Optimizing and informing site selection for Kelp Farms including prediction of yearly yield.

Problem:

With most land, that is usable and available for farming, currently being used. Kelp farming can be a helpful alternative to bolster the food supply. Kelp farms don't only produce kelp. They can become farms to grow mussels and oysters using a technique known as vertical or 3-D farming – using the water column to grow a mix of seaweed and shellfish – to get the most out of their relatively small operations.

There are also some additional benefits of kelp farming. Roughly 25% of CO2 in the atmosphere is being absorbed into oceans which turns the ocean more acidic. This can hurt shellfish due to their shells be made of calcium. Kelp absorbs and feeds off of this CO2 to produce healthy food.

Site selection has two major parts, state leasing requirements and having an ideal site for growth and access. The Site Selection and State Leasing and permitting processes are currently long and very onerous and only started after a farmer selects a location. By using machine learning methods LandSat images and NOAA coastal charts, states could identify prime kelp farming locations and open up leasing options ahead of demand to help foster this incredible eco-friendly and sustainable food source. Finally this new farming technique could help the many displaced fisherman that have fallen on hard times due to over-fishing and tighter catch limits.

Data:

Santa Barbara Coastal - Long Term Ecological Research – Extensive research and data on the health and growth patterns of kelp
Free LandSat images – From Open Nasa to identify current kelp locations
Office of Coast Survey - NOAA Coastal Charts – to identify possible kelp farm locations

Possible data science techniques:

Large-scale web scraping
NLP
Image Recognition – Machine Learning
D3/Custom Visualization

Related research/products:

Kelp Farming Manual – best practices for Kelp Farming in Maine

https://docs.google.com/document/d/1R4pc8nuEkiilfBUdU6saedul9v-5crOR7iW4jtCN6oA/edit?usp=sharing