**Result**

**K-means algorithm – Manhattan distance :**

Data structures – Lists

Result – K=3

First of all, we are reading a file and preparing points. We store them in a list. As the K=3, we will have 3 clusters and correspondingly 3 centers. Initially, we randomly assign 3 centers. We populate original lists, picking points with a minimum distance to one of the K centers using L1 distance formula which is a |Xcenter-Xpoint|+|Ycenter-Ypoint|. Next step is calculating centers because our original, random centers might be not good and repopulate our lists with new centers. We repeat these steps until we find the best centers and corresponding points.

**Kcenter 1** = [4.719158277729167, 5.1259647529375005]

**Klist 1** = [[4.791128395, 4.370299589], [4.346058487, 4.018067016], [8.231033082, 6.184286192], [3.888145888, 5.267364444], [5.025547369, 6.794483892], [3.807810649, 6.987931983], [5.910493777, 4.093302008], [5.478176272, 5.516863136], [6.62794025, 3.722270626], [2.343750659, 4.57456785], [6.068372741, 5.4309343], [4.23229562, 5.206003122], [5.195116303, 2.36092694], [2.488663641, 6.355903079], [5.28271118, 5.648397944], [5.288476, 5.89259064], [4.602393734, 2.647978123], [5.666789848, 5.701026649], [4.804948111, 5.157872987], [3.685961459, 4.082833651], [3.999606696, 5.384602232], [4.790463114, 7.188303292], [3.796399358, 5.737118242], [5.820319289, 3.416805651], [6.68456776, 6.001567197], [4.863746388, 3.705479154], [7.339464614, 5.503620224], [4.413579111, 4.893457373], [4.278927519, 2.989392822], [3.570462507, 5.05118644], [4.187363007, 5.006079291], [5.049608903, 5.681134719], [4.379925229, 6.509004434], [1.708022242, 4.50515623], [6.236542245, 5.405212129], [4.109295861, 3.899938059], [4.442377563, 5.751869679], [2.913106881, 5.253241651], [3.342571332, 5.414482622], [5.537613951, 1.817610623], [4.612527375, 6.265716757], [7.064695701, 5.108753941], [4.029541008, 7.011044352], [6.293670058, 4.343930914], [3.877198382, 5.839108313], [3.592349817, 9.653682134], [2.785143946, 5.398666109], [5.034694009, 3.296239386]]

**Kcenter 2** = [9.923003253480768, 0.15096781351923078]

**Klist 2** = [[6.544734089, 1.503317083], [8.425299789, 2.645545801], [12.16058412, -0.362125835], [10.22058808, 0.009016604], [9.273663197, -1.252746611], [10.58896571, 1.271951549], [10.46418918, 0.204367166], [8.39829614, 1.587436854], [10.17837225, 0.248014021], [10.23183027, -0.399234152], [11.30847308, 0.992310253], [7.877767016, 0.084727778], [10.02904103, 0.639421298], [10.66429482, 0.754367268], [10.63529107, -0.47353238], [10.78690808, 0.909634764], [10.25152739, -0.986960442], [10.16240361, 0.521375024], [10.22228819, -0.717850129], [8.106908717, 1.127392487], [11.43037929, -0.766911821], [10.07089281, 0.938592588], [8.005566045, -1.367474706], [10.61661672, 0.745495925], [10.65859351, 1.163325858], [10.63190368, 1.746369341], [8.48653224, 0.156627329], [10.51752782, 0.17169319], [9.489343157, -0.190821782], [11.36968167, 1.283354542], [9.157291133, 0.912298291], [9.453725245, 0.024082023], [8.613609933, 0.012923723], [9.089636524, 1.130473664], [9.62386144, 0.071194103], [10.87284469, -0.872054667], [9.67196997, -0.767002838], [9.647099157, 1.218331242], [11.47927287, 0.08871278], [10.58651356, 0.155673799], [10.91537566, -0.161546934], [9.212519802, -1.195793489], [8.505171787, 0.454283639], [11.41916539, -0.109842662], [8.860945078, -0.147791862], [10.57743272, -0.238018987], [12.14314995, -1.011735108], [10.61106931, -2.581639716], [10.19259728, -2.288667349], [9.76625099, -0.183011689], [9.225220637, 1.193757348], [8.562983285, -0.040977873]]

**Kcenter 3** = [-0.08667900622000003, -0.005460671820000012]

**Klist 3** = [[0.510039315, -0.033454921], [0.535879992, -0.544984943], [-0.030554412, 0.733389872], [0.127854799, -0.650548946], [0.715793713, 0.853664924], [-0.581730577, 0.633250846], [0.025365753, -0.196067087], [0.31512883, -0.114040657], [0.173119979, 0.672802088], [-0.735966061, 0.615308491], [0.746495179, 0.025851566], [-0.386343423, -0.628925622], [1.284563957, -0.219195524], [-0.048681172, 0.291538486], [-1.55638947, -0.04485903], [0.395953933, 0.494127144], [-1.326373584, 0.644738349], [0.877523801, -0.183924509], [0.250195385, -0.874326245], [0.781958321, 0.45034738], [0.58644216, -0.576533163], [-0.406803883, 0.161830401], [-0.924336618, -0.918433377], [-0.849464839, -0.451029601], [-0.60671378, -0.144416903], [-0.665808152, 0.342018893], [-1.006567109, -0.776052519], [-0.209310532, 0.603822258], [0.457496263, 0.649517422], [-0.146233036, 0.470677195], [0.011270991, 0.753474974], [-1.2159853, -0.388557274], [-0.326760934, -0.59826327], [-0.656723353, -0.7606785], [0.491927392, -0.245524001], [-1.541393849, -0.188592587], [0.446950982, 0.238815419], [0.462508086, -0.242278427], [0.006692734, 0.864144208], [-0.4594557, -0.066167696], [-0.82299408, -0.853014691], [-0.669972989, 0.345517373], [-0.781926012, -0.255114051], [-0.969241215, -0.488606904], [1.157738921, 0.048978901], [0.800929342, 0.512101627], [0.605962008, 0.576236041], [0.459491212, -0.38556238], [-0.552806475, 0.834823601], [0.917303196, -1.260858222]]

**K-means algorithm – Euclidean distance :**

Data structures – Lists

Result – K=3

First of all, we are reading a file and preparing points. We store them in a list. As the K=3, we will have 3 clusters and correspondingly 3 centers. Initially, we randomly assign 3 centers. We populate original lists, picking points with a minimum distance to one of the K centers using L1 distance formula which is a √(Xcenter-Xpoint)2+(Ycenter-Ypoint)2. Next step is calculating centers because our original, random centers might be not good and repopulate our lists with new centers. We repeat these steps until we find the best centers and corresponding points.

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