1. GSC
   1. Depth = 2, hidden dim = 5, Attention = False, Dropout = 0

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| **no** | gsc |
| Epoch [9/20], train\_loss: 0.2015, train\_precision: 0.0911, train\_recall: 0.0650, train\_f1\_score: 0.0759  val\_loss: 0.1917, val\_precision: 0.0598, val\_recall: 0.0453, val\_f1\_score: 0.0516  Epoch [10/20], train\_loss: 0.1986, train\_precision: 0.1056, train\_recall: 0.0670, train\_f1\_score: 0.0820  val\_loss: 0.1960, val\_precision: 0.0466, val\_recall: 0.0447, val\_f1\_score: 0.0456  Epoch [11/20], train\_loss: 0.1978, train\_precision: 0.1127, train\_recall: 0.0644, train\_f1\_score: 0.0820  val\_loss: 0.1970, val\_precision: 0.0563, val\_recall: 0.0466, val\_f1\_score: 0.0510  Epoch [12/20], train\_loss: 0.1942, train\_precision: 0.1024, train\_recall: 0.0667, train\_f1\_score: 0.0808  val\_loss: 0.1980, val\_precision: 0.0550, val\_recall: 0.0501, val\_f1\_score: 0.0525  Epoch [13/20], train\_loss: 0.1895, train\_precision: 0.1212, train\_recall: 0.0706, train\_f1\_score: 0.0892  val\_loss: 0.1931, val\_precision: 0.0558, val\_recall: 0.0501, val\_f1\_score: 0.0528  Epoch [14/20], train\_loss: 0.1867, train\_precision: 0.1424, train\_recall: 0.0720, train\_f1\_score: 0.0957  val\_loss: 0.1973, val\_precision: 0.0551, val\_recall: 0.0556, val\_f1\_score: 0.0553 | Epoch [10/20], train\_loss: 0.2038, train\_precision: 0.0461, train\_recall: 0.0498, train\_f1\_score: 0.0479  val\_loss: 0.1859, val\_precision: 0.0340, val\_recall: 0.0419, val\_f1\_score: 0.0376  Epoch [11/20], train\_loss: 0.2026, train\_precision: 0.0579, train\_recall: 0.0495, train\_f1\_score: 0.0534  val\_loss: 0.1878, val\_precision: 0.0338, val\_recall: 0.0423, val\_f1\_score: 0.0376  Epoch [12/20], train\_loss: 0.1997, train\_precision: 0.0550, train\_recall: 0.0464, train\_f1\_score: 0.0503  val\_loss: 0.1909, val\_precision: 0.0369, val\_recall: 0.0367, val\_f1\_score: 0.0368  Epoch [13/20], train\_loss: 0.1955, train\_precision: 0.0499, train\_recall: 0.0485, train\_f1\_score: 0.0492  ...  Epoch [16/20], train\_loss: 0.1884, train\_precision: 0.0562, train\_recall: 0.0491, train\_f1\_score: 0.0524  val\_loss: 0.1889, val\_precision: 0.0352, val\_recall: 0.0443, val\_f1\_score: 0.0392  Epoch [17/20], train\_loss: 0.1865, train\_precision: 0.0766, train\_recall: 0.0481, train\_f1\_score: 0.0591  val\_loss: 0.1874, val\_precision: 0.0365, val\_recall: 0.0457, val\_f1\_score: 0.0406 |

