

Automatic Self-Netekiv - AT Features Convolutional Co

ATOMATIC SCALE NETWORK - AT FIGHTERS COMBINED LUG
LADINATO POKASHANU

$$\begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ -1 & -1 & -1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \\ -1 & -1 & -1 \end{bmatrix} \begin{bmatrix} 3 & 3 & 3 \\ 3 & 0 & 3 \\ 3 & 0 & 3 \end{bmatrix} \begin{matrix} \text{LAPLACE} \\ = 240 \\ \text{Determine } V \end{matrix} \begin{bmatrix} 0 & 1 & 0 \\ 1 & -4 & 1 \\ 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 \\ -8 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

FEATURE MATCHING - COMPARE FEATURES TO MATCHES IN THE INDEX
 $P_1/P_2 < 0.8$ P_1, P_2 = DISTANCE TO MATCHING NEIGHBOR

ITZACELIUS-KISACHE FIGHTING - 1LTBILITY IS CALMANT

Dr. R. C. Brown

$$\Rightarrow [I_x \ I_y]^T \begin{bmatrix} u \\ v \end{bmatrix} = -I_z \quad I_x, I_y, I_z \in \mathbb{R}^{4 \times 4} \text{ in } \mathbb{R}^4, \tau$$

51261/2, 4)

$$[\mathcal{I}_x^i, \mathcal{I}_x, \mathcal{I}_x^i] \int \psi = -[\mathcal{I}_x^i, \mathcal{I}_x^i] \int \psi$$

$(A^T A) \mathbf{c} = A^T \mathbf{b}$ $A^T A \rightarrow$ SCALAR BE INVERTIBLE, A FULL RANK MATRIX

Lt. Anderson's white transportation materials company will be awarded a contract to provide transportation services to the Department of Defense.

$\mu_{\text{THEORETICAL}} \rightarrow \mu_{\text{PREDICTION}} \rightarrow \mu_{\text{OBSERVATION}} \rightarrow \mu_{\text{CORRECTION}}$

RC = Rectus Capitus Anterior

$X_2 = \frac{1}{2} X_c$
 $Y_2 = \frac{1}{2} Y_c$
 $X_1, Y_1 \in \mathbb{R}^n$
 $X_2, Y_2 \in \mathbb{R}^n$

$$K = \begin{bmatrix} x_0 & 3 & 0 \\ 0 & 0 & 0 \end{bmatrix} \quad [u] = \begin{bmatrix} x_u & y_u & x_0 \end{bmatrix} \quad \text{Dy skew}$$
$$T = C \text{ and } R \text{ is } \begin{bmatrix} X_e \\ T_y \\ T_x \end{bmatrix} \rightarrow \begin{bmatrix} X_w \\ T_y \\ T_x \end{bmatrix} = R \begin{bmatrix} X_e \\ T_y \\ T_x \end{bmatrix}$$
[illegible]

WILL - P. 1011, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1399, 1400, 1401, 1402, 1403, 1404, 1405, 1406, 1407, 1408, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1446, 1447, 1448, 1449, 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1473, 1474, 1475, 1476, 1477, 1478, 1479, 1480, 1481, 1482, 1483, 1484, 1485, 1486, 1487, 1488, 1489, 1490, 1491, 1492, 1493, 1494, 1495, 1496, 1497, 1498, 1499, 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515, 1516, 1517, 1518, 1519, 1520, 1521, 1522, 1523, 1524, 1525, 1526, 1527, 1528, 1529, 1530, 1531, 1532, 1533, 1534, 1535, 1536, 1537, 1538, 1539, 1540, 1541, 1542, 1543, 1544, 1545, 1546, 1547, 1548, 1549, 1550, 1551, 1552, 1553, 1554, 1555, 1556, 1557, 1558, 1559, 1560, 1561, 1562, 1563, 1564, 1565, 1566, 1567, 1568, 1569, 1570, 1571, 1572, 1573, 1574, 1575, 1576, 1577, 1578, 1579, 1580, 1581, 1582, 1583, 1584, 1585, 1586, 1587, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1596, 1597, 1598, 1599, 1600, 1601, 1602, 1603, 1604, 1605, 1606, 1607, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1630, 1631, 1632, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1641, 1642, 1643, 1644, 1645, 1646, 1647, 1648, 1649, 1650, 1651, 1652, 1653, 1654, 1655, 1656, 1657, 1658, 1659, 1660, 1661, 1662, 1663, 1664, 1665, 1666, 1667, 1668, 1669, 1670, 1671, 1672, 1673, 1674, 1675, 1676, 1677, 1678, 1679, 1680, 1681, 1682, 1683, 1684, 1685, 1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 17

Euclidean Matrix $E = \begin{bmatrix} 1 & \\ & \ddots \\ & & 1 \end{bmatrix}$ $R = (R^T)^T = R$ $\vec{z} = \begin{bmatrix} z_1 \\ \vdots \\ z_n \end{bmatrix}$

