111 |
| **42** | 0.0145560317 | 0.0065031019 | | -0.0025459863 | 7.9999814328 | 7.9999741475 | 7.9999790951 | 7.9999934218 | 99.6096040702 | 33.4371279087 |
| **43** | -0.0012980257 | -0.0067294954 | | 0.0131903749 | 7.9999799306 | 7.9999810853 | 7.9999767029 | 7.9999930834 | 99.6070682227 | 33.4391223089 |
| **44** | 0.0034589939 | 0.0217232029 | | 0.0370110377 | 7.9999814728 | 7.9999768235 | 7.9999801964 | 7.9999937689 | 99.6104158629 | 33.4397653760 |
| **45** | 0.0468945113 | -0.0036679033 | | 0.0143059566 | 7.9999769952 | 7.9999783107 | 7.9999762646 | 7.9999920964 | 99.6086596579 | 33.4357470258 |
| **46** | -0.0047395482 | -0.0180617238 | | -0.0417251933 | 7.9999780240 | 7.9999806684 | 7.9999786042 | 7.9999927081 | 99.6088525592 | 33.4394144187 |
| **47** | 0.0071703881 | 0.0201477716 | | -0.0281196594 | 7.9999757199 | 7.9999753575 | 7.9999757948 | 7.9999920136 | 99.6098130466 | 33.4373636453 |
| **48** | -0.0167319410 | -0.0188564561 | | -0.0060407082 | 7.9999770111 | 7.9999751195 | 7.9999795630 | 7.9999920720 | 99.6079362783 | 33.4461484684 |
| **49** | 0.0200322049 | 0.0059852278 | | 0.0267018477 | 7.9999757848 | 7.9999776712 | 7.9999768002 | 7.9999929401 | 99.6093549061 | 33.4401994038 |
| **50** | -0.0252481247 | 0.0236060155 | | -0.0166781351 | 7.9999771188 | 7.9999786059 | 7.9999777762 | 7.9999927203 | 99.6099737976 | 33.4349419784 |
| **Total** | -0.1090677331 | 0.0976584335 | | -0.2190955896 | 399.9988808138 | 399.9988890867 | 399.9988827314 | 399.9996292379 | 4980.4596153228 | 1672.0051662236 |
| **Average** | -0.0021813512 | 0.0019531662 | | -0.0043818837 | 7.9999776163 | 7.9999777817 | 7.9999776546 | 7.9999925848 | 99.6091923065 | 33.4401033245 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **7** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0031052748 | 0.0135420451 | | 0.0192179992 | 7.9999773740 | 7.9999732036 | 7.9999791190 | 7.9999926255 | 99.6079081469 | 33.4391021204 |
| **2** | 0.0126738684 | -0.0058745942 | | -0.0308970042 | 7.9999767987 | 7.9999779595 | 7.9999767325 | 7.9999920125 | 99.6096040702 | 33.4404122255 |
| **3** | -0.0140297960 | -0.0226278269 | | 0.0209994626 | 7.9999761896 | 7.9999799286 | 7.9999767359 | 7.9999926332 | 99.6130320859 | 33.4509647426 |
| **4** | 0.0110252177 | 0.0004374129 | | 0.0189179317 | 7.9999785251 | 7.9999773226 | 7.9999779236 | 7.9999926097 | 99.6083823624 | 33.4520113421 |
| **5** | -0.0200306934 | 0.0161119889 | | -0.0232232057 | 7.9999769256 | 7.9999759107 | 7.9999799404 | 7.9999925386 | 99.6104078254 | 33.4361424103 |
| **6** | 0.0140396277 | -0.0269126781 | | -0.0076642004 | 7.9999783053 | 7.9999759629 | 7.9999797588 | 7.9999930025 | 99.6087239583 | 33.4373816746 |
| **7** | 0.0255339679 | -0.0248966626 | | 0.0286009970 | 7.9999780061 | 7.9999773150 | 7.9999799542 | 7.9999932581 | 99.6107293274 | 33.4397497422 |
| **8** | 0.0179725561 | -0.0275883015 | | -0.0340474147 | 7.9999796406 | 7.9999776161 | 7.9999745600 | 7.9999919316 | 99.6075585134 | 33.4342944039 |
| **9** | -0.0017724909 | -0.0165322233 | | -0.0579960963 | 7.9999764521 | 7.9999806752 | 7.9999780527 | 7.9999929175 | 99.6104640882 | 33.4346400659 |
| **10** | -0.0051862889 | 0.0074713542 | | -0.0428252389 | 7.9999771782 | 7.9999771392 | 7.9999775580 | 7.9999919554 | 99.6095679012 | 33.4371592078 |
| **11** | -0.0235393580 | 0.0026586405 | | 0.0071913167 | 7.9999749553 | 7.9999791996 | 7.9999790306 | 7.9999920325 | 99.6091579861 | 33.4406625086 |
| **12** | 0.0357435522 | -0.0023722057 | | -0.0224251393 | 7.9999775782 | 7.9999787831 | 7.9999800758 | 7.9999931725 | 99.6115491577 | 33.4393363599 |
| **13** | -0.0089388655 | -0.0180957955 | | 0.0151830190 | 7.9999796857 | 7.9999784078 | 7.9999743053 | 7.9999919228 | 99.6076710391 | 33.4376447863 |
| **14** | 0.0136063514 | -0.0176868044 | | 0.0392905950 | 7.9999796356 | 7.9999805943 | 7.9999761229 | 7.9999925657 | 99.6086516204 | 33.4503169632 |
| **15** | 0.0006663248 | -0.0315905952 | | 0.0161031342 | 7.9999758984 | 7.9999778557 | 7.9999763010 | 7.9999926190 | 99.6102350180 | 33.4331687527 |
| **16** | -0.0337092032 | -0.0163919890 | | 0.0505240228 | 7.9999776994 | 7.9999773356 | 7.9999778408 | 7.9999920455 | 99.6105444637 | 33.4350751653 |
| **17** | 0.0176345012 | -0.0010325252 | | -0.0833256327 | 7.9999791940 | 7.9999798812 | 7.9999789993 | 7.9999939662 | 99.6102912809 | 33.4368753877 |
| **18** | -0.0273066102 | -0.0180878472 | | -0.0118153847 | 7.9999787502 | 7.9999745174 | 7.9999774121 | 7.9999932947 | 99.6103234311 | 33.4385613193 |
| **19** | 0.0082124016 | 0.0210164891 | | -0.0208167345 | 7.9999780285 | 7.9999773346 | 7.9999736400 | 7.9999920378 | 99.6073575746 | 33.4372088673 |
| **20** | 0.0059140544 | 0.0294798102 | | -0.0119727501 | 7.9999760598 | 7.9999784206 | 7.9999773134 | 7.9999926793 | 99.6117139275 | 33.4396315744 |
| **21** | 0.0024263714 | 0.0041934483 | | -0.0167096873 | 7.9999779311 | 7.9999816173 | 7.9999772084 | 7.9999936411 | 99.6089128408 | 33.4397984876 |
| **22** | -0.0138955731 | 0.0054993211 | | 0.0291876247 | 7.9999763529 | 7.9999789773 | 7.9999791111 | 7.9999919050 | 99.6100541731 | 33.4381662973 |
| **23** | -0.0123025460 | 0.0206336975 | | 0.0317157155 | 7.9999821239 | 7.9999794589 | 7.9999778615 | 7.9999920203 | 99.6081934799 | 33.4398371939 |
| **24** | -0.0139783094 | -0.0147400668 | | 0.0134766666 | 7.9999771467 | 7.9999776154 | 7.9999774517 | 7.9999919442 | 99.6084788130 | 33.4333605507 |
| **25** | 0.0401210989 | -0.0086936896 | | -0.0164243497 | 7.9999773795 | 7.9999794263 | 7.9999774042 | 7.9999925072 | 99.6080528228 | 33.4309520905 |
| **26** | -0.0165028097 | -0.0018629518 | | -0.0349258153 | 7.9999783656 | 7.9999800842 | 7.9999816840 | 7.9999920833 | 99.6081211420 | 33.4418419326 |
| **27** | -0.0257521952 | 0.0070394154 | | 0.0265413458 | 7.9999797695 | 7.9999816705 | 7.9999772537 | 7.9999929866 | 99.6088686343 | 33.4445153955 |
| **28** | 0.0021011321 | -0.0243521293 | | -0.0295987304 | 7.9999759351 | 7.9999792913 | 7.9999806434 | 7.9999931646 | 99.6093348122 | 33.4350345835 |
| **29** | -0.0028245294 | -0.0168478856 | | -0.0245276521 | 7.9999786921 | 7.9999798596 | 7.9999784108 | 7.9999931553 | 99.6100903421 | 33.4370135390 |
| **30** | 0.0158605563 | 0.0054644668 | | 0.0227155899 | 7.9999783280 | 7.9999805671 | 7.9999778178 | 7.9999929463 | 99.6088364841 | 33.4482298002 |
| **31** | 0.0059665687 | -0.0176569279 | | -0.0307414506 | 7.9999777677 | 7.9999746238 | 7.9999769672 | 7.9999921375 | 99.6098009902 | 33.4412973333 |
| **32** | 0.0105339006 | -0.0068352624 | | -0.0098258290 | 7.9999756818 | 7.9999767436 | 7.9999797810 | 7.9999918279 | 99.6085350759 | 33.4392068923 |
| **33** | -0.0269905796 | 0.0095518370 | | -0.0012919043 | 7.9999786925 | 7.9999780151 | 7.9999796680 | 7.9999930793 | 99.6101586613 | 33.4392856287 |
| **34** | -0.0002905054 | 0.0114858069 | | 0.0264659599 | 7.9999809707 | 7.9999816226 | 7.9999780080 | 7.9999929347 | 99.6074580440 | 33.4442877752 |
| **35** | 0.0009378880 | 0.0158921029 | | 0.0108995825 | 7.9999742199 | 7.9999800482 | 7.9999774690 | 7.9999914578 | 99.6097326710 | 33.4361117573 |
| **36** | -0.0009377902 | 0.0055537913 | | 0.0067939345 | 7.9999795704 | 7.9999792106 | 7.9999783267 | 7.9999929529 | 99.6113964442 | 33.4372586213 |
| **37** | 0.0091091707 | -0.0278813885 | | 0.0057639316 | 7.9999786873 | 7.9999790134 | 7.9999797826 | 7.9999930597 | 99.6080126350 | 33.4379166446 |
| **38** | -0.0158412165 | 0.0073228050 | | -0.0031793888 | 7.9999784524 | 7.9999777400 | 7.9999788811 | 7.9999918056 | 99.6112638246 | 33.4326274630 |
| **39** | 0.0077841122 | 0.0284004328 | | 0.0106848778 | 7.9999800554 | 7.9999789587 | 7.9999767677 | 7.9999922451 | 99.6093508873 | 33.4358585586 |
| **40** | -0.0178617794 | 0.0141146873 | | -0.0080027995 | 7.9999793069 | 7.9999807560 | 7.9999786966 | 7.9999938727 | 99.6089088220 | 33.4360626337 |
| **41** | 0.0173961821 | 0.0269523793 | | -0.0347228728 | 7.9999765875 | 7.9999748076 | 7.9999746984 | 7.9999914699 | 99.6096603331 | 33.4373888612 |
| **42** | -0.0229705226 | 0.0013133370 | | -0.0180340201 | 7.9999765176 | 7.9999744612 | 7.9999810201 | 7.9999938559 | 99.6086435828 | 33.4377376279 |
| **43** | 0.0017394086 | -0.0011367025 | | -0.0568869889 | 7.9999792510 | 7.9999774038 | 7.9999778364 | 7.9999926144 | 99.6099778164 | 33.4396188877 |
| **44** | 0.0150266660 | -0.0239455759 | | 0.0031756901 | 7.9999730843 | 7.9999799925 | 7.9999762880 | 7.9999921667 | 99.6090454604 | 33.4385540382 |
| **45** | 0.0035346656 | 0.0167995659 | | -0.0011422262 | 7.9999745056 | 7.9999792621 | 7.9999791811 | 7.9999934254 | 99.6114808385 | 33.4464050869 |
| **46** | -0.0059974877 | 0.0092151468 | | 0.0393632033 | 7.9999767204 | 7.9999744835 | 7.9999805106 | 7.9999923883 | 99.6097808963 | 33.4419911946 |
| **47** | -0.0114818294 | 0.0201698469 | | -0.0112223690 | 7.9999808066 | 7.9999747043 | 7.9999726902 | 7.9999918313 | 99.6104480131 | 33.4486827399 |
| **48** | 0.0095769228 | -0.0395989814 | | 0.0041876605 | 7.9999748513 | 7.9999749379 | 7.9999790043 | 7.9999917133 | 99.6101466049 | 33.4452800346 |
| **49** | 0.0334544748 | -0.0287483722 | | -0.0618479821 | 7.9999772233 | 7.9999798463 | 7.9999787539 | 7.9999926115 | 99.6090494792 | 33.4384972710 |
| **50** | 0.0404479653 | -0.0047028768 | | -0.0374465629 | 7.9999743056 | 7.9999803933 | 7.9999791732 | 7.9999936852 | 99.6078559028 | 33.4359470505 |
| **Total** | 0.0600038023 | -0.1463730303 | | -0.2965391698 | 399.9988821629 | 399.9989109559 | 399.9988997273 | 399.9996293098 | 4980.4735243056 | 1671.9691055914 |
| **Average** | 0.0012000755 | -0.0029274522 | | -0.0059307139 | 7.9999776433 | 7.9999782191 | 7.9999779945 | 7.9999925862 | 99.6094704861 | 33.4393821118 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **8** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0039925397 | -0.0000876234 | | 0.0287177114 | 7.9999766255 | 7.9999832620 | 7.9999739690 | 7.9999922675 | 99.6089650849 | 33.4337365348 |
| **2** | -0.0063702703 | -0.0136390261 | | 0.0128613636 | 7.9999793610 | 7.9999765188 | 7.9999728616 | 7.9999927224 | 99.6097005208 | 33.4418343678 |
| **3** | 0.0030137959 | 0.0112819113 | | -0.0610056183 | 7.9999811111 | 7.9999769563 | 7.9999779929 | 7.9999927582 | 99.6085632073 | 33.4380787983 |