* 1. Depth = 3, hidden dim = 5, Attention = False, Dropout = 0

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| no | gsc |
| Epoch [9/20], train\_loss: 0.2221, train\_precision: 0.1073, train\_recall: 0.1097, train\_f1\_score: 0.1085  val\_loss: 0.2126, val\_precision: 0.0587, val\_recall: 0.0810, val\_f1\_score: 0.0681  Epoch [10/20], train\_loss: 0.2164, train\_precision: 0.1313, train\_recall: 0.1120, train\_f1\_score: 0.1209  val\_loss: 0.2131, val\_precision: 0.0552, val\_recall: 0.0753, val\_f1\_score: 0.0637  Epoch [11/20], train\_loss: 0.2115, train\_precision: 0.1135, train\_recall: 0.1086, train\_f1\_score: 0.1110  val\_loss: 0.2127, val\_precision: 0.0518, val\_recall: 0.0647, val\_f1\_score: 0.0575  Epoch [12/20], train\_loss: 0.2069, train\_precision: 0.1208, train\_recall: 0.1105, train\_f1\_score: 0.1154  val\_loss: 0.2124, val\_precision: 0.0543, val\_recall: 0.0717, val\_f1\_score: 0.0618  Epoch [13/20], train\_loss: 0.2004, train\_precision: 0.1770, train\_recall: 0.1217, train\_f1\_score: 0.1442  ...  Epoch [17/20], train\_loss: 0.1880, train\_precision: 0.1778, train\_recall: 0.1312, train\_f1\_score: 0.1510  val\_loss: 0.2129, val\_precision: 0.0540, val\_recall: 0.0730, val\_f1\_score: 0.0621  Epoch [18/20], train\_loss: 0.1867, train\_precision: 0.1662, train\_recall: 0.1321, train\_f1\_score: 0.1472  val\_loss: 0.2119, val\_precision: 0.0531, val\_recall: 0.0728, val\_f1\_score: 0.0614 | Epoch [9/20], train\_loss: 0.1128, train\_precision: 0.0977, train\_recall: 0.0560, train\_f1\_score: 0.0712  val\_loss: 0.1167, val\_precision: 0.0784, val\_recall: 0.0519, val\_f1\_score: 0.0625  Epoch [10/20], train\_loss: 0.1113, train\_precision: 0.1201, train\_recall: 0.0571, train\_f1\_score: 0.0774  val\_loss: 0.1167, val\_precision: 0.0785, val\_recall: 0.0553, val\_f1\_score: 0.0649  Epoch [11/20], train\_loss: 0.1100, train\_precision: 0.1114, train\_recall: 0.0579, train\_f1\_score: 0.0762  val\_loss: 0.1171, val\_precision: 0.0832, val\_recall: 0.0545, val\_f1\_score: 0.0658  Epoch [12/20], train\_loss: 0.1080, train\_precision: 0.1400, train\_recall: 0.0621, train\_f1\_score: 0.0860  val\_loss: 0.1167, val\_precision: 0.0794, val\_recall: 0.0564, val\_f1\_score: 0.0659  Epoch [13/20], train\_loss: 0.1064, train\_precision: 0.1271, train\_recall: 0.0624, train\_f1\_score: 0.0837  ...  Epoch [14/20], train\_loss: 0.1056, train\_precision: 0.1384, train\_recall: 0.0650, train\_f1\_score: 0.0885  val\_loss: 0.1173, val\_precision: 0.0889, val\_recall: 0.0584, val\_f1\_score: 0.0705  Epoch [15/20], train\_loss: 0.1026, train\_precision: 0.1834, train\_recall: 0.0706, train\_f1\_score: 0.1019  val\_loss: 0.1174, val\_precision: 0.0895, val\_recall: 0.0618, val\_f1\_score: 0.0731 |

1. Depth

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| **2** | 3 | 5 |
| Epoch [14/20], train\_loss: 0.1458, train\_precision: 0.3300, train\_recall: 0.1627, train\_f1\_score: 0.2180  val\_loss: 0.2011, val\_precision: 0.1150, val\_recall: 0.0849, val\_f1\_score: 0.0977 | Epoch [17/25], train\_loss: 0.1603, train\_precision: 0.2573, train\_recall: 0.1492, train\_f1\_score: 0.1889  val\_loss: 0.1943, val\_precision: 0.0821, val\_recall: 0.0905, val\_f1\_score: 0.0861 | Epoch [25/25], train\_loss: 0.3723, train\_precision: 0.0633, train\_recall: 0.1240, train\_f1\_score: 0.0838  val\_loss: 0.3675, val\_precision: 0.0548, val\_recall: 0.0926, val\_f1\_score: 0.0689 |

1. Attention

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| **False** | True, head\_num = 1 |
| Epoch [14/20], train\_loss: 0.1867, train\_precision: 0.1424, train\_recall: 0.0720, train\_f1\_score: 0.0957  val\_loss: 0.1973, val\_precision: 0.0551, val\_recall: 0.0556, val\_f1\_score: 0.0553 | Epoch [18/20], train\_loss: 0.1983, train\_precision: 0.1176, train\_recall: 0.0683, train\_f1\_score: 0.0864  val\_loss: 0.1929, val\_precision: 0.0552, val\_recall: 0.0654, val\_f1\_score: 0.0598 |

