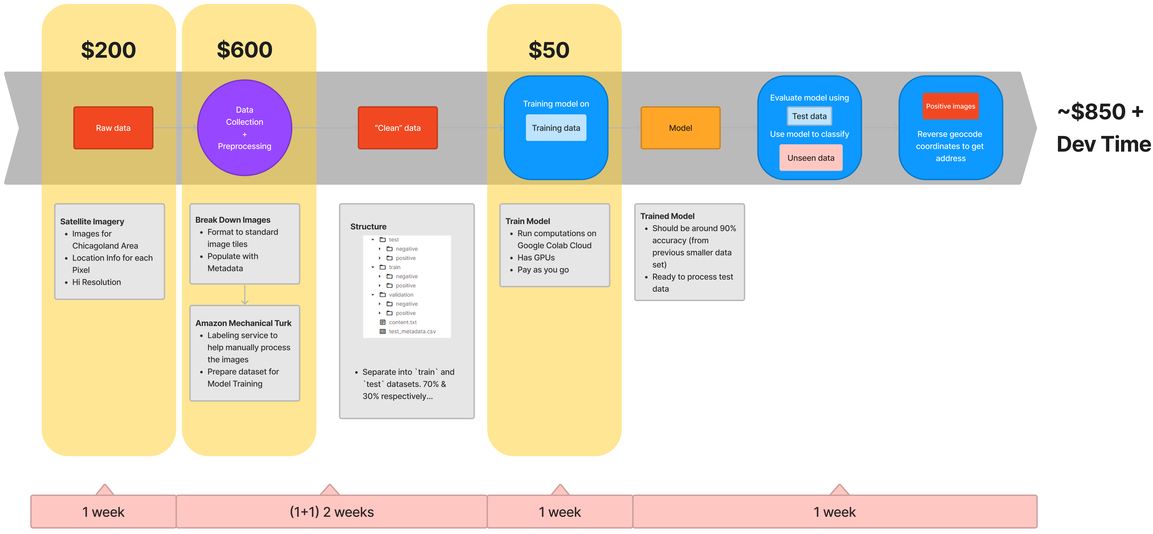
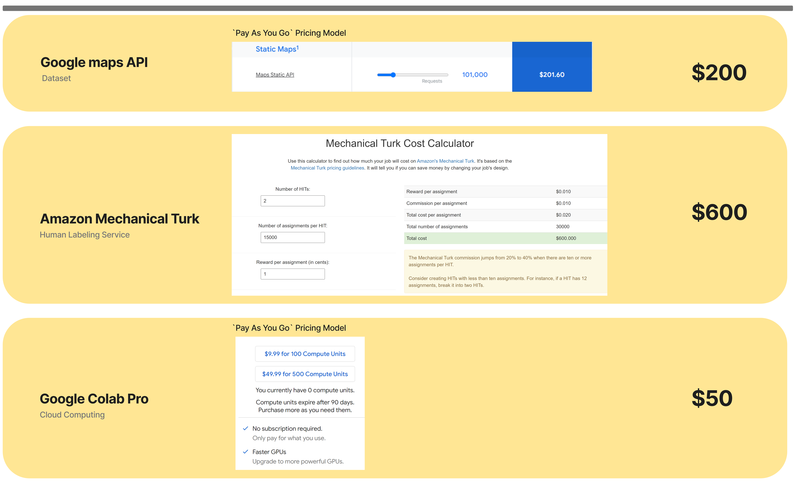
# SOLAR SATELLITE ML PROPOSAL

## Process




## Cost References




| Product | Cost info available? | Options | Cost/sqkm | Chicago Cost ~500sqkm |
|---|---|---|---|---|
| Google Maps Static API | ($2 per 1000 requests to API) | need to setup API | $200 | $850 |
| Amazon Mechanical Turk | | | $600 | |
| Clound Computing costs | | | $50 | |
| NearMap | Quote + demo requested | | NA | Reqested |
| | High and Med res | min order $350 Digital Aerial Imager | $2.78 (30-cm)<br>$5.91 (15-cm) | $1500 - $3000 |
| Apollo Mapping | not good enough | 83-cm BlackSky Satellite Imagery - Apol | NA | |
| | | min order 25sqkm 80-cm TripleSat Sate | $6.00 | $3,000.00 |
| | | min order 25sqkm 60-cm QuickBird Sat | $17.50 | $8,750.00 |
| | | min order 25sqkm 30-cm SuperView NE | $20.00 | $10,000.00 |
| | | min order 25sqkm 30-cm WorldView-4 | $22.50 | $11,250.00 |
| SkyFi | Yes (latest images) - very high res option | | 12 (approx) | $600.00 |
| PACGEO | No | | | Reqested |
| EOS Data Analytics | Too much work? - have to stitch different products to make one file | | | Reqested |
| Maptiler | Annual Subscription only | | $1500/year<br>$4800/year | Reqested<br>Reqested |
| Maxar | NA | | | Reqested |
| Planet Labs | No, quote + demo requested | | | Reqested |
| Airbus Defence & Space | NA, quote + demo requested | | | Reqested |
| Imagesat | | | | Reqested |
| Skywatch | Yes (archived) | medium | $2.50 | $1,250.00 |
| | | high | $10 | $5,000.00 |
| | | very high | $20 | $10,000.00 |
| USGS Landsat Commercial Cloud Access | | | | Reqested |

Replicating the DeepSolar dataset requires access to a large amount of data, expertise in machine learning and computer vision, and the necessary computational resources.

- Data Collection:
  - Satellite Imagery: Obtain high-resolution satellite imagery
    - Google Maps Static API: Need to set up a billing account to test the method.
    - Commercial satellite imagery products: Requested quotes, demos and samples form multiple vendors and am in conversations with them.
- Data Processing:
  - Process the information extracted from the satellite imagery to match our use case.
    - Depends on what data source we use.
      - Google maps api: We can make API requests with our input parameters and have the freedom to manipulate and download images as suited to our needs.
      - Commercial data: depending on what data first we receive from vendors, we will have to process it to fit our model's input format.This is usually in GIS data format - we need to break it down into image tiles of 300×300 dimensions with a defined zoom and resolution level.
- Data Labeling:
  - Collect a dataset of labeled images that include both positive examples (images with solar panels) and negative examples (images without solar panels). This labeled data will be used to train machine learning models for solar panel detection.We plan to use Amazon mechanical Turk for this.(AMT is an online platform that allows businesses to delegate small, manual tasks to a global workforce of individuals, known as "Turkers," for tasks that require human intelligence.)
- Machine Learning Model:
  - Develop or use pre-existing machine learning models and computer vision algorithms for solar panel detection.
    - We have a small model developed as a proof of concept.
    - Can try and use Deepsolar code (open sourced) but might need to clean up a lot
  - Train the machine learning model on the labeled dataset to detect and locate solar panels in satellite images.
    - Will need time and computing power.

We'll finally use this model to generate a database of solar installations from the satellite images we have (ChicagoLand). We can, in the future, scale it to other cities by following the same data collection pipeline and using this model to generate the DB.