| **4** | -0.0153811123 | -0.0004408807 | | -0.0763803725 | 7.9999768798 | 7.9999812643 | 7.9999775419 | 7.9999928654 | 99.6086275077 | 33.4423260138 |
| **5** | -0.0153820825 | 0.0101332803 | | 0.0219006115 | 7.9999752932 | 7.9999778697 | 7.9999802331 | 7.9999933840 | 99.6089891975 | 33.4412682878 |
| **6** | 0.0181067596 | 0.0287121149 | | 0.0021174697 | 7.9999777623 | 7.9999810121 | 7.9999738484 | 7.9999922165 | 99.6087159208 | 33.4343227559 |
| **7** | 0.0114382297 | -0.0248260214 | | 0.0217945895 | 7.9999776560 | 7.9999756054 | 7.9999785353 | 7.9999922960 | 99.6110628858 | 33.4408736283 |
| **8** | -0.0073309646 | -0.0047471103 | | -0.0208941957 | 7.9999753846 | 7.9999771347 | 7.9999778698 | 7.9999918992 | 99.6105645576 | 33.4419041369 |
| **9** | -0.0207138259 | 0.0005238746 | | -0.0065705494 | 7.9999791690 | 7.9999785093 | 7.9999767335 | 7.9999921657 | 99.6082256301 | 33.4434304995 |
| **10** | -0.0041495988 | -0.0246234377 | | -0.0826628754 | 7.9999760210 | 7.9999789538 | 7.9999787316 | 7.9999922894 | 99.6092865869 | 33.4402193558 |
| **11** | 0.0073526554 | 0.0139745616 | | 0.0262428386 | 7.9999777129 | 7.9999765200 | 7.9999772020 | 7.9999918436 | 99.6096040702 | 33.4372950267 |
| **12** | 0.0064244263 | -0.0107058253 | | 0.0033464709 | 7.9999772497 | 7.9999749463 | 7.9999774320 | 7.9999917199 | 99.6061519419 | 33.4430203479 |
| **13** | 0.0131249145 | 0.0072455587 | | -0.0470539330 | 7.9999771404 | 7.9999799425 | 7.9999780844 | 7.9999928208 | 99.6081452546 | 33.4475368057 |
| **14** | -0.0135251625 | -0.0086971761 | | -0.0107397542 | 7.9999740006 | 7.9999807610 | 7.9999780040 | 7.9999927065 | 99.6101546425 | 33.4402249191 |
| **15** | 0.0106074662 | -0.0201253115 | | 0.0605680293 | 7.9999769143 | 7.9999756085 | 7.9999794529 | 7.9999915495 | 99.6096161265 | 33.4374273784 |
| **16** | 0.0140584851 | -0.0062232164 | | -0.0448682706 | 7.9999798839 | 7.9999796640 | 7.9999744584 | 7.9999927351 | 99.6086998457 | 33.4431521795 |
| **17** | -0.0265197574 | 0.0166211101 | | 0.0428740930 | 7.9999792413 | 7.9999780238 | 7.9999787706 | 7.9999929319 | 99.6083542310 | 33.4328397646 |
| **18** | 0.0238476512 | 0.0491512428 | | 0.0013897475 | 7.9999784525 | 7.9999785575 | 7.9999790525 | 7.9999933207 | 99.6075022505 | 33.4371996005 |
| **19** | -0.0081170795 | -0.0366888237 | | -0.0004140491 | 7.9999780588 | 7.9999775715 | 7.9999768451 | 7.9999933191 | 99.6095236947 | 33.4370508270 |
| **20** | 0.0086189975 | -0.0151302545 | | 0.0040510930 | 7.9999812789 | 7.9999764060 | 7.9999763624 | 7.9999917526 | 99.6107454025 | 33.4408509971 |
| **21** | 0.0038559961 | -0.0027968517 | | -0.0588511116 | 7.9999754540 | 7.9999756771 | 7.9999788401 | 7.9999920053 | 99.6108338156 | 33.4413788435 |
| **22** | -0.0007724131 | -0.0021314168 | | 0.0331452613 | 7.9999750173 | 7.9999787681 | 7.9999764106 | 7.9999914998 | 99.6080648791 | 33.4355166475 |
| **23** | 0.0299713588 | 0.0147035004 | | 0.0007055968 | 7.9999790325 | 7.9999790673 | 7.9999790148 | 7.9999934041 | 99.6082939493 | 33.4408395396 |
| **24** | -0.0079935117 | 0.0167656188 | | -0.0056092065 | 7.9999766904 | 7.9999753386 | 7.9999752541 | 7.9999922293 | 99.6103515625 | 33.4482343076 |
| **25** | -0.0011247180 | 0.0081335962 | | 0.0210287030 | 7.9999767922 | 7.9999777129 | 7.9999781933 | 7.9999925365 | 99.6104038066 | 33.4438487358 |
| **26** | -0.0119845200 | 0.0125097244 | | -0.0106003866 | 7.9999733148 | 7.9999801546 | 7.9999798204 | 7.9999934955 | 99.6112115805 | 33.4404307277 |
| **27** | 0.0341682628 | 0.0104888547 | | -0.0481312170 | 7.9999770113 | 7.9999808965 | 7.9999787406 | 7.9999935535 | 99.6087199396 | 33.4323468263 |
| **28** | 0.0085782327 | 0.0052907314 | | 0.0160131666 | 7.9999816559 | 7.9999802587 | 7.9999787284 | 7.9999923493 | 99.6105082948 | 33.4427474967 |
| **29** | -0.0079726553 | 0.0041933818 | | 0.0167363079 | 7.9999773492 | 7.9999748772 | 7.9999751862 | 7.9999926996 | 99.6099577225 | 33.4389238759 |
| **30** | -0.0249587803 | -0.0139199420 | | 0.0281839885 | 7.9999785048 | 7.9999795925 | 7.9999760709 | 7.9999926540 | 99.6102390368 | 33.4388422869 |
| **31** | -0.0430597749 | -0.0457118278 | | -0.0309310570 | 7.9999803120 | 7.9999767511 | 7.9999781016 | 7.9999924265 | 99.6068230774 | 33.4418400729 |
| **32** | -0.0077783577 | 0.0307393398 | | 0.0402148220 | 7.9999788966 | 7.9999769618 | 7.9999762610 | 7.9999917260 | 99.6110628858 | 33.4425066223 |
| **33** | 0.0071945958 | 0.0429272085 | | -0.0082272572 | 7.9999801920 | 7.9999794894 | 7.9999784897 | 7.9999922799 | 99.6100260417 | 33.4360009021 |
| **34** | 0.0041150035 | 0.0086674644 | | -0.0572905034 | 7.9999786989 | 7.9999767952 | 7.9999735009 | 7.9999919475 | 99.6100943609 | 33.4400154384 |
| **35** | -0.0022938162 | -0.0028341353 | | -0.0407500124 | 7.9999819143 | 7.9999790273 | 7.9999737359 | 7.9999933502 | 99.6101064172 | 33.4368183053 |
| **36** | -0.0064999071 | 0.0158401324 | | -0.0335495922 | 7.9999809543 | 7.9999789214 | 7.9999768022 | 7.9999919699 | 99.6103756752 | 33.4378953215 |
| **37** | -0.0063523055 | 0.0394368408 | | -0.0135110221 | 7.9999764145 | 7.9999761299 | 7.9999799267 | 7.9999935683 | 99.6080528228 | 33.4411142663 |
| **38** | 0.0295652001 | 0.0041881923 | | -0.0134235333 | 7.9999772329 | 7.9999779121 | 7.9999785164 | 7.9999932819 | 99.6092664931 | 33.4384222854 |
| **39** | -0.0084464740 | 0.0000914036 | | -0.0091471315 | 7.9999770212 | 7.9999802985 | 7.9999814362 | 7.9999935840 | 99.6089409722 | 33.4437303159 |
| **40** | -0.0475171855 | -0.0080658510 | | 0.0582392899 | 7.9999799236 | 7.9999750992 | 7.9999759654 | 7.9999922642 | 99.6093549061 | 33.4417227562 |
| **41** | -0.0071087804 | -0.0313069101 | | 0.0190448891 | 7.9999768827 | 7.9999818643 | 7.9999788628 | 7.9999938183 | 99.6095638825 | 33.4409102700 |
| **42** | 0.0287757117 | -0.0062079285 | | 0.0518678253 | 7.9999773368 | 7.9999790909 | 7.9999766204 | 7.9999919176 | 99.6097969715 | 33.4452641644 |
| **43** | 0.0080808097 | -0.0278572619 | | -0.0230417696 | 7.9999777966 | 7.9999801195 | 7.9999779785 | 7.9999918331 | 99.6084305877 | 33.4364398943 |
| **44** | -0.0019284474 | 0.0017144031 | | -0.0319563913 | 7.9999740133 | 7.9999770860 | 7.9999789879 | 7.9999926286 | 99.6087842400 | 33.4441818056 |
| **45** | 0.0015523272 | -0.0201472817 | | 0.0044015245 | 7.9999756412 | 7.9999756772 | 7.9999762960 | 7.9999922442 | 99.6114888760 | 33.4379287955 |
| **46** | 0.0357652937 | 0.0358734107 | | -0.0337503560 | 7.9999800403 | 7.9999833301 | 7.9999805326 | 7.9999934358 | 99.6078478652 | 33.4493827791 |
| **47** | 0.0041983790 | -0.0122036449 | | -0.0275083382 | 7.9999768961 | 7.9999786580 | 7.9999766716 | 7.9999925726 | 99.6093026620 | 33.4393175741 |
| **48** | 0.0023818172 | -0.0169567027 | | 0.0103037438 | 7.9999800627 | 7.9999783269 | 7.9999782757 | 7.9999920261 | 99.6081573110 | 33.4419500455 |
| **49** | 0.0228369714 | 0.0058227332 | | -0.0143657701 | 7.9999767610 | 7.9999780025 | 7.9999799744 | 7.9999932964 | 99.6102510931 | 33.4439540277 |
| **50** | 0.0218612982 | 0.0007066226 | | -0.0419973465 | 7.9999752885 | 7.9999784700 | 7.9999784710 | 7.9999924316 | 99.6112477495 | 33.4372010661 |
| **Total** | 0.0522205988 | 0.0396623521 | | -0.3274824838 | 399.9988882987 | 399.9989154424 | 399.9988756476 | 399.9996285933 | 4980.4687580376 | 1672.0142982216 |
| **Average** | 0.0010444116 | 0.0007932469 | | -0.0065495560 | 7.9999777660 | 7.9999783088 | 7.9999775130 | 7.9999925719 | 99.6093751608 | 33.4402859644 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **9** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0000571634 | 0.0058856127 | | -0.0180232747 | 7.9999798160 | 7.9999733555 | 7.9999766653 | 7.9999931670 | 99.6078277713 | 33.4440497376 |
| **2** | 0.0067789557 | 0.0121908890 | | 0.0206208603 | 7.9999799788 | 7.9999761053 | 7.9999747516 | 7.9999924238 | 99.6087922775 | 33.4423060460 |
| **3** | 0.0256061631 | 0.0629325653 | | 0.0382392770 | 7.9999782366 | 7.9999761829 | 7.9999758997 | 7.9999923499 | 99.6085350759 | 33.4441137071 |
| **4** | 0.0011274537 | -0.0156175631 | | -0.0755871508 | 7.9999779487 | 7.9999772678 | 7.9999774096 | 7.9999923805 | 99.6080729167 | 33.4255484447 |
| **5** | 0.0189015045 | 0.0025640733 | | 0.0346128235 | 7.9999772744 | 7.9999759567 | 7.9999781814 | 7.9999928466 | 99.6103796939 | 33.4364531011 |
| **6** | 0.0009074927 | -0.0069035574 | | -0.0082418832 | 7.9999776855 | 7.9999778505 | 7.9999760076 | 7.9999933395 | 99.6076790766 | 33.4298506150 |
| **7** | 0.0097295177 | -0.0041084898 | | -0.0230282866 | 7.9999739121 | 7.9999749917 | 7.9999752520 | 7.9999911445 | 99.6102109053 | 33.4471058196 |
| **8** | -0.0337629907 | 0.0148346906 | | 0.0154440568 | 7.9999782447 | 7.9999777271 | 7.9999770949 | 7.9999921374 | 99.6084547004 | 33.4483422471 |
| **9** | 0.0055203300 | 0.0060453774 | | -0.0271982617 | 7.9999798318 | 7.9999762752 | 7.9999788841 | 7.9999932927 | 99.6069958848 | 33.4347046657 |
| **10** | -0.0300243339 | 0.0610509445 | | -0.0045062303 | 7.9999772416 | 7.9999803914 | 7.9999758832 | 7.9999927546 | 99.6115933642 | 33.4429292872 |
| **11** | -0.0071188516 | -0.0062452089 | | 0.0076151639 | 7.9999773070 | 7.9999808530 | 7.9999822548 | 7.9999934102 | 99.6050950039 | 33.4361751909 |
| **12** | 0.0009672999 | -0.0137135372 | | 0.0216116900 | 7.9999759547 | 7.9999808311 | 7.9999765241 | 7.9999925062 | 99.6099818351 | 33.4404270083 |
| **13** | -0.0202282204 | -0.0014656319 | | -0.0278483990 | 7.9999778898 | 7.9999758272 | 7.9999787961 | 7.9999929139 | 99.6099295910 | 33.4378205250 |
| **14** | -0.0063668262 | 0.0162050814 | | 0.0430253749 | 7.9999730350 | 7.9999802960 | 7.9999802265 | 7.9999919835 | 99.6097768776 | 33.4434220364 |
| **15** | 0.0156799372 | 0.0039352762 | | 0.0165683538 | 7.9999793034 | 7.9999794696 | 7.9999802402 | 7.9999934260 | 99.6083301183 | 33.4459968266 |
| **16** | 0.0059502242 | 0.0156092388 | | 0.0093105270 | 7.9999766769 | 7.9999810834 | 7.9999807914 | 7.9999926070 | 99.6104882009 | 33.4349284564 |
| **17** | 0.0066655456 | -0.0176983749 | | -0.0058289099 | 7.9999766362 | 7.9999767056 | 7.9999748739 | 7.9999922821 | 99.6093026620 | 33.4415392794 |
| **18** | -0.0071757362 | 0.0380578436 | | 0.0082101082 | 7.9999750999 | 7.9999745697 | 7.9999772631 | 7.9999911192 | 99.6101466049 | 33.4378717919 |
