1. Context and needs addressed by data product
   1. Background of data product
      1. Multiple factors as to why cancer is diagnosed in its latter stages
         1. Missing patient history
         2. Patient’s symptoms are difficult to notice or interpret
         3. Difficult to diagnose off on image.
         4. Lack of knowledge from the patient’s side
         5. Source(s)
            1. [Late-stage cancer detection in the USA is costing lives - The Lancet](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)62195-2/fulltext#:~:text=Patient%20delay%20can%20be%20a%20major%20factor%20behind,navigating%20the%20health-care%20system%20all%20play%20a%20part.)
            2. [8 Reasons Why Your Doctor Missed a Cancer Diagnosis - STL.News](https://www.stl.news/8-reasons-why-your-doctor-missed-a-cancer-diagnosis/519494/)
            3. [What could be the reasons of late diagnosis of breast cancer in Tunisia? - PubMed (nih.gov)](https://pubmed.ncbi.nlm.nih.gov/30746659/)
            4. [A Matter Of Race: Early- Versus Late-Stage Cancer Diagnosis - PMC (nih.gov)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2766845/)
            5. [Stage at Diagnosis | Cancer Trends Progress Report](https://progressreport.cancer.gov/diagnosis/stage)
      2. The importance of early diagnosis
         1. Save on costs
         2. Survival rate increases when diagnosed early
            1. Approximately 90% of women who are diagnosed early with breast cancer live more than 5 years after.
            2. Estimated savings from early diagnosis is approximately 8-11%
         3. Regulated screening can increase the odds of early diagnosis
            1. Early detection
         4. Source(s)
            1. [Data | Free Full-Text | Estimating Cost Savings from Early Cancer Diagnosis | HTML (mdpi.com)](https://www.mdpi.com/2306-5729/2/3/30/htm)
            2. [Drug delivery to the lymphatic system: importance in future cancer diagnosis and therapies: Expert Opinion on Drug Delivery: Vol 6, No 8 (tandfonline.com)](https://www.tandfonline.com/doi/abs/10.1517/17425240903085128?journalCode=iedd20)
            3. [Early diagnosis of pancreatic cancer: challenges and new developments - PMC (nih.gov)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3546485/)
            4. [Benefits and limitations of regular cancer screening | Canadian Cancer Society](https://cancer.ca/en/cancer-information/find-cancer-early/screening-for-cancer/benefits-and-limitations-of-regular-cancer-screening#:~:text=Cancer%20screening%20helps%20find%20cancer%20before%20it%20spreads%20when%20it,better%20your%20chance%20of%20survival.)
            5. [Understanding Perceived Benefit of Early Cancer Detection: Community-Partnered Research with African American Women in South Los Angeles - PMC (nih.gov)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4589099/)
            6. [Early detection of cancer | Science](https://www.science.org/doi/10.1126/science.aay9040)
            7. [Early diagnosis of pancreatic cancer: challenges and new developments - PMC (nih.gov)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3546485/)
      3. The Data Product
         1. Purpose: To diagnose cancer based on images taken.
         2. Goals
            1. Able to diagnose cancer independent of image modality (i.e. CT-scan vs MRI vs Ultrasound).
            2. Provide some textual context on the image ( surplus)
            3. Highlight the possible area where tumor is located.
         3. Gain
            1. Time saved from doctors waiting for diagnosis
            2. Removes the probability of human error when identifying tumors
            3. Faster diagnosis to patient
         4. Source(s):
            1. [Data | Free Full-Text | Estimating Cost Savings from Early Cancer Diagnosis | HTML (mdpi.com)](https://www.mdpi.com/2306-5729/2/3/30/htm)
            2. [Drug delivery to the lymphatic system: importance in future cancer diagnosis and therapies: Expert Opinion on Drug Delivery: Vol 6, No 8 (tandfonline.com)](https://www.tandfonline.com/doi/abs/10.1517/17425240903085128?journalCode=iedd20)
            3. [Early diagnosis of pancreatic cancer: challenges and new developments - PMC (nih.gov)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3546485/)
            4. [Benefits and limitations of regular cancer screening | Canadian Cancer Society](https://cancer.ca/en/cancer-information/find-cancer-early/screening-for-cancer/benefits-and-limitations-of-regular-cancer-screening#:~:text=Cancer%20screening%20helps%20find%20cancer%20before%20it%20spreads%20when%20it,better%20your%20chance%20of%20survival.)
            5. [Understanding Perceived Benefit of Early Cancer Detection: Community-Partnered Research with African American Women in South Los Angeles - PMC (nih.gov)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4589099/)
            6. [Early detection of cancer | Science](https://www.science.org/doi/10.1126/science.aay9040)
            7. [Early diagnosis of pancreatic cancer: challenges and new developments - PMC (nih.gov)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3546485/)
            8. [How AI is improving cancer diagnostics (nature.com)](https://www.nature.com/articles/d41586-020-00847-2)
            9. [What are Neural Networks? | IBM](https://www.ibm.com/cloud/learn/neural-networks)
            10. [What is Machine Learning? | IBM](https://www.ibm.com/cloud/learn/machine-learning)
      4. Possible Alternatives
         1. Currently multiple research-based algorithms, but no products fully available.
         2. Source(s):
            1. [Cancer Imaging Phenomics Toolkit (CaPTk) | CBICA | Perelman School of Medicine at the University of Pennsylvania (upenn.edu)](https://www.med.upenn.edu/cbica/captk/)
            2. [Cancer Research - Microscopy & Imaging Solutions - Imaris - Oxford Instruments (oxinst.com)](https://imaris.oxinst.com/cancer-research)
            3. [Artificial intelligence in cancer imaging and diagnosis (biomedcentral.com)](https://www.biomedcentral.com/collections/aicancerdiagnosis)
            4. [Artificial intelligence is improving the detection of lung cancer (nature.com)](https://www.nature.com/articles/d41586-020-03157-9)