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| **False** | **True, head\_num = 2** |
| Epoch [14/20], train\_loss: 0.1867, train\_precision: 0.1424, train\_recall: 0.0720, train\_f1\_score: 0.0957  val\_loss: 0.1973, val\_precision: 0.0551, val\_recall: 0.0556, val\_f1\_score: 0.0553 | Epoch [15/20], train\_loss: 0.1423, train\_precision: 0.2198, train\_recall: 0.1086, train\_f1\_score: 0.1454  val\_loss: 0.1713, val\_precision: 0.0787, val\_recall: 0.0717, val\_f1\_score: 0.0751 |

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| **False** | True, head\_num = 2 |
| Epoch [15/25], train\_loss: 0.1230, train\_precision: 0.4307, train\_recall: 0.2078, train\_f1\_score: 0.2803  val\_loss: 0.1841, val\_precision: 0.1570, val\_recall: 0.1050, val\_f1\_score: 0.1259 | Epoch [13/25], train\_loss: 0.1355, train\_precision: 0.2998, train\_recall: 0.1350, train\_f1\_score: 0.1862  val\_loss: 0.1770, val\_precision: 0.1176, val\_recall: 0.0865, val\_f1\_score: 0.0997 |

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| head\_num=1 | **head\_num=2** | head\_num=3 | head\_num=5 |
| Epoch [15/20], train\_loss: 0.1704, train\_precision: 0.1894, train\_recall: 0.0916, train\_f1\_score: 0.1235  val\_loss: 0.1881, val\_precision: 0.0731, val\_recall: 0.0629, val\_f1\_score: 0.0676 | Epoch [15/20], train\_loss: 0.1423, train\_precision: 0.2198, train\_recall: 0.1086, train\_f1\_score: 0.1454  val\_loss: 0.1713, val\_precision: 0.0787, val\_recall: 0.0717, val\_f1\_score: 0.0751 | Epoch [17/20], train\_loss: 0.1569, train\_precision: 0.1411, train\_recall: 0.0782, train\_f1\_score: 0.1007  val\_loss: 0.1716, val\_precision: 0.0703, val\_recall: 0.0746, val\_f1\_score: 0.0724 | Epoch [15/20], train\_loss: 0.1547, train\_precision: 0.1547, train\_recall: 0.0825, train\_f1\_score: 0.1076  val\_loss: 0.1894, val\_precision: 0.0689, val\_recall: 0.0542, val\_f1\_score: 0.0607 |

1. hidden dimension, Attention = True, head\_num=2

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| 3 | **5** | 10 |
| Epoch [15/20], train\_loss: 0.1704, train\_precision: 0.1894, train\_recall: 0.0916, train\_f1\_score: 0.1235  val\_loss: 0.1881, val\_precision: 0.0731, val\_recall: 0.0629, val\_f1\_score: 0.0676 | Epoch [15/20], train\_loss: 0.1423, train\_precision: 0.2198, train\_recall: 0.1086, train\_f1\_score: 0.1454  val\_loss: 0.1713, val\_precision: 0.0787, val\_recall: 0.0717, val\_f1\_score: 0.0751 | Epoch [19/20], train\_loss: 0.1869, train\_precision: 0.1188, train\_recall: 0.0644, train\_f1\_score: 0.0835  val\_loss: 0.1827, val\_precision: 0.0549, val\_recall: 0.0611, val\_f1\_score: 0.0579 |

1. Dropout

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| **0** | 0.2 | 0.5 |
| Epoch [15/25], train\_loss: 0.1230, train\_precision: 0.4307, train\_recall: 0.2078, train\_f1\_score: 0.2803  val\_loss: 0.1841, val\_precision: 0.1570, val\_recall: 0.1050, val\_f1\_score: 0.1259 | Epoch [17/25], train\_loss: 0.3611, train\_precision: 0.0545, train\_recall: 0.2516, train\_f1\_score: 0.0896  val\_loss: 0.2235, val\_precision: 0.0395, val\_recall: 0.0395, val\_f1\_score: 0.0395 | Epoch [19/20], train\_loss: 0.1869, train\_precision: 0.1188, train\_recall: 0.0644, train\_f1\_score: 0.0835  val\_loss: 0.1827, val\_precision: 0.0549, val\_recall: 0.0611, val\_f1\_score: 0.0579 |