| **19** | 0.0193647443 | 0.0263397090 | | 0.1106105968 | 7.9999775316 | 7.9999777676 | 7.9999779642 | 7.9999940231 | 99.6104681070 | 33.4329237492 |
| **20** | -0.0007159163 | -0.0212657951 | | 0.0424255928 | 7.9999794243 | 7.9999792676 | 7.9999774256 | 7.9999926048 | 99.6091941551 | 33.4424684991 |
| **21** | -0.0005516031 | -0.0186915982 | | 0.0593026352 | 7.9999781455 | 7.9999777791 | 7.9999745664 | 7.9999926053 | 99.6093750000 | 33.4315602180 |
| **22** | 0.0004519616 | -0.0154268586 | | 0.0178794571 | 7.9999790713 | 7.9999789726 | 7.9999769378 | 7.9999928086 | 99.6120474859 | 33.4386237758 |
| **23** | -0.0003235083 | 0.0209004602 | | -0.0051960336 | 7.9999778002 | 7.9999759144 | 7.9999766323 | 7.9999922456 | 99.6090776106 | 33.4337112243 |
| **24** | 0.0080701320 | 0.0041302992 | | -0.0440239001 | 7.9999773996 | 7.9999808010 | 7.9999796322 | 7.9999933066 | 99.6090896669 | 33.4352837634 |
| **25** | 0.0246193987 | 0.0206906723 | | 0.0291883446 | 7.9999745381 | 7.9999803595 | 7.9999773795 | 7.9999918865 | 99.6083662873 | 33.4414124279 |
| **26** | 0.0205435639 | -0.0310663433 | | -0.0261898985 | 7.9999769964 | 7.9999792330 | 7.9999775558 | 7.9999918396 | 99.6070199974 | 33.4387767257 |
| **27** | 0.0100276334 | -0.0016350513 | | 0.0045991374 | 7.9999767169 | 7.9999778086 | 7.9999764914 | 7.9999930276 | 99.6099054784 | 33.4451349332 |
| **28** | 0.0152933008 | -0.0087606341 | | -0.0069189972 | 7.9999775570 | 7.9999735605 | 7.9999773308 | 7.9999918872 | 99.6104962384 | 33.4394938013 |
| **29** | -0.0081582932 | -0.0024256770 | | -0.0392393760 | 7.9999786315 | 7.9999754092 | 7.9999749910 | 7.9999923676 | 99.6094634131 | 33.4369765033 |
| **30** | 0.0022794026 | -0.0203697461 | | -0.0260837894 | 7.9999795936 | 7.9999737653 | 7.9999767447 | 7.9999923789 | 99.6084145126 | 33.4339272138 |
| **31** | -0.0727060751 | 0.0010980340 | | 0.0197827381 | 7.9999746914 | 7.9999755817 | 7.9999800616 | 7.9999919319 | 99.6091861175 | 33.4335450677 |
| **32** | -0.0123741287 | -0.0281179894 | | 0.0189266377 | 7.9999739127 | 7.9999769043 | 7.9999771571 | 7.9999913404 | 99.6072932742 | 33.4441757538 |
| **33** | 0.0099976666 | -0.0083494523 | | 0.0329312028 | 7.9999805610 | 7.9999773488 | 7.9999772855 | 7.9999927322 | 99.6102711870 | 33.4402830416 |
| **34** | 0.0196309431 | 0.0272205685 | | -0.0103920240 | 7.9999800917 | 7.9999790900 | 7.9999778677 | 7.9999931085 | 99.6100380980 | 33.4360387416 |
| **35** | -0.0348725369 | -0.0320187059 | | -0.0044185671 | 7.9999790024 | 7.9999795417 | 7.9999780707 | 7.9999931590 | 99.6101064172 | 33.4367816478 |
| **36** | 0.0001685793 | 0.0033879477 | | 0.0351523533 | 7.9999769493 | 7.9999762872 | 7.9999733418 | 7.9999921853 | 99.6088646155 | 33.4371185315 |
| **37** | -0.0179247239 | 0.0004294230 | | 0.0046513693 | 7.9999753750 | 7.9999789638 | 7.9999784913 | 7.9999926165 | 99.6071445795 | 33.4337859578 |
| **38** | 0.0108663287 | -0.0056097071 | | 0.0401211911 | 7.9999799092 | 7.9999785056 | 7.9999804649 | 7.9999930929 | 99.6072731803 | 33.4415657875 |
| **39** | 0.0221706435 | -0.0086345605 | | 0.0425908993 | 7.9999782411 | 7.9999762900 | 7.9999798690 | 7.9999925540 | 99.6091017233 | 33.4356819374 |
| **40** | 0.0202128576 | 0.0104595038 | | 0.0535914806 | 7.9999809988 | 7.9999764612 | 7.9999764200 | 7.9999928916 | 99.6106730646 | 33.4359411878 |
| **41** | 0.0269387160 | 0.0269204150 | | -0.0217049397 | 7.9999732773 | 7.9999797175 | 7.9999817193 | 7.9999926756 | 99.6098773470 | 33.4352922265 |
| **42** | 0.0201854071 | 0.0209981252 | | 0.0196863623 | 7.9999788659 | 7.9999758800 | 7.9999794976 | 7.9999926430 | 99.6095156572 | 33.4423737663 |
| **43** | -0.0271810185 | -0.0124397841 | | -0.0353039740 | 7.9999790227 | 7.9999785217 | 7.9999774072 | 7.9999930007 | 99.6100220229 | 33.4467407099 |
| **44** | 0.0002411248 | -0.0134320484 | | 0.0273099837 | 7.9999789559 | 7.9999810285 | 7.9999808101 | 7.9999922002 | 99.6121117863 | 33.4360380167 |
| **45** | -0.0080458173 | -0.0113466066 | | -0.0210014022 | 7.9999794024 | 7.9999766001 | 7.9999775840 | 7.9999916106 | 99.6095920139 | 33.4384441602 |
| **46** | 0.0058663681 | -0.0334961450 | | 0.0147432018 | 7.9999746054 | 7.9999761533 | 7.9999780208 | 7.9999915922 | 99.6097889339 | 33.4395871630 |
| **47** | 0.0007203640 | 0.0004997449 | | -0.0302971691 | 7.9999787872 | 7.9999774261 | 7.9999774461 | 7.9999921712 | 99.6108338156 | 33.4374678025 |
| **48** | 0.0229942779 | 0.0104069876 | | -0.0045713916 | 7.9999747502 | 7.9999762553 | 7.9999774334 | 7.9999916428 | 99.6088123714 | 33.4340804316 |
| **49** | 0.0079256545 | 0.0013040053 | | -0.0252642888 | 7.9999797717 | 7.9999783685 | 7.9999785695 | 7.9999924884 | 99.6084346065 | 33.4386342088 |
| **50** | -0.0121719638 | -0.0108546850 | | -0.0095304143 | 7.9999746807 | 7.9999819005 | 7.9999818589 | 7.9999928651 | 99.6092263053 | 33.4315876717 |
| **Total** | 0.0666437857 | 0.0644037372 | | 0.2883528577 | 399.9988773311 | 399.9988832041 | 399.9988900275 | 399.9996255683 | 4980.4626776299 | 1671.9190414329 |
| **Average** | 0.0013328749 | 0.0012880740 | | 0.0057669932 | 7.9999775466 | 7.9999776641 | 7.9999778006 | 7.9999925114 | 99.6092535526 | 33.4383808287 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **10** | | | | | | | |
| **Resolution** | | | **2160p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0067970267 | -0.0089665807 | | 0.0209685704 | 7.9999779814 | 7.9999724296 | 7.9999779180 | 7.9999926181 | 99.6116255144 | 33.4445213686 |
| **2** | -0.0055081979 | -0.0110896182 | | 0.0030702070 | 7.9999801418 | 7.9999786140 | 7.9999810567 | 7.9999943113 | 99.6093348122 | 33.4463763881 |
| **3** | 0.0143874474 | -0.0265301368 | | -0.0335754950 | 7.9999797595 | 7.9999726694 | 7.9999782391 | 7.9999920950 | 99.6102792245 | 33.4374466055 |
| **4** | -0.0214326238 | 0.0133275074 | | 0.0174290799 | 7.9999818305 | 7.9999802790 | 7.9999774793 | 7.9999929175 | 99.6093549061 | 33.4422107774 |
| **5** | -0.0029636669 | 0.0123571876 | | 0.0063256165 | 7.9999774745 | 7.9999765703 | 7.9999778247 | 7.9999929304 | 99.6092102302 | 33.4425402224 |
| **6** | -0.0149389296 | -0.0007331065 | | 0.0182064338 | 7.9999738377 | 7.9999766175 | 7.9999761903 | 7.9999926192 | 99.6086355453 | 33.4321541458 |
| **7** | 0.0257279602 | -0.0029590094 | | -0.0243164634 | 7.9999782086 | 7.9999794743 | 7.9999737206 | 7.9999931969 | 99.6080769354 | 33.4430054864 |
| **8** | -0.0562053167 | 0.0013273850 | | 0.0069766457 | 7.9999777230 | 7.9999780115 | 7.9999761846 | 7.9999926610 | 99.6085149820 | 33.4352359636 |
| **9** | 0.0216832814 | 0.0026682029 | | 0.0292982115 | 7.9999786977 | 7.9999785988 | 7.9999804408 | 7.9999928410 | 99.6103194123 | 33.4345348212 |
| **10** | -0.0167434010 | -0.0220785279 | | -0.0000243648 | 7.9999792509 | 7.9999759726 | 7.9999738247 | 7.9999921813 | 99.6108097029 | 33.4468729827 |
| **11** | 0.0471735684 | 0.0012220984 | | -0.0097812918 | 7.9999756002 | 7.9999769751 | 7.9999768689 | 7.9999917095 | 99.6090173290 | 33.4401224324 |
| **12** | 0.0111774194 | -0.0108522636 | | 0.0431470944 | 7.9999758763 | 7.9999778923 | 7.9999773603 | 7.9999927714 | 99.6098090278 | 33.4353619325 |
| **13** | -0.0384314484 | 0.0012186547 | | 0.0077199937 | 7.9999801984 | 7.9999783968 | 7.9999772483 | 7.9999929614 | 99.6087601273 | 33.4405020412 |
| **14** | -0.0254513747 | 0.0140044397 | | -0.0197030842 | 7.9999767556 | 7.9999784890 | 7.9999738493 | 7.9999921905 | 99.6081412359 | 33.4406941545 |
| **15** | 0.0082760274 | -0.0064072253 | | 0.0001669502 | 7.9999797026 | 7.9999782929 | 7.9999774156 | 7.9999933091 | 99.6085752636 | 33.4463842366 |
| **16** | -0.0276995410 | -0.0084469791 | | 0.0515600551 | 7.9999810653 | 7.9999794874 | 7.9999773589 | 7.9999926849 | 99.6089972351 | 33.4347873106 |
| **17** | -0.0027914230 | 0.0080161561 | | -0.0183317657 | 7.9999814088 | 7.9999779664 | 7.9999771017 | 7.9999927139 | 99.6098009902 | 33.4338484301 |
| **18** | 0.0044263239 | -0.0019327217 | | -0.0041548931 | 7.9999772730 | 7.9999773741 | 7.9999804025 | 7.9999921840 | 99.6074540252 | 33.4403765766 |
| **19** | 0.0090916717 | -0.0262478073 | | -0.0102374128 | 7.9999753999 | 7.9999800466 | 7.9999788098 | 7.9999921883 | 99.6108137217 | 33.4376173640 |
| **20** | 0.0151382092 | 0.0359731361 | | 0.0347684015 | 7.9999776881 | 7.9999777817 | 7.9999747945 | 7.9999914506 | 99.6076830954 | 33.4423889589 |
| **21** | 0.0157512676 | 0.0136166719 | | 0.0123110990 | 7.9999778509 | 7.9999789221 | 7.9999826461 | 7.9999930277 | 99.6078438465 | 33.4461406830 |
| **22** | -0.0195359191 | 0.0242829795 | | -0.0343284206 | 7.9999773419 | 7.9999783479 | 7.9999791531 | 7.9999920749 | 99.6107936278 | 33.4449078014 |
| **23** | -0.0231934817 | 0.0212837180 | | 0.0198008416 | 7.9999799489 | 7.9999822404 | 7.9999784271 | 7.9999932590 | 99.6102269805 | 33.4406236762 |
| **24** | 0.0189633538 | -0.0145001870 | | -0.0293778481 | 7.9999772799 | 7.9999774371 | 7.9999783418 | 7.9999926700 | 99.6096000514 | 33.4434578744 |
| **25** | 0.0182496252 | -0.0184208775 | | -0.0141136070 | 7.9999778052 | 7.9999762527 | 7.9999784496 | 7.9999922860 | 99.6097407086 | 33.4420059774 |
| **26** | 0.0213808875 | -0.0134311798 | | 0.0039278286 | 7.9999775040 | 7.9999756211 | 7.9999782359 | 7.9999919712 | 99.6099858539 | 33.4352797131 |
| **27** | -0.0018224737 | -0.0282931065 | | -0.0356217848 | 7.9999765704 | 7.9999762284 | 7.9999780216 | 7.9999917676 | 99.6103555813 | 33.4414232392 |
| **28** | 0.0124724055 | 0.0174316143 | | 0.0322932572 | 7.9999766362 | 7.9999787382 | 7.9999801625 | 7.9999928927 | 99.6085833012 | 33.4390385922 |
| **29** | -0.0019884689 | -0.0023301005 | | -0.0208533981 | 7.9999778944 | 7.9999781623 | 7.9999753343 | 7.9999918740 | 99.6084426440 | 33.4256549974 |
| **30** | -0.0234446071 | 0.0099022644 | | -0.0172209224 | 7.9999742288 | 7.9999773150 | 7.9999772960 | 7.9999922732 | 99.6100662294 | 33.4477952839 |
| **31** | -0.0049211583 | -0.0278519275 | | 0.0437279481 | 7.9999807591 | 7.9999778137 | 7.9999763891 | 7.9999929123 | 99.6089449910 | 33.4422452758 |
| **32** | -0.0171905771 | 0.0349942682 | | -0.0043016523 | 7.9999787770 | 7.9999758137 | 7.9999751061 | 7.9999928819 | 99.6072169174 | 33.4451255560 |
| **33** | 0.0029740695 | -0.0122635992 | | 0.0081498082 | 7.9999792050 | 7.9999791899 | 7.9999768635 | 7.9999922376 | 99.6073696309 | 33.4357417462 |
