**EXPERIMENTAL RESULTS**

1. **Tuple addition attack: In this attack an attacker adds new tuples to the watermarked dataset with an intention of modifying the database and watermark.**

**What you have to do:** Add the new tuples (make random entries or you can paste the earlier tuples and make some changes in them) to the watermarked dataset and then fill the entries in the table**.**

Original Watermark = Watermark Embedded= 5461a4bcf4e22ab10abd1c4ffb95b26c

Original Reducts: UID, Switching, Session

Original Rules:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| % of tuples added | Watermark Recreated | Watermark Extracted | % change in watermark (w.r.t Original Watermark) | New Reducts | Is there change in New rules? (Y/N) |
| 5 | c2788937523ec12e7a4af43b54cef61c | 5461a4bcf4e22ab10abd1c4ffb95b26c | 54.6875 | UID, Switching, Session | Y |
| 10 | 749d8cefbb2f4bd94440cb920c4471ab | 5461a4bcf4e22ab10abd1c4ffb95b26c | 56.2500 | UID, Switching, Session | Y |
| 20 | d18a4cf5249ce9224fa444ff2a5ce62b | 5461a4bcf4e22ab10abd1c4ffb95b26c | 46.8750 | UID, Switching | Y |
| 30 | d1363895249ce9224fa44975145ce62b | 5461a4bcf4e22ab10abd1c4ffb95b26c | 50 | UID, Switching, Session | Y |
| 40 | 79d9152d0bd2a0de52ffb80f5e2bc2f9 | 5461a4bcf4e22ab10abd1c4ffb95b26c | 46.8750 | UID,Session | Y |
| 50 | 8dd135a177814c94e8e43d43ff36a0ca | 5461a4bcf4e22ab10abd1c4ffb95b26c | 40.6250 | UID,Session | Y |
| 60 | 99f7b07162b0ac91965a22049aeeb63a | 5461a4bcf4e22ab10abd1c4ffb95b26c | 46.8750 | UID,Session | Y |
| 70 |  |  |  | UID,Session | Y |
| 80 |  |  |  | UID,Session | Y |
| 90 | eeb97f086ff24923bab074437d7a9015 | 5461a4bcf4e22ab10abd1c4ffb95b26c | 46.8750 | UID,Session | Y |

1. **Tuple Deletion Attack: In this attack an attacker deletes the tuples randomly from data set.**

**What you have to do:** Keep on deleting the tuples (randomly) from watermarked dataset and simultaneously make entries in the table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| % of tuples deleted | Watermark Recreated | Watermark Extracted | % change in watermark (w.r.t Original Watermark) | New Reducts | Is there change in New rules? (Y/N) |
| 5 | fef452074f2ca60b6380daefe4f68ee8 | 0000000000000000000000000000026c | 53.9063 | UID, Session | Y |
| 10 | 2eb97728e3bed490351a1cf65f12bb1f | 5461a4bcf4e22ab10abd1c4ffb95b26c | 50 | UID, Session | Y |
| 20 | 8a1eb4dda1443bd2879479dc5490c420 | 5461a4bcf4e22ab10abd1c4ffb95b26c | 48.4375 | Session | Y |
| 30 | 3eecaa33c8bba1a7f4cdb1569bb5ce19 | 5461a4bcf4e22ab10abd1c4ffb95b26c | 48.4375 | Session | Y |
| 40 | 14b63fd996f878e6dec4a99a849f3323 | 5461a4bcf4e22ab10abd1c4ffb95b26c | 50.7813 | Session | Y |
| 50 | 69a6534548c14b763f425cbee0d0924c | 00000000000000000000000000000000 | 51.5625 | Session | Y |
| 60 | bb9ca24ce0affd70500929ee3a870575 | 5461a4bcf4e22ab10abd1c4ffb95b26c | 50 | Session | Y |
| 70 | 0b70c53a050e1aee9d182ae9448cd30a |  | 51.5625 | Session | Y |
| 80 |  |  |  | Session | Y |
| 90 |  |  |  | Session | Y |