1. InceptionModule

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| None | **2** | 3 |
| Epoch [23/25], train\_loss: 0.2368, train\_precision: 0.0756, train\_recall: 0.0689, train\_f1\_score: 0.0721  val\_loss: 0.2275, val\_precision: 0.0476, val\_recall: 0.0657, val\_f1\_score: 0.0552 | Epoch [14/25], train\_loss: 0.2059, train\_precision: 0.2961, train\_recall: 0.1705, train\_f1\_score: 0.2164  val\_loss: 0.2391, val\_precision: 0.0884, val\_recall: 0.0955, val\_f1\_score: 0.0918 | Epoch [19/25], train\_loss: 0.1255, train\_precision: 0.1828, train\_recall: 0.1060, train\_f1\_score: 0.1342  val\_loss: 0.1422, val\_precision: 0.0859, val\_recall: 0.0642, val\_f1\_score: 0.0735 |

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| **2** | 2, True, head\_num = 2 |
| Epoch [14/25], train\_loss: 0.2059, train\_precision: 0.2961, train\_recall: 0.1705, train\_f1\_score: 0.2164  val\_loss: 0.2391, val\_precision: 0.0884, val\_recall: 0.0955, val\_f1\_score: 0.0918 | Epoch [15/25], train\_loss: 0.1594, train\_precision: 0.1976, train\_recall: 0.1312, train\_f1\_score: 0.1577  val\_loss: 0.1806, val\_precision: 0.1042, val\_recall: 0.0936, val\_f1\_score: 0.0986 |

1. CNNGCN vs Resnet

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| --- | --- |
| CNNGCN 2 1 5 1 no None True 2 0 | **Resnet50** |
| Epoch [15/25], train\_loss: 0.1516, train\_precision: 0.2232, train\_recall: 0.1547, train\_f1\_score: 0.1827  val\_loss: 0.1804, val\_precision: 0.1311, val\_recall: 0.0817, val\_f1\_score: 0.1007 | Epoch [13/25], train\_loss: 0.0887, train\_precision: 0.2672, train\_recall: 0.1128, train\_f1\_score: 0.1586  val\_loss: 0.1102, val\_precision: 0.1585, val\_recall: 0.0835, val\_f1\_score: 0.1094 |

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| CNNGCN 2 1 5 1 no None False 1 0 | **Resnet50** |
| Epoch [20/25], train\_loss: 0.1766, train\_precision: 0.1121, train\_recall: 0.0791, train\_f1\_score: 0.0928  val\_loss: 0.1776, val\_precision: 0.0541, val\_recall: 0.0482, val\_f1\_score: 0.0510 | Epoch [13/25], train\_loss: 0.0887, train\_precision: 0.2672, train\_recall: 0.1128, train\_f1\_score: 0.1586  val\_loss: 0.1102, val\_precision: 0.1585, val\_recall: 0.0835, val\_f1\_score: 0.1094 |

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| **CNNGCN no Inception, 2 GCN** | Resnet50 |
| Epoch [15/25], train\_loss: 0.2227, train\_precision: 0.4011, train\_recall: 0.2002, train\_f1\_score: 0.2671  val\_loss: 0.2528, val\_precision: 0.1244, val\_recall: 0.0884, val\_f1\_score: 0.1034 | Epoch [13/25], train\_loss: 0.0771, train\_precision: 0.3505, train\_recall: 0.1632, train\_f1\_score: 0.2227  val\_loss: 0.1109, val\_precision: 0.1531, val\_recall: 0.0891, val\_f1\_score: 0.1127 |

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| --- | --- |
| CNNGCN no Inception, 1 GCN | **Resnet50** |
| Epoch [19/25], train\_loss: 0.2113, train\_precision: 0.2064, train\_recall: 0.1128, train\_f1\_score: 0.1459  val\_loss: 0.2342, val\_precision: 0.0720, val\_recall: 0.0672, val\_f1\_score: 0.0695 | Epoch [11/25], train\_loss: 0.0860, train\_precision: 0.3300, train\_recall: 0.1348, train\_f1\_score: 0.1914  val\_loss: 0.1147, val\_precision: 0.1319, val\_recall: 0.0793, val\_f1\_score: 0.099 |

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| --- | --- |
| CNNGCN 2 1 5 1 gsc ELU True 2 0 | **Resnet50** |
| Epoch [19/25], train\_loss: 0.2113, train\_precision: 0.2064, train\_recall: 0.1128, train\_f1\_score: 0.1459  val\_loss: 0.2342, val\_precision: 0.0720, val\_recall: 0.0672, val\_f1\_score: 0.0695 | Epoch [11/25], train\_loss: 0.0860, train\_precision: 0.3300, train\_recall: 0.1348, train\_f1\_score: 0.1914  val\_loss: 0.1147, val\_precision: 0.1319, val\_recall: 0.0793, val\_f1\_score: 0.099 |