| **34** | 0.0331761397 | -0.0130089223 | | -0.0061676593 | 7.9999779173 | 7.9999787130 | 7.9999787098 | 7.9999940498 | 99.6107614776 | 33.4440939757 |
| **35** | -0.0356267859 | 0.0041955151 | | 0.0124520659 | 7.9999752199 | 7.9999752639 | 7.9999779245 | 7.9999921275 | 99.6124212320 | 33.4344304906 |
| **36** | -0.0064931167 | 0.0085321915 | | 0.0092966383 | 7.9999779717 | 7.9999772695 | 7.9999772829 | 7.9999926776 | 99.6097407086 | 33.4387321094 |
| **37** | -0.0134248775 | 0.0051725280 | | -0.0223885946 | 7.9999775809 | 7.9999742347 | 7.9999758020 | 7.9999932926 | 99.6094995820 | 33.4380256401 |
| **38** | 0.0123260548 | 0.0288647720 | | -0.0122262410 | 7.9999793974 | 7.9999762241 | 7.9999785340 | 7.9999928485 | 99.6092182677 | 33.4449355073 |
| **39** | -0.0263718909 | 0.0523920718 | | -0.0299000006 | 7.9999766887 | 7.9999792723 | 7.9999757262 | 7.9999924259 | 99.6095920139 | 33.4343558675 |
| **40** | 0.0073490864 | 0.0044727558 | | 0.0382142870 | 7.9999747292 | 7.9999773159 | 7.9999775184 | 7.9999916679 | 99.6094875257 | 33.4410487681 |
| **41** | 0.0091510330 | -0.0087954098 | | -0.0109378839 | 7.9999784459 | 7.9999792222 | 7.9999813329 | 7.9999930079 | 99.6119389789 | 33.4370964834 |
| **42** | 0.0027873991 | -0.0109825571 | | -0.0810048242 | 7.9999743669 | 7.9999746016 | 7.9999817709 | 7.9999928861 | 99.6095076196 | 33.4350528808 |
| **43** | -0.0151536609 | 0.0093771189 | | 0.0071123725 | 7.9999784947 | 7.9999795978 | 7.9999797561 | 7.9999924670 | 99.6075464570 | 33.4336224961 |
| **44** | -0.0055674716 | 0.0089106664 | | 0.0222268840 | 7.9999783557 | 7.9999764221 | 7.9999809907 | 7.9999936292 | 99.6098693094 | 33.4329224569 |
| **45** | -0.0017723630 | -0.0002363102 | | 0.0193714616 | 7.9999776023 | 7.9999772941 | 7.9999782117 | 7.9999921016 | 99.6077674897 | 33.4377150754 |
| **46** | 0.0080780257 | 0.0178523246 | | -0.0239345556 | 7.9999768320 | 7.9999763408 | 7.9999763303 | 7.9999924625 | 99.6116255144 | 33.4259446014 |
| **47** | -0.0260844929 | 0.0248076238 | | 0.0141244663 | 7.9999759240 | 7.9999755915 | 7.9999810704 | 7.9999917130 | 99.6110869985 | 33.4439605996 |
| **48** | 0.0064016851 | -0.0028947700 | | 0.0131168233 | 7.9999754283 | 7.9999760048 | 7.9999771614 | 7.9999926473 | 99.6077313207 | 33.4393033586 |
| **49** | 0.0156686458 | 0.0210791567 | | 0.0396945782 | 7.9999793587 | 7.9999802751 | 7.9999768804 | 7.9999931944 | 99.6085149820 | 33.4345214253 |
| **50** | 0.0347055336 | -0.0334067403 | | -0.0075442744 | 7.9999787587 | 7.9999799042 | 7.9999782106 | 7.9999929932 | 99.6106489519 | 33.4376093895 |
| **Total** | -0.0514431204 | 0.0846233445 | | 0.0654111819 | 399.9988907479 | 399.9988775689 | 399.9988917286 | 399.9996308554 | 4980.4713421103 | 1671.9597937414 |
| **Average** | -0.0010288620 | 0.0016924653 | | 0.0013082229 | 7.9999778150 | 7.9999775514 | 7.9999778346 | 7.9999926171 | 99.6094268422 | 33.4391958748 |

# DECRYPTION METRICS

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **1** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0025772576 | | 25.8884216297 |
| **2** | 0.0024287200 | | 26.1462254984 |
| **3** | 0.0024906591 | | 26.0368571443 |
| **4** | 0.0023002094 | | 26.3823263188 |
| **5** | 0.0023143756 | | 26.3556616222 |
| **6** | 0.0022790576 | | 26.4224469282 |
| **7** | 0.0022415766 | | 26.4944641464 |
| **8** | 0.0024311738 | | 26.1418398588 |
| **9** | 0.0024297833 | | 26.1443246385 |
| **10** | 0.0022606442 | | 26.4576777582 |
| **11** | 0.0023749473 | | 26.2434601532 |
| **12** | 0.0023872659 | | 26.2209921365 |
| **13** | 0.0024779379 | | 26.0590958452 |
| **14** | 0.0024098658 | | 26.1800714154 |
| **15** | 0.0023127339 | | 26.3587434265 |
| **16** | 0.0023576646 | | 26.2751798261 |
| **17** | 0.0022516110 | | 26.4750663359 |
| **18** | 0.0022366918 | | 26.5039385900 |
| **19** | 0.0022372662 | | 26.5028234722 |
| **20** | 0.0023194381 | | 26.3461721976 |
| **21** | 0.0003302418 | | 34.8116797274 |
| **22** | 0.0003465565 | | 34.6022590963 |
| **23** | 0.0003300553 | | 34.8141324871 |
| **24** | 0.0003400998 | | 34.6839357895 |
| **25** | 0.0003240824 | | 34.8934454750 |
| **26** | 0.0003421667 | | 34.6576222025 |
| **27** | 0.0003192482 | | 34.9587159197 |
| **28** | 0.0003333087 | | 34.7715330318 |
| **29** | 0.0003275954 | | 34.8466223892 |
| **30** | 0.0003405270 | | 34.6784850052 |
| **31** | 0.0003261437 | | 34.8659107036 |
| **32** | 0.0003390684 | | 34.6971263192 |
| **33** | 0.0003251059 | | 34.8797508563 |
| **34** | 0.0003412142 | | 34.6697291869 |
| **35** | 0.0003241247 | | 34.8928787407 |
| **36** | 0.0003163189 | | 34.9987482356 |
| **37** | 0.0002383207 | | 36.2283826941 |
| **38** | 0.0002409677 | | 36.1804121762 |
| **39** | 0.0002141129 | | 36.6935714086 |
| **40** | 0.0002244934 | | 36.4879648824 |
| **41** | 0.0001986635 | | 37.0188190103 |
| **42** | 0.0002180524 | | 36.6143915993 |
| **43** | 0.0002095979 | | 36.7861310099 |
| **44** | 0.0002319833 | | 36.3454324608 |
| **45** | 0.0002165875 | | 36.6436651240 |
| **46** | 0.0002287791 | | 36.4058371791 |
| **47** | 0.0002100021 | | 36.7777636063 |
| **48** | 0.0002267098 | | 36.4452975690 |
| **49** | 0.0001969569 | | 37.0562879811 |
| **50** | 0.0002254141 | | 36.4701898387 |
| **Total** | 0.0555053785 | | 1594.5125106482 |
| **Average** | 0.0011101076 | | 31.8902502130 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **2** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0006185230 | | 32.0864412081 |
| **2** | 0.0002922590 | | 35.3423209423 |
| **3** | 0.0002834280 | | 35.4755722271 |
| **4** | 0.0002847450 | | 35.4554385280 |
| **5** | 0.0002584123 | | 35.8768676078 |
| **6** | 0.0002599251 | | 35.8515178579 |
| **7** | 0.0002504976 | | 36.0119650441 |
| **8** | 0.0002600778 | | 35.8489671259 |
| **9** | 0.0002434344 | | 36.1361801991 |
| **10** | 0.0002472171 | | 36.0692146210 |
| **11** | 0.0002443337 | | 36.1201663181 |
| **12** | 0.0002614355 | | 35.8263541065 |
| **13** | 0.0002410238 | | 36.1794008117 |
| **14** | 0.0002632469 | | 35.7963678909 |
| **15** | 0.0002633651 | | 35.7944181085 |
| **16** | 0.0002629332 | | 35.8015451649 |
| **17** | 0.0002491793 | | 36.0348799945 |
| **18** | 0.0002528162 | | 35.9719518597 |
| **19** | 0.0002451363 | | 36.1059234930 |
| **20** | 0.0002543559 | | 35.9455811151 |
| **21** | 0.0002378313 | | 36.2373100984 |
| **22** | 0.0002422976 | | 36.1565079911 |
| **23** | 0.0002391078 | | 36.2140632013 |
| **24** | 0.0002579029 | | 35.8854373476 |
| **25** | 0.0002394410 | | 36.2080142340 |
| **26** | 0.0002603425 | | 35.8445493534 |
| **27** | 0.0002614050 | | 35.8268606053 |
| **28** | 0.0002616482 | | 35.8228232144 |
| **29** | 0.0002454329 | | 36.1006727770 |
| **30** | 0.0002495137 | | 36.0290560256 |
| **31** | 0.0002414181 | | 36.1723024870 |
| **32** | 0.0002491810 | | 36.0348511371 |
| **33** | 0.0002398399 | | 36.2007856846 |
| **34** | 0.0002423967 | | 36.1547330460 |
| **35** | 0.0002364340 | | 36.2629000779 |
| **36** | 0.0002584984 | | 35.8754211661 |
| **37** | 0.0002342508 | | 36.3031897760 |
| **38** | 0.0002518709 | | 35.9882196280 |
| **39** | 0.0002462617 | | 36.0860308012 |
| **40** | 0.0002489241 | | 36.0393313468 |
| **41** | 0.0002381610 | | 36.2312930623 |
| **42** | 0.0002530150 | | 35.9685380165 |
| **43** | 0.0002378737 | | 36.2365356633 |
| **44** | 0.0002459649 | | 36.0912678715 |
| **45** | 0.0002407271 | | 36.1847497907 |
| **46** | 0.0002452166 | | 36.1045006990 |
| **47** | 0.0002376523 | | 36.2405803469 |
| **48** | 0.0002570684 | | 35.8995134707 |
| **49** | 0.0002302669 | | 36.3776848648 |
| **50** | 0.0002442722 | | 36.1212591255 |
| **Total** | 0.0129105620 | | 1796.6300571345 |
| **Average** | 0.0002582112 | | 35.9326011427 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **3** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0027981439 | | 25.5312995199 |
| **2** | 0.0025738894 | | 25.8941011436 |
| **3** | 0.0025813817 | | 25.8814777657 |
| **4** | 0.0026524911 | | 25.7634607168 |
| **5** | 0.0027125293 | | 25.6662556380 |
| **6** | 0.0026453069 | | 25.7752393496 |
| **7** | 0.0026156925 | | 25.8241331400 |
| **8** | 0.0025782308 | | 25.8867820478 |
| **9** | 0.0026968404 | | 25.6914475620 |
| **10** | 0.0025660652 | | 25.9073230935 |
| **11** | 0.0025807243 | | 25.8825838944 |
| **12** | 0.0025434569 | | 25.9457561616 |
| **13** | 0.0027477389 | | 25.6102453994 |
| **14** | 0.0025547460 | | 25.9265226614 |
| **15** | 0.0026269841 | | 25.8054255933 |
| **16** | 0.0025765847 | | 25.8895558009 |
| **17** | 0.0026537564 | | 25.7613894446 |
| **18** | 0.0025939215 | | 25.8604317932 |
| **19** | 0.0025562283 | | 25.9240036042 |
| **20** | 0.0025475945 | | 25.9386969850 |
| **21** | 0.0026244154 | | 25.8096743011 |
| **22** | 0.0024875469 | | 26.0422871487 |
| **23** | 0.0024992567 | | 26.0218913273 |
| **24** | 0.0025064847 | | 26.0093494490 |
| **25** | 0.0026920446 | | 25.6991775352 |
| **26** | 0.0025452718 | | 25.9426583472 |
| **27** | 0.0025557563 | | 25.9248055395 |
| **28** | 0.0025638771 | | 25.9110279050 |
| **29** | 0.0025901693 | | 25.8667184838 |
| **30** | 0.0025157583 | | 25.9933108543 |
| **31** | 0.0025150961 | | 25.9944541023 |
| **32** | 0.0024667635 | | 26.0787249136 |
| **33** | 0.0025638014 | | 25.9111562021 |
| **34** | 0.0024442971 | | 26.1184601082 |
| **35** | 0.0025147321 | | 25.9950826916 |
| **36** | 0.0025631669 | | 25.9122311656 |
| **37** | 0.0028877083 | | 25.3944668599 |
| **38** | 0.0026525960 | | 25.7632888972 |
| **39** | 0.0026502234 | | 25.7671751373 |
| **40** | 0.0026245810 | | 25.8094001378 |
| **41** | 0.0026816471 | | 25.7159837128 |
| **42** | 0.0025678012 | | 25.9043860159 |
| **43** | 0.0025664718 | | 25.9066350615 |
| **44** | 0.0025650213 | | 25.9090901862 |
| **45** | 0.0026294227 | | 25.8013959491 |
| **46** | 0.0025413619 | | 25.9493347920 |
| **47** | 0.0025913678 | | 25.8647093412 |
| **48** | 0.0026436918 | | 25.7778918025 |
| **49** | 0.0028441966 | | 25.4604039380 |
| **50** | 0.0026449478 | | 25.7758288659 |
| **Total** | 0.1301417838 | | 1292.3971320868 |
| **Average** | 0.0026028357 | | 25.8479426417 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **4** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0836424184 | | 10.7757341866 |
