

# Assignment

GDP ANALYSIS

## PART I-A

# Data Exploration

### Columns of Dataset:

1. Item Description
2. Duration
3. Different states (33 columns)
4. All India GDP

### Problem Statements:

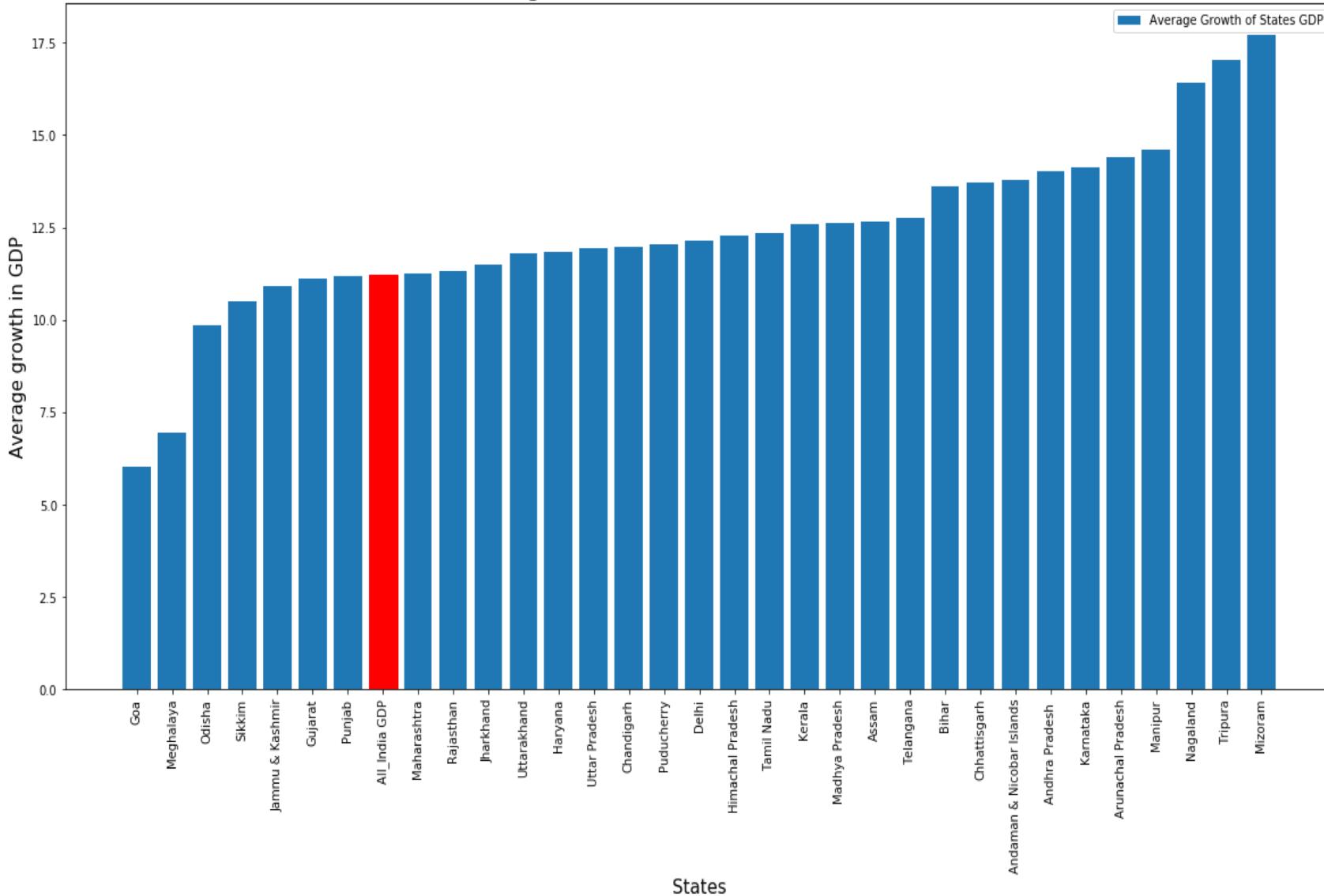
- Average growth of states for the duration 2013-14, 2014-15 and 2015-16.
- Which states have been growing consistently fast, and which ones have been struggling?
- Plot the total GDP of the states for the year 2015-16:

# Data Cleaning and Manipulation

- Filtering 2016-17 row as per the problem description
- Transforming Dataset into two data frames:
  1. 1)GDPs of states in different years
  2. 2)%Growth of states in different years

