To-do

Median filters to eliminate cosmic rays

* Top and lowest 5%

K-means algorithm

* Choose components for analysis
* Principal/Multiple component analysis
* Starting point: use already existing maps (fragile and relies on other algorithms)

Add noise:

* Up to how much can it still produce results?

Python

* Learn to use TensorFlow

RESEARCH CLUSTERING METHODS

* Is any especially good for hyperspectral data?

# Test

Use available data (IDX) to group pixels into sections 🡪 average spectra

Calculate correlation between each pixel and each group spectrum

NO BASELINE REMOVAL: Out of 40000 points, 32409 are correctly grouped into their section (81.0225%)

BASELINE REMOVAL: Out of 40000 points, 14443 are correctly grouped into their section (36.1075%)

# Compare results from different tissues

T24:

t = 0.9 -> 81.38250000000001%

[5100. 279. 3055. 2776. 2448. 1151. 1691. 3199. 1717. 2137. 3459. 1395.

1311. 1007. 1828.]

t = 0.905 -> 81.42%

[5103. 279. 3055. 2776. 2448. 1151. 1700. 3199. 1718. 2137. 3459. 1395.

1312. 1008. 1828.]

t = 0.91 -> 81.4375%

[5105. 279. 3055. 2776. 2448. 1151. 1705. 3198. 1718. 2137. 3459. 1397.

1312. 1007. 1828.]

t = 0.915 -> 81.44500000000001%

[5105. 279. 3055. 2776. 2448. 1152. 1709. 3197. 1718. 2137. 3459. 1396.

1312. 1007. 1828.]

t = 0.92 -> 81.44749999999999%

[5103. 279. 3055. 2776. 2448. 1151. 1714. 3197. 1718. 2137. 3459. 1395.

1312. 1007. 1828.]

t = 0.925 -> 81.435%

[5103. 279. 3055. 2775. 2448. 1153. 1714. 3193. 1718. 2137. 3459. 1397.

1312. 1008. 1823.]

t = 0.93 -> 81.4525%

[5103. 279. 3055. 2775. 2448. 1152. 1717. 3193. 1718. 2137. 3459. 1402.

1312. 1008. 1823.]

t = 0.935 -> 81.455%

[5103. 277. 3055. 2775. 2448. 1151. 1720. 3193. 1718. 2137. 3459. 1402.

1312. 1009. 1823.]

t = 0.94 -> 81.455%

[5103. 277. 3055. 2774. 2448. 1149. 1723. 3192. 1718. 2137. 3459. 1402.

1312. 1010. 1823.]

t = 0.945 -> 81.475%

[5107. 277. 3055. 2774. 2448. 1146. 1724. 3192. 1718. 2137. 3459. 1404.

1312. 1013. 1824.]

t = 0.95 -> 81.45750000000001%

[5107. 277. 3055. 2773. 2448. 1137. 1727. 3192. 1718. 2137. 3459. 1399.

1316. 1014. 1824.]

t = 0.955 -> 81.435%

[5113. 277. 3055. 2768. 2448. 1133. 1736. 3192. 1718. 2138. 3459. 1389.

1318. 1013. 1817.]

t = 0.96 -> 81.4075%

[5119. 276. 3054. 2761. 2448. 1124. 1739. 3187. 1719. 2138. 3458. 1383.

1337. 1013. 1807.]

t = 0.965 -> 81.35%

[5121. 275. 3054. 2757. 2448. 1121. 1744. 3180. 1722. 2138. 3455. 1374.

1336. 1015. 1800.]

t = 0.97 -> 81.27250000000001%

[5121. 275. 3054. 2748. 2448. 1118. 1754. 3172. 1726. 2138. 3453. 1358.

1332. 1023. 1789.]

t = 0.975 -> 81.35%

[5125. 273. 3054. 2744. 2448. 1088. 1789. 3165. 1733. 2138. 3450. 1341.

1337. 1078. 1777.]

t = 0.98 -> 80.865%

[5096. 282. 3049. 2731. 2446. 1040. 1797. 3151. 1734. 2142. 3449. 1316.

1307. 1052. 1754.]

t = 0.985 -> 79.205%

[4812. 280. 3046. 2704. 2436. 982. 1759. 3092. 1728. 2161. 3457. 1291.

1267. 978. 1689.]

t = 0.99 -> 75.40249999999999%

[4117. 255. 3096. 2644. 2429. 999. 1638. 2905. 1778. 2052. 3436. 1188.

1296. 803. 1525.]