| **2** | 0.0871598033 | | 10.5968375875 |
| **3** | 0.0856305405 | | 10.6737131447 |
| **4** | 0.0851094675 | | 10.7002212646 |
| **5** | 0.0806037373 | | 10.9364482086 |
| **6** | 0.0814372638 | | 10.8917682653 |
| **7** | 0.0794653895 | | 10.9982198355 |
| **8** | 0.0792274517 | | 11.0112431265 |
| **9** | 0.0807818455 | | 10.9268622949 |
| **10** | 0.0773749837 | | 11.1139942947 |
| **11** | 0.0813477229 | | 10.8965459942 |
| **12** | 0.0777306948 | | 11.0940745021 |
| **13** | 0.0823154073 | | 10.8451886842 |
| **14** | 0.0778706996 | | 11.0862592328 |
| **15** | 0.0785574307 | | 11.0481272929 |
| **16** | 0.0808657294 | | 10.9223549187 |
| **17** | 0.0813842303 | | 10.8945973948 |
| **18** | 0.0836481768 | | 10.7754352032 |
| **19** | 0.0820333870 | | 10.8600935701 |
| **20** | 0.0825717174 | | 10.8316868269 |
| **21** | 0.0848933709 | | 10.7112622152 |
| **22** | 0.0844584097 | | 10.7335710015 |
| **23** | 0.0878454345 | | 10.5628080481 |
| **24** | 0.0849835214 | | 10.7066527737 |
| **25** | 0.0893499646 | | 10.4890561518 |
| **26** | 0.0837152589 | | 10.7719537516 |
| **27** | 0.0838808000 | | 10.7633743608 |
| **28** | 0.0845709947 | | 10.7277856114 |
| **29** | 0.0829068576 | | 10.8140954538 |
| **30** | 0.0821688981 | | 10.8529253687 |
| **31** | 0.0810638982 | | 10.9117251568 |
| **32** | 0.0808091800 | | 10.9253929994 |
| **33** | 0.0823831598 | | 10.8416155476 |
| **34** | 0.0825821595 | | 10.8311376487 |
| **35** | 0.0857038148 | | 10.6699984655 |
| **36** | 0.0839294392 | | 10.7608567858 |
| **37** | 0.0913739859 | | 10.3917742996 |
| **38** | 0.0859865235 | | 10.6556960967 |
| **39** | 0.0866985617 | | 10.6198810730 |
| **40** | 0.0897719277 | | 10.4685944921 |
| **41** | 0.0886114875 | | 10.5250997291 |
| **42** | 0.0898398857 | | 10.4653080949 |
| **43** | 0.0874813448 | | 10.5808454951 |
| **44** | 0.0852960247 | | 10.6907120906 |
| **45** | 0.0874714469 | | 10.5813368953 |
| **46** | 0.0846749859 | | 10.7224486678 |
| **47** | 0.0882722207 | | 10.5417594748 |
| **48** | 0.0877985150 | | 10.5651282937 |
| **49** | 0.0952207783 | | 10.2126827309 |
| **50** | 0.0889000097 | | 10.5109819171 |
| **Total** | 4.2114009575 | | 537.4858665200 |
| **Average** | 0.0842280192 | | 10.7497173304 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **5** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0005479833 | | 32.6123269509 |
| **2** | 0.0003333947 | | 34.7704136089 |
| **3** | 0.0003000622 | | 35.2278872294 |
| **4** | 0.0003063918 | | 35.1372287919 |
| **5** | 0.0003332771 | | 34.7719457694 |
| **6** | 0.0003314967 | | 34.7952083512 |
| **7** | 0.0003146199 | | 35.0221375754 |
| **8** | 0.0003290557 | | 34.8273062717 |
| **9** | 0.0003276515 | | 34.8458786550 |
| **10** | 0.0003175107 | | 34.9824156973 |
| **11** | 0.0003035303 | | 35.1779794230 |
| **12** | 0.0003101624 | | 35.0841078906 |
| **13** | 0.0003271994 | | 34.8518755090 |
| **14** | 0.0003084436 | | 35.1082426518 |
| **15** | 0.0003026809 | | 35.1901498943 |
| **16** | 0.0003143531 | | 35.0258221965 |
| **17** | 0.0003278881 | | 34.8427431919 |
| **18** | 0.0003270567 | | 34.8537700989 |
| **19** | 0.0003213071 | | 34.9307967322 |
| **20** | 0.0003321838 | | 34.7862158545 |
| **21** | 0.0003425823 | | 34.6523504889 |
| **22** | 0.0003409364 | | 34.6732663254 |
| **23** | 0.0003259628 | | 34.8683198941 |
| **24** | 0.0003306977 | | 34.8056881178 |
| **25** | 0.0003450340 | | 34.6213809737 |
| **26** | 0.0003301719 | | 34.8125989333 |
| **27** | 0.0003244074 | | 34.8890923398 |
| **28** | 0.0003374149 | | 34.7183580018 |
| **29** | 0.0003357834 | | 34.7394071902 |
| **30** | 0.0003480697 | | 34.5833379228 |
| **31** | 0.0003337441 | | 34.7658634587 |
| **32** | 0.0003496482 | | 34.5636869168 |
| **33** | 0.0003426373 | | 34.6516532477 |
| **34** | 0.0003441628 | | 34.6323612265 |
| **35** | 0.0003375849 | | 34.7161700468 |
| **36** | 0.0003415356 | | 34.6656401711 |
| **37** | 0.0003520304 | | 34.5341982881 |
| **38** | 0.0003434042 | | 34.6419445238 |
| **39** | 0.0003296701 | | 34.8192048435 |
| **40** | 0.0003363292 | | 34.7323542763 |
| **41** | 0.0003358113 | | 34.7390467371 |
| **42** | 0.0003330355 | | 34.7750941607 |
| **43** | 0.0003329420 | | 34.7763140782 |
| **44** | 0.0003436598 | | 34.6387122379 |
| **45** | 0.0003445632 | | 34.6273112740 |
| **46** | 0.0003461272 | | 34.6076422285 |
| **47** | 0.0003302337 | | 34.8117864531 |
| **48** | 0.0003400950 | | 34.6839968983 |
| **49** | 0.0003413392 | | 34.6681389589 |
| **50** | 0.0003403174 | | 34.6811588796 |
| **Total** | 0.0167761805 | | 1737.9405314370 |
| **Average** | 0.0003355236 | | 34.7588106287 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **6** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0012725027 | | 28.9534128170 |
| **2** | 0.0007844380 | | 31.0544137828 |
| **3** | 0.0007618456 | | 31.1813303992 |
| **4** | 0.0007511769 | | 31.2425778107 |
| **5** | 0.0007915165 | | 31.0154002664 |
| **6** | 0.0007295344 | | 31.3695421366 |
| **7** | 0.0007162658 | | 31.4492577239 |
| **8** | 0.0007235067 | | 31.4055746045 |
| **9** | 0.0007639334 | | 31.1694450289 |
| **10** | 0.0007161850 | | 31.4497477505 |
| **11** | 0.0007370520 | | 31.3250185262 |
| **12** | 0.0007489127 | | 31.2556879921 |
| **13** | 0.0008307370 | | 30.8053646315 |
| **14** | 0.0007794552 | | 31.0820884976 |
| **15** | 0.0007603087 | | 31.1901002362 |
| **16** | 0.0007657483 | | 31.1591396047 |
| **17** | 0.0008152401 | | 30.8871448196 |
| **18** | 0.0007630665 | | 31.1743760251 |
| **19** | 0.0007667604 | | 31.1534030455 |
| **20** | 0.0007664975 | | 31.1548923952 |
| **21** | 0.0008087300 | | 30.9219645584 |
| **22** | 0.0007494596 | | 31.2525177217 |
| **23** | 0.0007550853 | | 31.2200398889 |
| **24** | 0.0007534404 | | 31.2295110513 |
| **25** | 0.0008118584 | | 30.9051970549 |
| **26** | 0.0007382224 | | 31.3181277487 |
| **27** | 0.0007810168 | | 31.0733962739 |
| **28** | 0.0007917273 | | 31.0142438085 |
| **29** | 0.0008207509 | | 30.8578865277 |
| **30** | 0.0007871590 | | 31.0393751890 |
| **31** | 0.0007909318 | | 31.0186095708 |
| **32** | 0.0007979937 | | 30.9800053167 |
| **33** | 0.0008253035 | | 30.8338633461 |
| **34** | 0.0007818516 | | 31.0687569646 |
| **35** | 0.0007748436 | | 31.1078597128 |
| **36** | 0.0007708638 | | 31.1302236133 |
| **37** | 0.0008263508 | | 30.8283552572 |
| **38** | 0.0007495145 | | 31.2521996609 |
| **39** | 0.0007586974 | | 31.1993139072 |
| **40** | 0.0007690184 | | 31.1406328957 |
| **41** | 0.0008194671 | | 30.8646848842 |
| **42** | 0.0007912340 | | 31.0169505877 |
| **43** | 0.0007829427 | | 31.0627003367 |
| **44** | 0.0007808038 | | 31.0745805490 |
| **45** | 0.0008201588 | | 30.8610203874 |
| **46** | 0.0007787884 | | 31.0858054628 |
| **47** | 0.0007639171 | | 31.1695378325 |
| **48** | 0.0007657662 | | 31.1590378221 |
| **49** | 0.0008352778 | | 30.7816904458 |
| **50** | 0.0007513849 | | 31.2413751681 |
| **Total** | 0.0392772434 | | 1553.1873816388 |
| **Average** | 0.0007855449 | | 31.0637476328 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **7** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.1403443590 | | 8.5280503856 |
| **2** | 0.1460406212 | | 8.3552632846 |
| **3** | 0.1451876771 | | 8.3807024296 |
| **4** | 0.1470996398 | | 8.3238839080 |
| **5** | 0.1451756716 | | 8.3810615634 |
| **6** | 0.1460806699 | | 8.3540724826 |
| **7** | 0.1456358634 | | 8.3673166519 |
| **8** | 0.1476657044 | | 8.3072035852 |
| **9** | 0.1451017193 | | 8.3832744152 |
| **10** | 0.1452962467 | | 8.3774560428 |
| **11** | 0.1450013159 | | 8.3862805651 |
| **12** | 0.1467617253 | | 8.3338719140 |
| **13** | 0.1485950522 | | 8.2799565099 |
| **14** | 0.1455467316 | | 8.3699754276 |
| **15** | 0.1445831925 | | 8.3988218988 |
| **16** | 0.1448450774 | | 8.3909625986 |
| **17** | 0.1445550340 | | 8.3996677973 |
| **18** | 0.1444702818 | | 8.4022148002 |
| **19** | 0.1422753972 | | 8.4687019330 |
| **20** | 0.1409887311 | | 8.5081559796 |
| **21** | 0.1427164728 | | 8.4552589621 |
| **22** | 0.1394247700 | | 8.5566006313 |
| **23** | 0.1402588989 | | 8.5306957499 |
| **24** | 0.1422458944 | | 8.4696025976 |
| **25** | 0.1484008927 | | 8.2856348670 |
| **26** | 0.1419683808 | | 8.4780837107 |
| **27** | 0.1405193208 | | 8.5226395815 |
| **28** | 0.1408843184 | | 8.5113734477 |
| **29** | 0.1388518562 | | 8.5744831027 |
| **30** | 0.1399132032 | | 8.5414130057 |
| **31** | 0.1396536416 | | 8.5494773515 |
| **32** | 0.1418836441 | | 8.4806766587 |
| **33** | 0.1400689789 | | 8.5365803731 |
| **34** | 0.1414477473 | | 8.4940396476 |
| **35** | 0.1412689537 | | 8.4995327137 |
| **36** | 0.1439463747 | | 8.4179926853 |
| **37** | 0.1493940823 | | 8.2566660530 |
| **38** | 0.1411481506 | | 8.5032480770 |
| **39** | 0.1411207792 | | 8.5040903411 |
| **40** | 0.1398191484 | | 8.5443334739 |
| **41** | 0.1380541021 | | 8.5995068427 |
| **42** | 0.1407263690 | | 8.5162451787 |
| **43** | 0.1370799096 | | 8.6302619059 |
| **44** | 0.1376311098 | | 8.6128338807 |
| **45** | 0.1363850332 | | 8.6523328636 |
| **46** | 0.1385974922 | | 8.5824462770 |
| **47** | 0.1378229648 | | 8.6067841184 |
| **48** | 0.1395013139 | | 8.5542170205 |
| **49** | 0.1467015947 | | 8.3356516513 |
| **50** | 0.1376612742 | | 8.6118821504 |
| **Total** | 7.1263473838 | | 423.1114790931 |
| **Average** | 0.1425269477 | | 8.4622295819 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **8** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0015407618 | | 28.1226450998 |
| **2** | 0.0010711293 | | 29.7015809493 |
| **3** | 0.0010502989 | | 29.7868709708 |
| **4** | 0.0010183725 | | 29.9209333911 |
| **5** | 0.0011511335 | | 29.3887430602 |
| **6** | 0.0009962106 | | 30.0164884446 |
| **7** | 0.0010136845 | | 29.9409721391 |
| **8** | 0.0010191877 | | 29.9174580853 |
| **9** | 0.0011528768 | | 29.3821710399 |
| **10** | 0.0010158594 | | 29.9316640018 |
| **11** | 0.0010313309 | | 29.8660198894 |
| **12** | 0.0010096222 | | 29.9584110669 |
| **13** | 0.0012078817 | | 29.1797561150 |
| **14** | 0.0009817538 | | 30.0799740375 |
| **15** | 0.0009988086 | | 30.0051771105 |
| **16** | 0.0009862568 | | 30.0600999622 |
| **17** | 0.0011002464 | | 29.5851004343 |
| **18** | 0.0009707277 | | 30.1290258082 |