Factor	Effect	Significance
Factor 1	Effect 1	Significant
Factor 2	Effect 2	Significant
Factor 3	Effect 3	Significant
Factor 4	Effect 4	Significant
Factor 5	Effect 5	Significant
Factor 6	Effect 6	Significant
Factor 7	Effect 7	Significant
Factor 8	Effect 8	Significant
Factor 9	Effect 9	Significant
Factor 10	Effect 10	Significant
Factor 11	Effect 11	Significant
Factor 12	Effect 12	Significant
Factor 13	Effect 13	Significant
Factor 14	Effect 14	Significant
Factor 15	Effect 15	Significant
Factor 16	Effect 16	Significant
Factor 17	Effect 17	Significant
Factor 18	Effect 18	Significant
Factor 19	Effect 19	Significant
Factor 20	Effect 20	Significant
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Factor 88	Effect 88	Significant
Factor 89	Effect 89	Significant
Factor 90	Effect 90	Significant
Factor 91	Effect 91	Significant
Factor 92	Effect 92	Significant
Factor 93	Effect 93	Significant
Factor 94	Effect 94	Significant
Factor 95	Effect 95	Significant
Factor 96	Effect 96	Significant
Factor 97	Effect 97	Significant
Factor 98	Effect 98	Significant
Factor 99	Effect 99	Significant
Factor 100	Effect 100	Significant

100

TEXTURE MATCHING - MAKE 10-20 OCCURRENCE VECTORS
 - NORMALIZE TO PROBABILITIES, P
 - MAKE VECTORS OF RESULTS, E.C. ENTROPY VECTORS, ENERGY VECTOR
 ENERGY $\sum p(a,b)$ ENTROPY $= - \sum p(a,b) \log_2(p(a,b))$ CONTRAST $\sum (a-b)^2 p(a,b)$ HOMO $= \sum p(a,b)$
STEREO MATCHING DEPTH $= d = \frac{f}{x-x'}$ $x-x'$ = DISPARITY
 $x-x' = \text{PIXEL OFFSET}$

LAMBERT = COMPLETELY DIFFUSE

ρ = REFLECTANCE FACTOR = ALBEDO

LAMBERT COSINE LAW $R \propto \cos(\theta)$

NORMAL N IS CROSS PRODUCT OF SURF VECTORS $N = [p, q, 1]^T$ (INWARD)

$$R(p, q) = \rho \frac{n \cdot s}{|n| |s|}$$

PHOTOMETRIC STEREO
SHADE FROM SHADING

R WILL BE CONSTANT IN CIRCLES OR CONICAL SECTIONS. WE NEED THREE IMAGES TO RECOVER N FROM INTENSITIES.

- ASSUMES UNIFORM LIGHTS FAR FROM OBJECT, CAMERA FAR FROM LAMBERT OBJECT (NO REFLECTANCE)

ALSO SHADE FROM MOTION, TEXTURE, FOCUS/DEFOCUS, ZOOMING, CONTRAST

MOTION VECTORS / OPTICAL FLOW

$$\frac{d^2}{dx} u + \frac{d^2}{dy} v + \frac{d^2}{dt} w = 0 \quad \text{ESTIMATE MOTION } u, v$$

WE CAN MEASURE $\frac{d^2}{dx}, \frac{d^2}{dy}, \frac{d^2}{dt}$ FROM IMAGES, BUT ONLY 1 EQUATION, 2 UNKNOWN

ASSUME NEIGHBORING PIXELS HAVE SAME MOTION FOR ADDITIONAL CONSTRAINTS TO SOLVE FOR U, V.

APERTURE PROBLEM = MOTION IS HARD TO ESTIMATE WHEN WE ONLY OBSERVE PART

CAN'T SEE MOTION OF AN EDGE ALONG ITS EDGE, ONLY PERPENDICULAR

FOCUS OF EXPANSION = THE POINT AT INFINITY WHERE AN

OBJECT APPEARS TO COME FROM, DUE TO ITS MOTION OR CAM MOTION.

TIME TO AVOIDANCE = TIME UNTIL MOVING OBJECT HITS US = $\frac{\text{DEPTH}}{\text{VELOCITY}}$

CONVOLUTIONAL LAYER

INPUT HAS THREE DIMS (X, Y, FEATURES_IN (EG. RGB))

CONV LAYER HAS FOUR DIMS (WIDTH, HEIGHT, FEATURES_IN, FEATURES_CONV)

FEATURE MAP HAS THREE DIMS (X, Y, FEATURES_CONV)

- CONVOLUTIONAL LAYERS AREN'T FULLY CONNECTED TO THE INPUT
 JUST A LOCALIZED SECTION

DILATION

4x4

DILATION=1

X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X

CAN REUSE THE SAME KERNEL REPEATEDLY
 APPLIED ACROSS THE WHOLE IMAGE

STRIDE = 2 \Rightarrow SHIFT THE KERNEL 2 PIXEL AT EACH STEP

POOLING = DOWNSIZE A LAYER (EG. FROM 100x100)

MAX POOLING \Rightarrow SELECT MAX VALUE IN EACH GROUP FOR WHERE COMING