In this document we will define the steps taken to produce the results.

Data Preparation:

Step 1: (performed in python file *processingLandfall.ipynb*)

- The data containing records of cyclone from 1982 to 2020 (till June) is downloaded from the IMD website - http://www.rsmcnewdelhi.imd.gov.in/52index.php?option=%20com_content&view=article&id=48&Itemid=194&lang=en
- This data is carefully observed and manual errors are corrected. The file *data.xls* contains the data after this step.
- The file *data.xls* is parsed through a code to extract the features like Basin of Origin, Name of cyclone (if any), Date, Time , year, latitude, longitude, CiNo (T.No), estimated central pressure (ECP), Maximum Surface Sustained Wind (MSSW), pressure drop (PD), Grade, OCI, diam. **Though in this study we have used only ECP, MSSW, latitude and longitude features from this dataset.**
- Resulted dataset after this step - *IMDData1.csv*

Step 2: (performed in python file *processingLandfall.ipynb*)

- If the recordings are not available at an interval of 3 hours for a cyclone, then the missing time stamps are inserted to make it a continuous data at an interval of 3 hours.
- Resulted dataset after this step - *IMDData2.csv*

Step 3: (performed in python file *processingLandfall.ipynb*)

- For the newly inserted timestamps (done in step 2), the missing data is filled as per the process described in paper.
- Resulted dataset after this step - *IMDData3.csv*

Step 4: (One can use python file *mergingIMDSSTLandfall.ipynb*)

- The Sea Surface Temperature (SST) data for NIO region is downloaded from the NOAA websites - http://apdrc.soest.hawaii.edu/erddap/griddap/hawaii_soest_afc8_9785_907e.html, and http://apdrc.soest.hawaii.edu/erddap/griddap/hawaii_soest_330b_094e_ca45.html , which provides SST data for 1981 to 2015 (1.53 GB) and 2015 to present (302MB) respectively. The dataset is provided at a stride of 0.25 degree. We have downloaded data at a stride of 4 (1 degree).
- Due to the huge size of these datasets, we are not able to share these downloaded datasets, but anyone can download these datasets.
- We fetch the SST for the required locations in NIO. The resulted dataset is - *IMDDataSSTLandfall.csv.*

Step 5: (performed in the python file *featureGeneratoin.ipynb*)

- Using the data generated at the last step, we generated two more features: distance and direction between two consecutive recordings of a dataset to capture speed and change of angle.
- Next we process the dataset to keep the recordings of a cyclone between the time when it originates on sea and hit the land (coast) for the first time.

The resulted processed dataset after above steps in store in file ***IMDDataTillLandfall.csv***

Results Section (Performed on Google Colab using GPU):

- The python file *LatiLongAtLandfallFromStartDistance.ipynb* contains the experiments to produce the results regarding Landfall's latitude, longitude and distance error between predicted landfall location and actual landfall location. The corresponding graphs are shown. The 150 epochs time is shown. The model representation is shown.
- The python file *LandfallIntenistyAndTimeFromStart..ipynb* contains the experiments to produce the results regarding Landfall's time and its intensity prediction. The graphs are shown.

(Though we have reported 5-fold cross validation results, the reported results and the results in python files may still vary a bit due to randomness used at various functions.)