| **19** | 0.0010290904 | | 29.8754648938 |
| **20** | 0.0010374892 | | 29.8401643470 |
| **21** | 0.0011690750 | | 29.3215762074 |
| **22** | 0.0010289258 | | 29.8761593958 |
| **23** | 0.0010482538 | | 29.7953355479 |
| **24** | 0.0010290548 | | 29.8756151560 |
| **25** | 0.0012461460 | | 29.0443107590 |
| **26** | 0.0010116258 | | 29.9498012388 |
| **27** | 0.0010106487 | | 29.9539977828 |
| **28** | 0.0009966065 | | 30.0147630292 |
| **29** | 0.0011179126 | | 29.5159215431 |
| **30** | 0.0009920368 | | 30.0347220257 |
| **31** | 0.0010431689 | | 29.8164535636 |
| **32** | 0.0010348300 | | 29.8513097771 |
| **33** | 0.0011914199 | | 29.2393515727 |
| **34** | 0.0010375338 | | 29.8399774896 |
| **35** | 0.0010852344 | | 29.6447646664 |
| **36** | 0.0010588486 | | 29.7516613757 |
| **37** | 0.0013011802 | | 28.8566256473 |
| **38** | 0.0010419786 | | 29.8214118329 |
| **39** | 0.0010328837 | | 29.8594858544 |
| **40** | 0.0010037706 | | 29.9836553551 |
| **41** | 0.0011437295 | | 29.4167668749 |
| **42** | 0.0009950211 | | 30.0216772831 |
| **43** | 0.0010451905 | | 29.8080453512 |
| **44** | 0.0010397745 | | 29.8306081814 |
| **45** | 0.0011810732 | | 29.2772317125 |
| **46** | 0.0010432941 | | 29.8159324221 |
| **47** | 0.0010924440 | | 29.6160083583 |
| **48** | 0.0010611571 | | 29.7422030933 |
| **49** | 0.0012879933 | | 28.9008639471 |
| **50** | 0.0010449380 | | 29.8090947700 |
| **Total** | 0.0537984722 | | 1484.9740526612 |
| **Average** | 0.0010759694 | | 29.6994810532 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **9** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0004943131 | | 33.0599791512 |
| **2** | 0.0004177050 | | 33.7913036183 |
| **3** | 0.0004119830 | | 33.8512073256 |
| **4** | 0.0004108477 | | 33.8631912616 |
| **5** | 0.0004099682 | | 33.8724987959 |
| **6** | 0.0003882850 | | 34.1084941185 |
| **7** | 0.0003817029 | | 34.1827451011 |
| **8** | 0.0003842229 | | 34.1541672689 |
| **9** | 0.0003789503 | | 34.2141771449 |
| **10** | 0.0003933269 | | 34.0524633334 |
| **11** | 0.0003872985 | | 34.1195417667 |
| **12** | 0.0003950937 | | 34.0329993544 |
| **13** | 0.0004107054 | | 33.8646954331 |
| **14** | 0.0003893206 | | 34.0969260121 |
| **15** | 0.0003881874 | | 34.1095854169 |
| **16** | 0.0004029367 | | 33.9476314468 |
| **17** | 0.0003987207 | | 33.9933118400 |
| **18** | 0.0004054950 | | 33.9201453512 |
| **19** | 0.0003839934 | | 34.1567627838 |
| **20** | 0.0003962990 | | 34.0197706057 |
| **21** | 0.0004046922 | | 33.9287520438 |
| **22** | 0.0004149085 | | 33.8204767469 |
| **23** | 0.0004119580 | | 33.8514701185 |
| **24** | 0.0004069657 | | 33.9044223288 |
| **25** | 0.0004196126 | | 33.7715145175 |
| **26** | 0.0003910976 | | 34.0771487109 |
| **27** | 0.0003859734 | | 34.1344266287 |
| **28** | 0.0003863927 | | 34.1297106167 |
| **29** | 0.0003822863 | | 34.1761129050 |
| **30** | 0.0004039422 | | 33.9368072782 |
| **31** | 0.0003795142 | | 34.2077192409 |
| **32** | 0.0003898756 | | 34.0907399500 |
| **33** | 0.0003848120 | | 34.1475142415 |
| **34** | 0.0003864722 | | 34.1288169594 |
| **35** | 0.0003874032 | | 34.1183677735 |
| **36** | 0.0004069011 | | 33.9051116999 |
| **37** | 0.0004122613 | | 33.8482743695 |
| **38** | 0.0004105640 | | 33.8661913459 |
| **39** | 0.0003710026 | | 34.3062307689 |
| **40** | 0.0003803698 | | 34.1979394704 |
| **41** | 0.0003918474 | | 34.0688307367 |
| **42** | 0.0003929192 | | 34.0569672606 |
| **43** | 0.0003895064 | | 34.0948539413 |
| **44** | 0.0004052827 | | 33.9224188294 |
| **45** | 0.0004034810 | | 33.9417692525 |
| **46** | 0.0003946660 | | 34.0377024279 |
| **47** | 0.0003979197 | | 34.0020456896 |
| **48** | 0.0004030959 | | 33.9459163269 |
| **49** | 0.0004088035 | | 33.8848544111 |
| **50** | 0.0004050252 | | 33.9251794476 |
| **Total** | 0.0199389075 | | 1699.8398831683 |
| **Average** | 0.0003987782 | | 33.9967976634 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **10** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0001296338 | | 38.8728160692 |
| **2** | 0.0001303646 | | 38.8484046186 |
| **3** | 0.0001296497 | | 38.8722851376 |
| **4** | 0.0001305231 | | 38.8431250061 |
| **5** | 0.0001303743 | | 38.8480806812 |
| **6** | 0.0001317262 | | 38.8032775270 |
| **7** | 0.0001315299 | | 38.8097551746 |
| **8** | 0.0001316841 | | 38.8046660275 |
| **9** | 0.0001305115 | | 38.8435109501 |
| **10** | 0.0001318609 | | 38.7988385765 |
| **11** | 0.0001312281 | | 38.8197330666 |
| **12** | 0.0001315517 | | 38.8090350403 |
| **13** | 0.0001298297 | | 38.8662600820 |
| **14** | 0.0001315326 | | 38.8096663246 |
| **15** | 0.0001317571 | | 38.8022592997 |
| **16** | 0.0001308418 | | 38.8325355783 |
| **17** | 0.0001296143 | | 38.8734698435 |
| **18** | 0.0001324812 | | 38.7784579869 |
| **19** | 0.0001318975 | | 38.7976345329 |
| **20** | 0.0001326970 | | 38.7713889860 |
| **21** | 0.0001320976 | | 38.7910517291 |
| **22** | 0.0001325873 | | 38.7749806237 |
| **23** | 0.0001318009 | | 38.8008156056 |
| **24** | 0.0001324657 | | 38.7789643793 |
| **25** | 0.0001298127 | | 38.8668272472 |
| **26** | 0.0001333138 | | 38.7512505221 |
| **27** | 0.0001318196 | | 38.8002017330 |
| **28** | 0.0001340368 | | 38.7277598157 |
| **29** | 0.0001315340 | | 38.8096194516 |
| **30** | 0.0001338935 | | 38.7324045267 |
| **31** | 0.0001326248 | | 38.7737516847 |
| **32** | 0.0001339916 | | 38.7292244949 |
| **33** | 0.0001322478 | | 38.7861152648 |
| **34** | 0.0001346250 | | 38.7087424884 |
| **35** | 0.0001333630 | | 38.7496456826 |
| **36** | 0.0001337476 | | 38.7371394197 |
| **37** | 0.0001308418 | | 38.8325342449 |
| **38** | 0.0001329404 | | 38.7634298056 |
| **39** | 0.0001316597 | | 38.8054721206 |
| **40** | 0.0001326911 | | 38.7715817761 |
| **41** | 0.0001302891 | | 38.8509180031 |
| **42** | 0.0001320287 | | 38.7933179323 |
| **43** | 0.0001318793 | | 38.7982337552 |
| **44** | 0.0001318975 | | 38.7976354283 |
| **45** | 0.0001310067 | | 38.8270646685 |
| **46** | 0.0001327049 | | 38.7711290130 |
| **47** | 0.0001320070 | | 38.7940302394 |
| **48** | 0.0001328804 | | 38.7653904544 |
| **49** | 0.0001314871 | | 38.8111672227 |
| **50** | 0.0001316702 | | 38.8051238498 |
| **Total** | 0.0065912349 | | 1940.0107236924 |
| **Average** | 0.0001318247 | | 38.8002144738 |

# PROCESSING TIME

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **1** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 61.5901086330 | | 60.4579610825 |
| **2** | 61.6423759460 | | 60.2346377373 |
| **3** | 60.8903048038 | | 60.2503194809 |
| **4** | 60.7464838028 | | 60.2052886486 |
| **5** | 60.7399914265 | | 60.1866142750 |
| **6** | 60.7527637482 | | 60.9595277309 |
| **7** | 61.1708154678 | | 60.2436339855 |
| **8** | 62.1807472706 | | 60.2966954708 |
| **9** | 61.6029753685 | | 60.1843430996 |
| **10** | 62.3525626659 | | 60.2714130878 |
| **11** | 62.2458832264 | | 60.2420210838 |
| **12** | 61.8500821590 | | 60.1749286652 |
| **13** | 62.0601379871 | | 60.1857705116 |
| **14** | 64.8352246284 | | 60.2350740433 |
| **15** | 62.7944455147 | | 60.2052836418 |
| **16** | 60.8820977211 | | 60.2018284798 |
| **17** | 60.7148227692 | | 60.7906303406 |
| **18** | 61.3725414276 | | 60.6761236191 |
| **19** | 60.7299208641 | | 60.3957402706 |
| **20** | 60.8460760117 | | 60.2446551323 |
| **21** | 60.7727913857 | | 60.2620279789 |
| **22** | 61.7466943264 | | 60.2598032951 |
| **23** | 61.4111437798 | | 60.1684792042 |
| **24** | 61.4182696342 | | 60.2472074032 |
| **25** | 61.4216830730 | | 60.1767458916 |
| **26** | 61.4069480896 | | 60.2107629776 |
| **27** | 61.5447819233 | | 60.2103986740 |
| **28** | 62.1325197220 | | 60.2590084076 |
| **29** | 61.3927702904 | | 60.2090775967 |
| **30** | 61.8114705086 | | 60.8278942108 |
| **31** | 61.6328291893 | | 60.2795031071 |
| **32** | 61.3692648411 | | 60.6945707798 |
| **33** | 61.3736073971 | | 60.2168734074 |
| **34** | 62.2095439434 | | 60.1994848251 |
| **35** | 61.2975707054 | | 60.2038829327 |
| **36** | 61.3372621536 | | 60.2543272972 |
| **37** | 61.3803107738 | | 60.9436683655 |
| **38** | 61.3518128395 | | 60.2182500362 |
| **39** | 61.3397524357 | | 60.2185537815 |
| **40** | 62.2753415108 | | 60.2637383938 |
| **41** | 62.1246213913 | | 60.9628751278 |
| **42** | 61.3897252083 | | 61.0697615147 |
| **43** | 62.1740517616 | | 60.3215487003 |
| **44** | 62.0694999695 | | 60.2165045738 |
| **45** | 61.4022512436 | | 61.0417299271 |
| **46** | 62.2025611401 | | 60.2707021236 |
| **47** | 62.1671328545 | | 60.2499818802 |
| **48** | 62.1461808681 | | 60.2955236435 |
| **49** | 62.0652377605 | | 60.1701018810 |
| **50** | 62.1550838947 | | 60.2703311443 |
| **Total** | 3082.5230760574 | | 3017.8358094692 |
| **Average** | 61.6504615211 | | 60.3567161894 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **2** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 63.2419755459 | | 60.6454138756 |
| **2** | 62.5426609516 | | 60.1434426308 |
| **3** | 62.4931650162 | | 59.9304957390 |
| **4** | 62.9423677921 | | 60.1383848190 |
| **5** | 62.7682383060 | | 59.8914060593 |
| **6** | 62.4657320976 | | 60.1221072674 |
| **7** | 62.8780119419 | | 59.9600956440 |
| **8** | 63.9456105232 | | 60.1135654449 |
| **9** | 63.2185549736 | | 59.9674665928 |
| **10** | 64.3975985050 | | 60.1261761189 |
| **11** | 63.6447889805 | | 59.9352111816 |
| **12** | 63.5692212582 | | 60.2144958973 |
| **13** | 63.8899850845 | | 59.9168875217 |
| **14** | 63.5871281624 | | 60.1225590706 |
| **15** | 63.5218267441 | | 59.9664993286 |
| **16** | 62.3751442432 | | 60.1119403839 |
| **17** | 62.4189200401 | | 60.6891403198 |
| **18** | 63.5270671844 | | 60.1346235275 |
| **19** | 62.7624869347 | | 59.9535384178 |
| **20** | 63.0735206604 | | 60.1489038467 |
| **21** | 62.9139475822 | | 59.9939134121 |
| **22** | 63.3626856804 | | 60.3032753468 |
| **23** | 63.8114936352 | | 60.5634186268 |
| **24** | 63.4458823204 | | 60.5038282871 |
| **25** | 64.1420373917 | | 60.4292571545 |
| **26** | 63.6716756821 | | 60.7075884342 |
| **27** | 63.5369262695 | | 60.4412763119 |
| **28** | 63.6580371857 | | 60.1860561371 |
| **29** | 63.6063084602 | | 60.0883257389 |
| **30** | 63.5146100521 | | 60.9371016026 |
| **31** | 63.5313031673 | | 60.6355698109 |
| **32** | 63.4881293774 | | 60.9245622158 |