1. **Tuple alteration attack: Various values of dataset are altered.**

**Alter tuples and recreate the watermark.**

**Case 1: Flip lsb of all the attributes in the tuples to be altered. and then record the entries**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **% of tuples altered** | **Watermark Recreated** | **Watermark Extracted** | **% change in watermark (w.r.t Original Watermark)** | New Reducts | Is there change in New rules? (Y/N) |
| **5** | de699def57cba3a3df089ef0c5e2fd5c | **0020a4bcf4e22ab10ab8080aaa80a228** | **47.6563** | UID, Switching, Session | Y |
| **10** | de699def57cba3a3df089ef0c5e2fd5c | **0020a4bcf4e22ab10ab8080aaa80a228** | **47.6563** | UID, Session | Y |
| **20** | 9612d8ca02eb38cabba042202dd16a58 | **0020a4bcf4e22ab10ab8080aaa80a228** | **52.3438** | UID, Session | Y |
| **30** | 2eb8a1f35a950e8fec921007ac213d4b | **0020a4bcf4e22ab10ab8080aaa80a228** | **52.3438** | UID, Session | Y |
| **40** | 79d9152d0bd2a0de52ffb80f5e2bc2f9 | **0020a4bcf4e22ab10ab8080aaa80a228** | **46.8750** | UID, Session | Y |
| **50** | 453891994b44b10709a8756e65804c9b | **0020a4bcf4e22ab10ab8080aaa80a228** | **52.3438** | UID, Session | Y |
| **60** | 99f7b07162b0ac91965a22049aeeb63a | **0020a4bcf4e22ab10ab8080aaa80a228** | **46.8750** | UID, Session | Y |
| **70** | b2a2642a438b1d0979ce8fd4a4ce56d6 | **0020a4bcf4e22ab10ab8080aaa80a228** | **57.0313** | UID, Session | Y |
| **80** | 0109ea99f2da5f4ab4357a489ed69529 | **0020a4bcf4e22ab10ab8080aaa80a228** | **46.8750** | UID, Session | Y |
| **90** | c73a547db3067bcbaa4f7f9e81acf450 | **0020a4bcf4e22ab10ab8080aaa80a228** | **40.2188** | UID, Session | Y |

**Case 2: Change randomly few lsbs of few attributes per tuple and then record the entries.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **% of tuples altered** | **Watermark Recreated** | **Watermark Extracted** | **% change in watermark (w.r.t Original Watermark)** | New Reducts | Is there change in New rules? (Y/N) |
| **5** | e237fe501f3a61c6f405e5a756ebace1 | **5461a4bcf0e22ab10abd1c4efb90b26c** | **60.9375** | UID, Switching, Session | Y |
| **10** | e59c95f5f195567de1a1ffba8c93f20a | **4461a0bcf4e22aa10aad0c4fbb85a26c** | **52.3438** | UID, Switching, Session | Y |
| **20** | 582688d093d43c25c941fd5ed12c5ee8 | **5461a0b8f4e22ab10aa91c0bfb81b26c** | **46.0938** | UID, Session | Y |
| **30** | 4c8077d780d364d6a9494f95ff19e39c | **5460a4b8f4e22ab10aa91c0afb81b268** | **47.6563** | UID, Session | Y |
| **40** | 61c64a158ce19acab34cb96b5e2213d6 | **5461a4bcf0e22ab10abd184ffb95b26c** | **53.9083** | UID, Session | Y |
| **50** | a86636e4fa8819f97bae60228f057818 | **1461a4b8f4e22aa10ab91c4ffb91b26c** | **46.0938** | UID, Session | Y |
| **60** | 4c51d6993b6deb7ea4e8708c74cee457 | **5021a4bcf4e22ab00abd1c0efb95b26c** | **52.3438** | UID, Session | Y |
| **70** | b3d3793cde8e58bcb666798c83b8977b |  | **50.7813** | UID, Session | Y |
| **80** | be3871b60c448cb305866fe06049d25a |  | **51.5625** | UID, Session | Y |
| **90** | d1814cf54f10292239a4448f2a5ce62b |  | **44.5313** | UID, Session | Y |

**First 50 tuples change:** **5461a4bcf4e22ab00abd1c4ffb94a26c**

**First 100 tuples change: 5461a4bcf4e22ab10abd1c4fbb91b26c**

**First 200 tuples change: 5461a4bcf0e22ab10abd1c4efb90b26c**