T3\_1

Pts per section:

0. 1827

1. 2573

2. 1

3. 1

4. 3744

5. 3793

6. 855

7. 16

8. 5368

9. 1509

10. 7210

11. 4886

12. 4835

13. 3214

14. 168

t = 0.9 -> 82.8425%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.448e+03 3.135e+03 6.750e+02

1.500e+01 4.457e+03 1.170e+03 6.851e+03 4.068e+03 4.144e+03 2.209e+03

1.450e+02]

t = 0.905 -> 82.8225%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.440e+03 3.135e+03 6.750e+02

1.500e+01 4.457e+03 1.170e+03 6.851e+03 4.068e+03 4.144e+03 2.209e+03

1.450e+02]

t = 0.91 -> 82.83%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.435e+03 3.145e+03 6.750e+02

1.500e+01 4.453e+03 1.170e+03 6.852e+03 4.069e+03 4.144e+03 2.209e+03

1.450e+02]

t = 0.915 -> 82.8075%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.427e+03 3.146e+03 6.750e+02

1.500e+01 4.453e+03 1.170e+03 6.853e+03 4.069e+03 4.143e+03 2.209e+03

1.430e+02]

t = 0.92 -> 82.8075%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.427e+03 3.146e+03 6.750e+02

1.500e+01 4.453e+03 1.170e+03 6.853e+03 4.069e+03 4.143e+03 2.209e+03

1.430e+02]

t = 0.925 -> 82.8%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.427e+03 3.148e+03 6.710e+02

1.500e+01 4.452e+03 1.170e+03 6.853e+03 4.069e+03 4.143e+03 2.209e+03

1.430e+02]

t = 0.93 -> 82.8%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.427e+03 3.148e+03 6.710e+02

1.500e+01 4.452e+03 1.170e+03 6.853e+03 4.069e+03 4.143e+03 2.209e+03

1.430e+02]

t = 0.935 -> 82.8125%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.427e+03 3.159e+03 6.710e+02

1.500e+01 4.449e+03 1.170e+03 6.850e+03 4.069e+03 4.143e+03 2.209e+03

1.430e+02]

t = 0.94 -> 82.8225%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.428e+03 3.167e+03 6.670e+02

1.500e+01 4.448e+03 1.170e+03 6.850e+03 4.069e+03 4.143e+03 2.209e+03

1.430e+02]

t = 0.945 -> 82.8%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.429e+03 3.167e+03 6.570e+02

1.500e+01 4.448e+03 1.170e+03 6.850e+03 4.070e+03 4.142e+03 2.210e+03

1.420e+02]

t = 0.95 -> 82.7675%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.429e+03 3.167e+03 6.430e+02

1.500e+01 4.448e+03 1.170e+03 6.850e+03 4.070e+03 4.142e+03 2.210e+03

1.430e+02]

t = 0.955 -> 82.705%

[1.685e+03 2.133e+03 1.000e+00 1.000e+00 2.429e+03 3.179e+03 6.100e+02

1.500e+01 4.446e+03 1.169e+03 6.850e+03 4.069e+03 4.140e+03 2.212e+03

1.430e+02]

t = 0.96 -> 82.61500000000001%

[1.684e+03 2.133e+03 1.000e+00 1.000e+00 2.432e+03 3.180e+03 5.750e+02

1.500e+01 4.445e+03 1.169e+03 6.849e+03 4.064e+03 4.140e+03 2.215e+03

1.430e+02]

t = 0.965 -> 82.55%

[1.683e+03 2.133e+03 1.000e+00 1.000e+00 2.438e+03 3.181e+03 5.560e+02

1.500e+01 4.445e+03 1.167e+03 6.847e+03 4.059e+03 4.135e+03 2.216e+03

1.430e+02]

t = 0.97 -> 82.47%

[1.681e+03 2.134e+03 1.000e+00 1.000e+00 2.433e+03 3.178e+03 5.530e+02

1.500e+01 4.448e+03 1.168e+03 6.836e+03 4.061e+03 4.120e+03 2.218e+03

1.410e+02]

t = 0.975 -> 82.33749999999999%

[1.677e+03 2.138e+03 1.000e+00 1.000e+00 2.396e+03 3.188e+03 5.440e+02

1.500e+01 4.446e+03 1.182e+03 6.831e+03 4.053e+03 4.093e+03 2.229e+03

1.410e+02]

t = 0.98 -> 81.8325%

[1.666e+03 2.175e+03 1.000e+00 1.000e+00 2.256e+03 3.145e+03 5.340e+02

1.500e+01 4.465e+03 1.190e+03 6.832e+03 4.021e+03 4.038e+03 2.253e+03

1.410e+02]

t = 0.985 -> 78.1425%

[1.625e+03 1.389e+03 1.000e+00 1.000e+00 1.858e+03 2.771e+03 4.900e+02

1.500e+01 5.064e+03 1.192e+03 6.852e+03 3.835e+03 3.882e+03 2.139e+03

1.430e+02]

t = 0.99 -> 4.5675%

[1827. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.

0. 0. 0.]