| **33** | 64.0903146267 | | 60.5909872055 |
| **34** | 63.5278475285 | | 60.7558467388 |
| **35** | 63.7965590954 | | 60.5103633404 |
| **36** | 63.5222296715 | | 60.7301084995 |
| **37** | 63.5174837112 | | 60.5295312405 |
| **38** | 63.7776453495 | | 60.1520292759 |
| **39** | 63.5134713650 | | 59.9864895344 |
| **40** | 63.5877995491 | | 60.1049952507 |
| **41** | 64.3746285439 | | 59.9696621895 |
| **42** | 63.4588105679 | | 60.7367331982 |
| **43** | 64.2164421082 | | 59.9751784801 |
| **44** | 64.1895470619 | | 60.1147408485 |
| **45** | 64.1499364376 | | 59.9745895863 |
| **46** | 63.5222296715 | | 60.1580641270 |
| **47** | 63.4960880280 | | 60.1387846470 |
| **48** | 63.5596048832 | | 60.1579723358 |
| **49** | 63.4647150040 | | 59.9147984982 |
| **50** | 63.4943816662 | | 60.1373143196 |
| **Total** | 3173.2067766190 | | 3012.5847160816 |
| **Average** | 63.4641355324 | | 60.2516943216 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **3** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 61.6227607727 | | 60.6864299774 |
| **2** | 60.7856900692 | | 61.0080044270 |
| **3** | 61.6700885296 | | 60.3085365295 |
| **4** | 60.7316503525 | | 60.4338877201 |
| **5** | 60.8123431206 | | 60.1211054325 |
| **6** | 61.6073310375 | | 60.2615032196 |
| **7** | 61.3240537643 | | 60.1151609421 |
| **8** | 63.2433655262 | | 60.3444509506 |
| **9** | 62.4389269352 | | 60.2259306908 |
| **10** | 62.0696423054 | | 60.9555766582 |
| **11** | 62.2215623856 | | 60.9296724796 |
| **12** | 62.4369914532 | | 60.9793367386 |
| **13** | 61.9999880791 | | 60.1538505554 |
| **14** | 61.7320363522 | | 60.2563331127 |
| **15** | 61.4474003315 | | 60.1290185452 |
| **16** | 61.6567571163 | | 60.1821193695 |
| **17** | 60.7836530209 | | 60.1579518318 |
| **18** | 61.2779464722 | | 60.1835589409 |
| **19** | 60.7688581944 | | 60.1532306671 |
| **20** | 60.6946947575 | | 60.1954050064 |
| **21** | 61.1135826111 | | 60.1352937222 |
| **22** | 61.6663155556 | | 60.1355321407 |
| **23** | 61.8135449886 | | 60.1578099728 |
| **24** | 61.3630845547 | | 60.1579923630 |
| **25** | 61.5114696026 | | 60.1173756123 |
| **26** | 61.4398143291 | | 60.1248698235 |
| **27** | 61.5137181282 | | 60.1592099667 |
| **28** | 61.4248931408 | | 60.1983857155 |
| **29** | 61.4662444592 | | 60.1853206158 |
| **30** | 61.3991570473 | | 60.2294383049 |
| **31** | 61.4835956097 | | 60.1495206356 |
| **32** | 61.5362491608 | | 60.1958131790 |
| **33** | 61.4870257378 | | 60.1388049126 |
| **34** | 61.4531705379 | | 60.1868672371 |
| **35** | 62.1198620796 | | 60.9199502468 |
| **36** | 61.4495661259 | | 60.9322721958 |
| **37** | 61.7881274223 | | 60.4077103138 |
| **38** | 61.9548256397 | | 60.1587102413 |
| **39** | 61.8494544029 | | 60.1561436653 |
| **40** | 61.7868974209 | | 60.1611948013 |
| **41** | 61.8327448368 | | 60.1818239689 |
| **42** | 61.8255643845 | | 60.1559507847 |
| **43** | 62.4221248627 | | 60.2061247826 |
| **44** | 64.7392876148 | | 60.1864030361 |
| **45** | 61.4860870838 | | 60.1324663162 |
| **46** | 62.1305892467 | | 60.1214456558 |
| **47** | 61.4666647911 | | 60.1461982727 |
| **48** | 62.0490031242 | | 60.1680488586 |
| **49** | 61.4691956043 | | 60.1487214565 |
| **50** | 61.4337084293 | | 60.1881380081 |
| **Total** | 3083.8013091087 | | 3014.4246006012 |
| **Average** | 61.6760261822 | | 60.2884920120 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **4** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 62.0894215107 | | 60.9972352982 |
| **2** | 61.5704321861 | | 60.3016071320 |
| **3** | 61.0422790051 | | 60.9884872437 |
| **4** | 61.0189239979 | | 60.3226943016 |
| **5** | 61.0237646103 | | 60.2293853760 |
| **6** | 60.9823319912 | | 60.2482907772 |
| **7** | 61.2733781338 | | 60.2359333038 |
| **8** | 62.1154265404 | | 60.3042225838 |
| **9** | 61.8031110764 | | 60.2339618206 |
| **10** | 62.2939236164 | | 61.0655651093 |
| **11** | 62.2616274357 | | 60.2982461452 |
| **12** | 62.1632390022 | | 60.7142133713 |
| **13** | 62.3535261154 | | 60.3122718334 |
| **14** | 61.9766778946 | | 60.3096868992 |
| **15** | 61.7220721245 | | 60.7427413464 |
| **16** | 60.9556417465 | | 61.0077116489 |
| **17** | 61.0712790489 | | 60.3305346966 |
| **18** | 62.3115212917 | | 60.2385380268 |
| **19** | 61.8313899040 | | 60.6632857323 |
| **20** | 60.9929754734 | | 60.5774519444 |
| **21** | 60.9352111816 | | 60.2743797302 |
| **22** | 61.6196010113 | | 60.2050180435 |
| **23** | 61.6898713112 | | 60.3246316910 |
| **24** | 62.5013868809 | | 60.2344441414 |
| **25** | 61.6530332565 | | 60.2681782246 |
| **26** | 62.4121880531 | | 60.4864020348 |
| **27** | 61.9291481972 | | 60.2017753124 |
| **28** | 61.7375416756 | | 60.2856612206 |
| **29** | 62.6403145790 | | 61.1535646915 |
| **30** | 62.3757185936 | | 60.2798352242 |
| **31** | 62.2176327705 | | 60.6678385735 |
| **32** | 62.7594778538 | | 60.3280632496 |
| **33** | 61.5913908482 | | 60.8949995041 |
| **34** | 61.7674467564 | | 60.3122575283 |
| **35** | 61.9755480289 | | 60.5162010193 |
| **36** | 61.7966177464 | | 60.9623291492 |
| **37** | 61.6729016304 | | 60.2121379375 |
| **38** | 61.7258722782 | | 60.2461705208 |
| **39** | 61.6666998863 | | 60.3643326759 |
| **40** | 61.6531825066 | | 61.0728559494 |
| **41** | 62.2756032944 | | 60.3116042614 |
| **42** | 61.6095957756 | | 60.9518780708 |
| **43** | 61.6885201931 | | 61.0368826389 |
| **44** | 61.7030236721 | | 61.0899121761 |
| **45** | 63.8003435135 | | 61.0368361473 |
| **46** | 62.5650014877 | | 60.2101869583 |
| **47** | 62.3885982037 | | 60.2568249702 |
| **48** | 62.3243732452 | | 60.2395222187 |
| **49** | 61.6297447681 | | 60.2594847679 |
| **50** | 61.6412775517 | | 61.0731053352 |
| **Total** | 3092.7998094559 | | 3025.8793785572 |
| **Average** | 61.8559961891 | | 60.5175875711 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **5** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 60.7480890751 | | 60.6207075119 |
| **2** | 60.6438019276 | | 60.2506594658 |
| **3** | 61.3661510944 | | 60.2846326828 |
| **4** | 61.6578674316 | | 60.1686403751 |
| **5** | 61.6988615990 | | 60.9302637577 |
| **6** | 61.6720211506 | | 60.9841406345 |
| **7** | 61.9776120186 | | 60.1467304230 |
| **8** | 62.0199298859 | | 60.2677974701 |
| **9** | 61.4933531284 | | 60.2343184948 |
| **10** | 61.9927451611 | | 60.1932938099 |
| **11** | 62.1928281784 | | 60.1673226357 |
| **12** | 61.6805908680 | | 60.2137238979 |
| **13** | 61.9247448444 | | 60.8780140877 |
| **14** | 61.7089500427 | | 60.8855526447 |
| **15** | 61.3523738384 | | 60.9130823612 |
| **16** | 60.6547112465 | | 60.8795819283 |
| **17** | 60.6676199436 | | 60.3140053749 |
| **18** | 61.1901910305 | | 60.1610429287 |
| **19** | 60.6038053036 | | 60.8421313763 |
| **20** | 60.5860023499 | | 60.8521981239 |
| **21** | 61.5770661831 | | 60.8397271633 |
| **22** | 61.5625305176 | | 60.9622783661 |
| **23** | 61.3368127346 | | 60.2083239555 |
| **24** | 61.3133559227 | | 60.7595829964 |
| **25** | 61.3249430656 | | 60.1579141617 |
| **26** | 61.2795290947 | | 60.1858496666 |
| **27** | 61.2924811840 | | 60.1724689007 |
| **28** | 61.3481047153 | | 60.2432034016 |
| **29** | 61.3509242535 | | 60.1745724678 |
| **30** | 61.8972589970 | | 60.1865389347 |
| **31** | 61.3558905125 | | 60.1668703556 |
| **32** | 61.3874599934 | | 60.2050917149 |
| **33** | 61.3256452084 | | 60.9307854176 |
| **34** | 61.3500163555 | | 60.8391442299 |
| **35** | 61.3638453484 | | 60.1321287155 |
| **36** | 61.3578245640 | | 60.5487065315 |
| **37** | 61.3979961872 | | 60.6378810406 |
| **38** | 61.3284165859 | | 60.9212915897 |
| **39** | 62.3478727341 | | 60.1630570889 |
| **40** | 61.5459239483 | | 60.9007289410 |
| **41** | 62.2206718922 | | 60.1308298111 |
| **42** | 61.3247539997 | | 60.2241656780 |
| **43** | 61.8942179680 | | 60.2584056854 |
| **44** | 61.3483603001 | | 60.9492363930 |
| **45** | 61.3522281647 | | 60.1460022926 |
| **46** | 61.3399939537 | | 60.2018578053 |
| **47** | 62.2796742916 | | 60.1456985474 |
| **48** | 62.3670158386 | | 60.2251811028 |
| **49** | 62.3717045784 | | 60.9028007984 |
| **50** | 61.3468513489 | | 60.9113771915 |
| **Total** | 3074.7216205597 | | 3023.6195409298 |
| **Average** | 61.4944324112 | | 60.4723908186 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **6** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 61.7087647915 | | 60.5488698483 |
| **2** | 63.3829772472 | | 61.0147552490 |
| **3** | 61.3813242912 | | 60.9861292839 |
| **4** | 61.3246350288 | | 60.2357490063 |
| **5** | 61.3253321648 | | 60.2031645775 |
| **6** | 61.2455372810 | | 60.1692533493 |
| **7** | 62.2510499954 | | 60.8877995014 |
| **8** | 62.1827692986 | | 60.3040640354 |
| **9** | 61.7833547592 | | 60.2487974167 |
| **10** | 62.6684162617 | | 60.3096435070 |
| **11** | 62.7470865250 | | 60.2539708614 |
| **12** | 62.0547440052 | | 60.2627422810 |
| **13** | 62.1424384117 | | 60.2165582180 |
| **14** | 61.9088664055 | | 60.2303297520 |
| **15** | 61.4139082432 | | 60.7769451141 |
| **16** | 60.7883958817 | | 60.2398464680 |
| **17** | 60.7895176411 | | 60.1966285706 |
| **18** | 61.2870666981 | | 60.5339906216 |
| **19** | 60.7811250687 | | 60.6799829006 |
| **20** | 60.8207218647 | | 60.3131170273 |
| **21** | 60.7946841717 | | 60.2564511299 |
| **22** | 61.6405947208 | | 60.3296816349 |
| **23** | 61.5001931190 | | 60.3181970119 |
| **24** | 61.7181515694 | | 60.3991572857 |
| **25** | 61.7963461876 | | 60.3427097797 |
| **26** | 61.9464838505 | | 60.4225664139 |
| **27** | 61.7869141102 | | 60.3297064304 |
| **28** | 61.9032664299 | | 60.5737297535 |
| **29** | 61.9821400642 | | 60.6270282269 |
| **30** | 61.4891343117 | | 61.2160515785 |
| **31** | 61.5066041946 | | 61.1252160072 |
| **32** | 61.5346286297 | | 61.4348738194 |
| **33** | 61.4768805504 | | 61.1889834404 |
| **34** | 61.4018473625 | | 61.2136096954 |
| **35** | 61.5691800117 | | 60.9693851471 |
| **36** | 62.4569008350 | | 61.0253398418 |
| **37** | 62.2446217537 | | 61.1047625542 |
| **38** | 61.4610791206 | | 60.9175567627 |
| **39** | 61.9687402248 | | 61.0332536697 |
| **40** | 61.7624628544 | | 61.0152788162 |
| **41** | 64.9544579983 | | 61.1888256073 |
| **42** | 61.8965396881 | | 60.9687273502 |