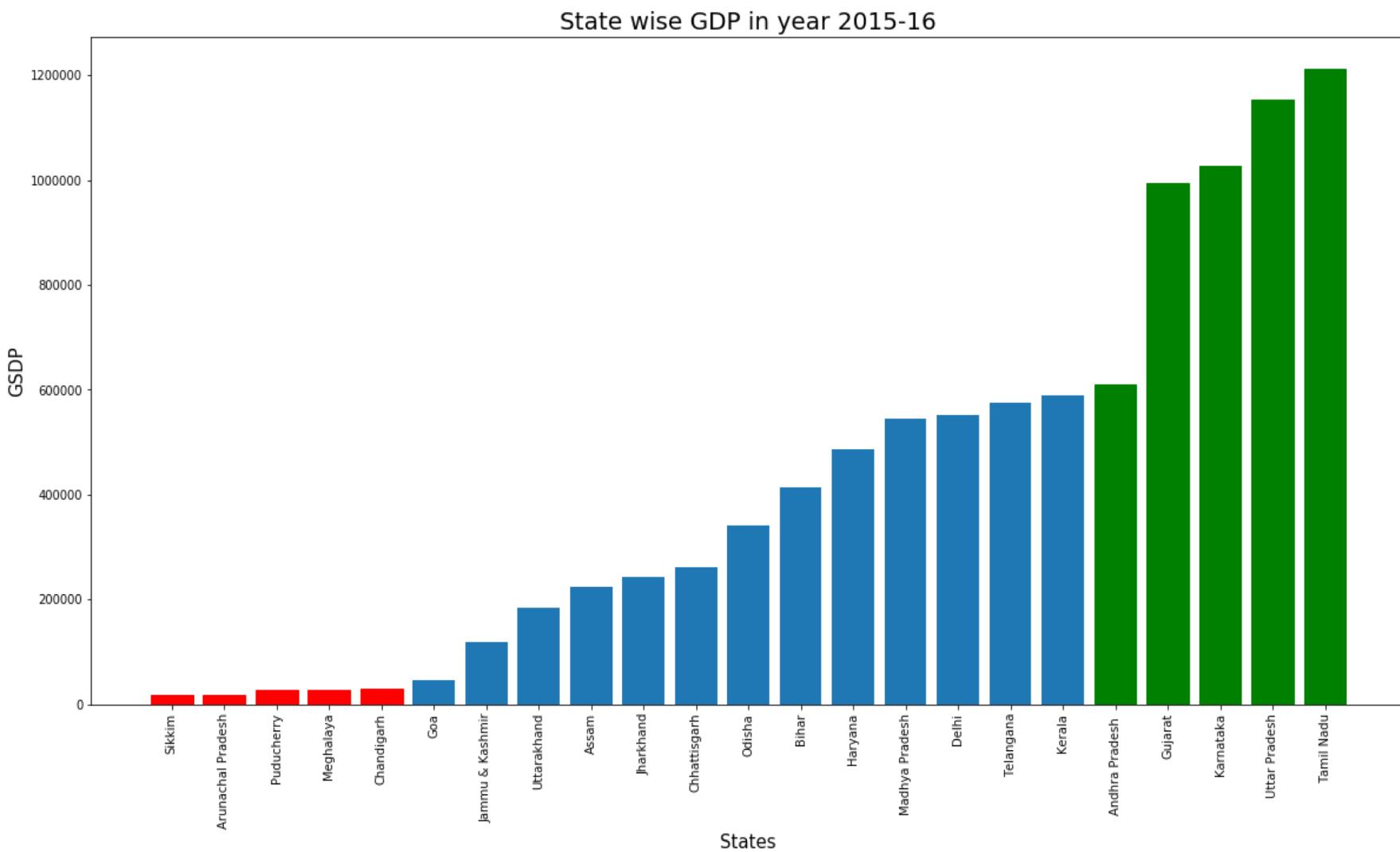
# Analyzing Average Growth in GDP

State wise growth in GDP in the duration 2013-2016



- We can clearly see the states like Mizoram, Tripura, Nagaland, Manipur, Karnataka are consistently growing whereas states like Meghalaya, Odisha, Sikkim, J&K have been struggling, their average growth in GDP is lower than growth of All\_India GDP.
- Average Growth Rate of Chhattisgarh (Home State) 13.703333 and Average Growth Rate of India is 11.203333. So, my home state i.e., Chhattisgarh's Average growth is higher than the National average growth rate by around 22.3%

# Analyzing State wise GDP in the year 2015-16



- In the above plot, Top five states are plotted with green and bottom five are plotted with red
- Top five States are:
  - 1) Tamil Nadu
  - 2) Uttar Pradesh
  - 3) Karnataka
  - 4) Gujarat
  - 5) Andhra Pradesh
- Bottom five states are:
  - 1) Sikkim
  - 2) Arunachal Pradesh
  - 3) Puducherry
  - 4) Meghalaya
  - 5) Chandigarh