| **43** | 62.1170623302 | | 61.0238819122 |
| **44** | 61.3629097939 | | 60.4918687344 |
| **45** | 61.5158224106 | | 60.2481267452 |
| **46** | 61.4788813591 | | 60.2801413536 |
| **47** | 61.3667292595 | | 60.2345371246 |
| **48** | 62.2745511532 | | 60.2297921181 |
| **49** | 62.2573983669 | | 60.2454056740 |
| **50** | 61.4546339512 | | 60.1883392334 |
| **Total** | 3088.6078722477 | | 3029.5555224419 |
| **Average** | 61.7721574450 | | 60.5911104488 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **7** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 60.8184981346 | | 60.3733239174 |
| **2** | 60.6942718029 | | 60.1390194893 |
| **3** | 61.6210632324 | | 60.2308025360 |
| **4** | 60.7181036472 | | 60.3049342632 |
| **5** | 60.8474912643 | | 60.2640330791 |
| **6** | 60.7516579628 | | 60.3138339520 |
| **7** | 61.6721696854 | | 60.4682006836 |
| **8** | 62.2014932632 | | 60.3490600586 |
| **9** | 61.5782868862 | | 60.2541980743 |
| **10** | 62.3866703510 | | 60.5280618668 |
| **11** | 62.1568644047 | | 60.9146082401 |
| **12** | 61.7839891911 | | 60.8137917519 |
| **13** | 62.0594370365 | | 60.7188000679 |
| **14** | 62.5208153725 | | 62.9982316494 |
| **15** | 62.1870677471 | | 60.8026063442 |
| **16** | 61.3931348324 | | 60.7251780033 |
| **17** | 61.6376702785 | | 60.5886857510 |
| **18** | 61.9660625458 | | 60.7634577751 |
| **19** | 61.4022359848 | | 60.2901806831 |
| **20** | 61.4190969467 | | 60.6289277077 |
| **21** | 60.8287656307 | | 60.2404286861 |
| **22** | 61.6346442699 | | 60.3287496567 |
| **23** | 61.5011379719 | | 60.2480895519 |
| **24** | 61.4137670994 | | 61.0450806618 |
| **25** | 62.4579606056 | | 60.8255763054 |
| **26** | 62.3907394409 | | 60.3210895061 |
| **27** | 62.3698692322 | | 60.3482434750 |
| **28** | 61.4181787968 | | 60.3224322796 |
| **29** | 62.2206385136 | | 60.3359274864 |
| **30** | 61.3931748867 | | 60.3659076691 |
| **31** | 61.4008266926 | | 60.2438781261 |
| **32** | 61.4015240669 | | 60.4197363853 |
| **33** | 61.3755967617 | | 60.1504180431 |
| **34** | 61.3744893074 | | 60.3144164085 |
| **35** | 61.3892815113 | | 60.6748089790 |
| **36** | 61.3798456192 | | 60.2677710056 |
| **37** | 61.3785848618 | | 60.8310475349 |
| **38** | 61.4769687653 | | 62.1571304798 |
| **39** | 62.1070446968 | | 62.3713700771 |
| **40** | 61.8327860832 | | 62.0454444885 |
| **41** | 61.9156994820 | | 60.2636079788 |
| **42** | 61.7397825718 | | 60.9452965260 |
| **43** | 61.7979001999 | | 61.0112292767 |
| **44** | 61.7540361881 | | 60.9389219284 |
| **45** | 62.9920282364 | | 60.9458229542 |
| **46** | 61.3174839020 | | 61.0126647949 |
| **47** | 61.3376975060 | | 61.0012698174 |
| **48** | 61.3300428391 | | 60.2228922844 |
| **49** | 61.3450598717 | | 60.2821359634 |
| **50** | 61.3533055782 | | 60.9714336395 |
| **Total** | 3081.4449417591 | | 3033.9227578640 |
| **Average** | 61.6288988352 | | 60.6784551573 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **8** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 60.8591783047 | | 60.6944658756 |
| **2** | 60.7729821205 | | 60.6135461330 |
| **3** | 60.7243442535 | | 60.5726082325 |
| **4** | 60.6942365170 | | 60.9733786583 |
| **5** | 60.8056147099 | | 60.2243750095 |
| **6** | 60.7579669952 | | 60.1870615482 |
| **7** | 61.3119850159 | | 60.7989017963 |
| **8** | 62.4444558620 | | 60.1840612888 |
| **9** | 61.7791666985 | | 60.1440494061 |
| **10** | 62.1900575161 | | 60.2085573673 |
| **11** | 62.2470569611 | | 60.9054043293 |
| **12** | 61.9206225872 | | 60.1646559238 |
| **13** | 62.1138556004 | | 60.1888823509 |
| **14** | 62.5578501225 | | 60.1756823063 |
| **15** | 62.1735744476 | | 60.1180555820 |
| **16** | 61.6499860287 | | 60.1110718250 |
| **17** | 61.5418016911 | | 60.1682236195 |
| **18** | 61.3579840660 | | 60.1521928310 |
| **19** | 61.6342346668 | | 60.6325650215 |
| **20** | 61.6658861637 | | 60.1814942360 |
| **21** | 61.0216035843 | | 60.8750178814 |
| **22** | 62.6865589619 | | 60.1880578995 |
| **23** | 61.9546589851 | | 60.6617658138 |
| **24** | 61.4102241993 | | 60.1601321697 |
| **25** | 61.8773698807 | | 60.8473114967 |
| **26** | 62.2353107929 | | 60.3700342178 |
| **27** | 62.1419799328 | | 60.1288087368 |
| **28** | 62.0485944748 | | 60.1332821846 |
| **29** | 62.1217718124 | | 60.1382694244 |
| **30** | 62.1586008072 | | 60.0912821293 |
| **31** | 62.1889021397 | | 60.1363258362 |
| **32** | 62.1743025780 | | 60.1335773468 |
| **33** | 62.0787851810 | | 60.1370744705 |
| **34** | 61.4499175549 | | 60.1724057198 |
| **35** | 61.4362726212 | | 60.1976289749 |
| **36** | 61.4064133167 | | 60.1068925858 |
| **37** | 62.1665935516 | | 60.1558272839 |
| **38** | 61.3466231823 | | 60.1518261433 |
| **39** | 62.2170922756 | | 60.1415774822 |
| **40** | 61.7715551853 | | 60.1343533993 |
| **41** | 62.2403922081 | | 60.1481153965 |
| **42** | 61.3526396751 | | 60.1329143047 |
| **43** | 61.3435256481 | | 60.1106810570 |
| **44** | 61.3626129627 | | 60.1239244938 |
| **45** | 61.3851881027 | | 60.1095893383 |
| **46** | 62.2351994514 | | 60.1498956680 |
| **47** | 61.3403644562 | | 60.1310009956 |
| **48** | 61.8980183601 | | 60.1408259869 |
| **49** | 61.3626320362 | | 60.1312613487 |
| **50** | 61.3451457024 | | 60.1254663467 |
| **Total** | 3084.9616899490 | | 3013.7643594742 |
| **Average** | 61.6992337990 | | 60.2752871895 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **9** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 60.7776529789 | | 60.4964556694 |
| **2** | 60.6411068439 | | 60.2494130135 |
| **3** | 60.7474095821 | | 60.2371249199 |
| **4** | 60.6667163372 | | 60.2557959557 |
| **5** | 60.7389843464 | | 60.1303570271 |
| **6** | 60.7040042877 | | 60.1820201874 |
| **7** | 61.5807359219 | | 60.2129516602 |
| **8** | 62.2728412151 | | 60.1587455273 |
| **9** | 61.5196785927 | | 60.1808712482 |
| **10** | 62.0283074379 | | 60.3839051723 |
| **11** | 62.1436412334 | | 60.9405336380 |
| **12** | 61.8669159412 | | 60.1256520748 |
| **13** | 61.9468901157 | | 60.1689500809 |
| **14** | 61.9808807373 | | 60.3689584732 |
| **15** | 61.4742736816 | | 60.4312772751 |
| **16** | 60.6947658062 | | 60.4866747856 |
| **17** | 60.6897082329 | | 60.1673517227 |
| **18** | 61.2477364540 | | 60.1791553497 |
| **19** | 60.7091481686 | | 60.1943075657 |
| **20** | 60.7106068134 | | 60.9698464870 |
| **21** | 61.2963356972 | | 60.2603914738 |
| **22** | 61.6866211891 | | 60.2439694405 |
| **23** | 61.4349098206 | | 60.2654840946 |
| **24** | 62.2330613136 | | 60.2139573097 |
| **25** | 61.4882502556 | | 60.3217535019 |
| **26** | 61.3971188068 | | 60.2617542744 |
| **27** | 62.1703560352 | | 60.2142674923 |
| **28** | 61.3675255775 | | 60.2388796806 |
| **29** | 61.4580633640 | | 60.2190504074 |
| **30** | 61.3608579636 | | 60.1730535030 |
| **31** | 61.3802704811 | | 60.1965606213 |
| **32** | 61.4375295639 | | 60.9606454372 |
| **33** | 61.3978283405 | | 61.0429844856 |
| **34** | 61.4057404995 | | 60.2456367016 |
| **35** | 61.3974571228 | | 60.1798026562 |
| **36** | 62.3505117893 | | 60.2433261871 |
| **37** | 61.4005663395 | | 60.1651902199 |
| **38** | 61.3560822010 | | 60.5403525829 |
| **39** | 61.3877470493 | | 60.2008450031 |
| **40** | 61.3663504124 | | 60.1641178131 |
| **41** | 62.2031564713 | | 60.6864585876 |
| **42** | 62.2335429192 | | 60.7846109867 |
| **43** | 63.0050604343 | | 60.1634216309 |
| **44** | 61.4611284733 | | 60.2416007519 |
| **45** | 61.3976869583 | | 60.2221052647 |
| **46** | 61.4534940720 | | 60.7454080582 |
| **47** | 61.4341208935 | | 60.2071337700 |
| **48** | 61.5247728825 | | 60.9197709560 |
| **49** | 61.4133360386 | | 60.2524430752 |
| **50** | 61.3470733166 | | 60.1859390736 |
| **Total** | 3073.3885610104 | | 3017.2812628746 |
| **Average** | 61.4677712202 | | 60.3456252575 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **10** | |
| **Resolution** | | **2160p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 61.6949894428 | | 60.8026993275 |
| **2** | 61.8659110069 | | 60.7288279533 |
| **3** | 61.7582378387 | | 60.8987197876 |
| **4** | 60.8387398720 | | 60.6644871235 |
| **5** | 61.4045417309 | | 60.1490335464 |
| **6** | 60.8072652817 | | 60.6460704803 |
| **7** | 61.9232971668 | | 60.6508910656 |
| **8** | 63.1273329258 | | 60.5516431332 |
| **9** | 62.5485429764 | | 60.5603322983 |
| **10** | 62.3352398872 | | 60.5707507133 |
| **11** | 62.3182823658 | | 60.7187142372 |
| **12** | 62.3916089535 | | 60.5022835732 |
| **13** | 62.5660893917 | | 60.8781914711 |
| **14** | 62.3317234516 | | 60.2345454693 |
| **15** | 61.5166192055 | | 60.1591420174 |
| **16** | 60.8931999207 | | 60.2387452126 |
| **17** | 60.8205733299 | | 60.2023615837 |
| **18** | 61.3327443600 | | 60.2138509750 |
| **19** | 60.8239729404 | | 60.2310106754 |
| **20** | 60.8057913780 | | 60.3162572384 |
| **21** | 60.7846271992 | | 60.1695399284 |
| **22** | 61.9071059227 | | 60.7315888405 |
| **23** | 61.8344717026 | | 60.7647564411 |
| **24** | 61.8301997185 | | 61.2064802647 |
| **25** | 62.7233936787 | | 60.2101318836 |
| **26** | 62.8896644115 | | 60.7288937569 |
| **27** | 61.8562483788 | | 60.1989698410 |
| **28** | 62.8456406593 | | 60.2362568378 |
| **29** | 61.8181567192 | | 60.1384773254 |
| **30** | 61.9675085545 | | 60.1534016132 |
| **31** | 61.8660619259 | | 60.1811265945 |
| **32** | 61.8871011734 | | 60.1838858128 |
| **33** | 62.5126929283 | | 60.1823427677 |
| **34** | 62.0239183903 | | 60.3932507038 |
| **35** | 61.8381450176 | | 60.8153564930 |
| **36** | 61.8316113949 | | 60.8272380829 |
| **37** | 61.8681328297 | | 60.1963739395 |
| **38** | 62.7302858829 | | 60.1301825047 |
| **39** | 61.8412034512 | | 60.8357908726 |
| **40** | 61.8436615467 | | 60.8205983639 |
| **41** | 62.6510758400 | | 60.1990811825 |
| **42** | 61.9192435741 | | 60.1750507355 |
| **43** | 62.1402642727 | | 60.4676449299 |
| **44** | 61.8333365917 | | 60.8794667721 |
| **45** | 61.8624243736 | | 60.1429104805 |
| **46** | 61.8456881046 | | 60.1696078777 |
| **47** | 61.8585591316 | | 60.1961936951 |
| **48** | 61.9783756733 | | 60.2045164108 |
| **49** | 62.2686114311 | | 60.1477215290 |
| **50** | 62.1806941032 | | 60.1906955242 |
| **Total** | 3095.3428080082 | | 3021.7960898876 |
| **Average** | 61.9068561602 | | 60.4359217978 |