## PART I-B

# Data Exploration

**Contents of each Dataset(33 dataset for each states):**

1. Sectors
2. Sub-Sectors
3. GSDP
4. GDP Per Capita of the state

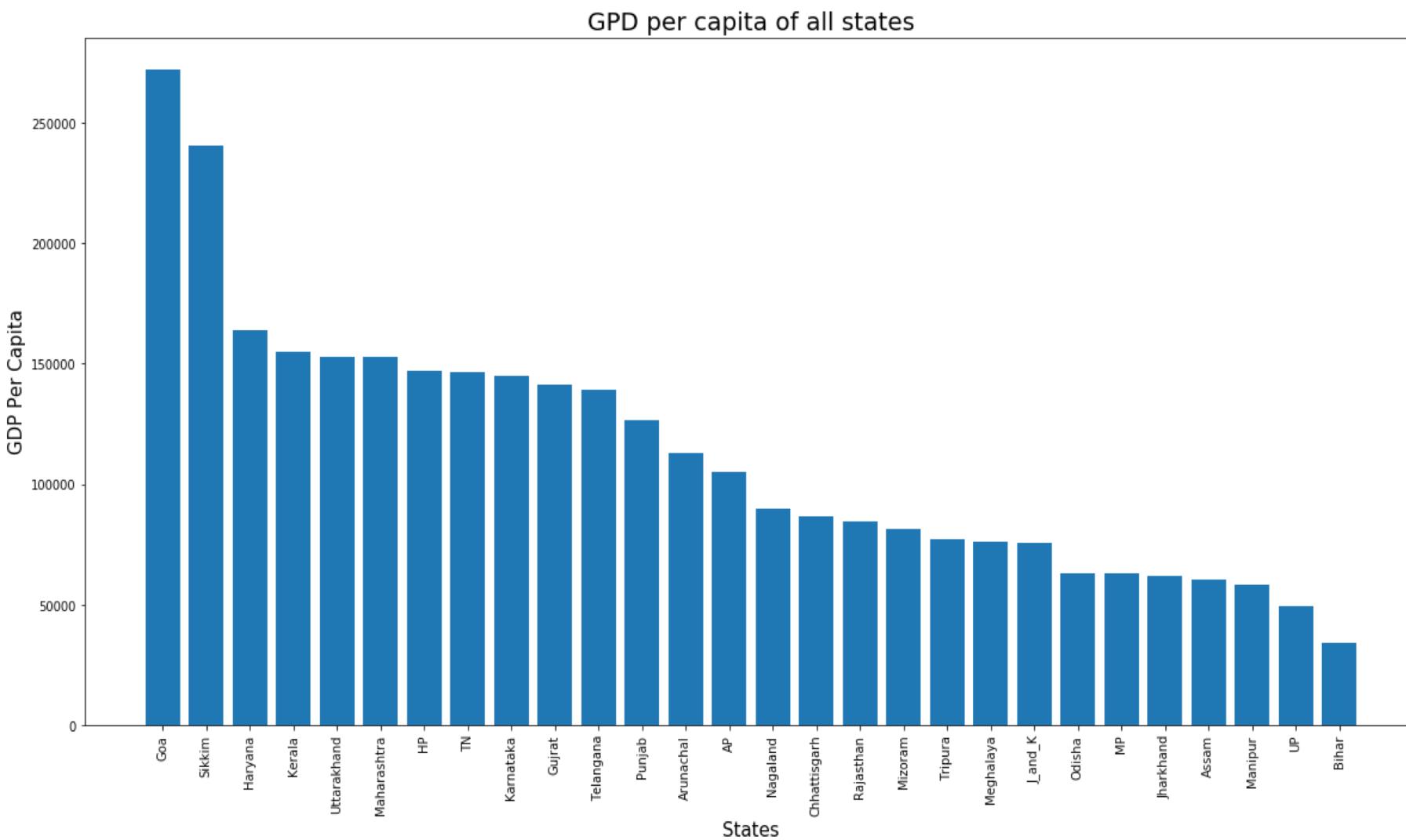
**Problem Statements:**

- Plot the GDP per capita for all the states.
- Plot the percentage contribution of the primary, secondary and tertiary sectors as a percentage of the total GDP for all the states.
- Categorise the states into four groups based on the GDP per capita
- Find the top 3/4/5 sub-sectors that contribute to approximately 80% of the GSDP of each category.
- Plot the contribution of the sub-sectors as a percentage of the GSDP of each category.

# Data Cleaning and Manipulation

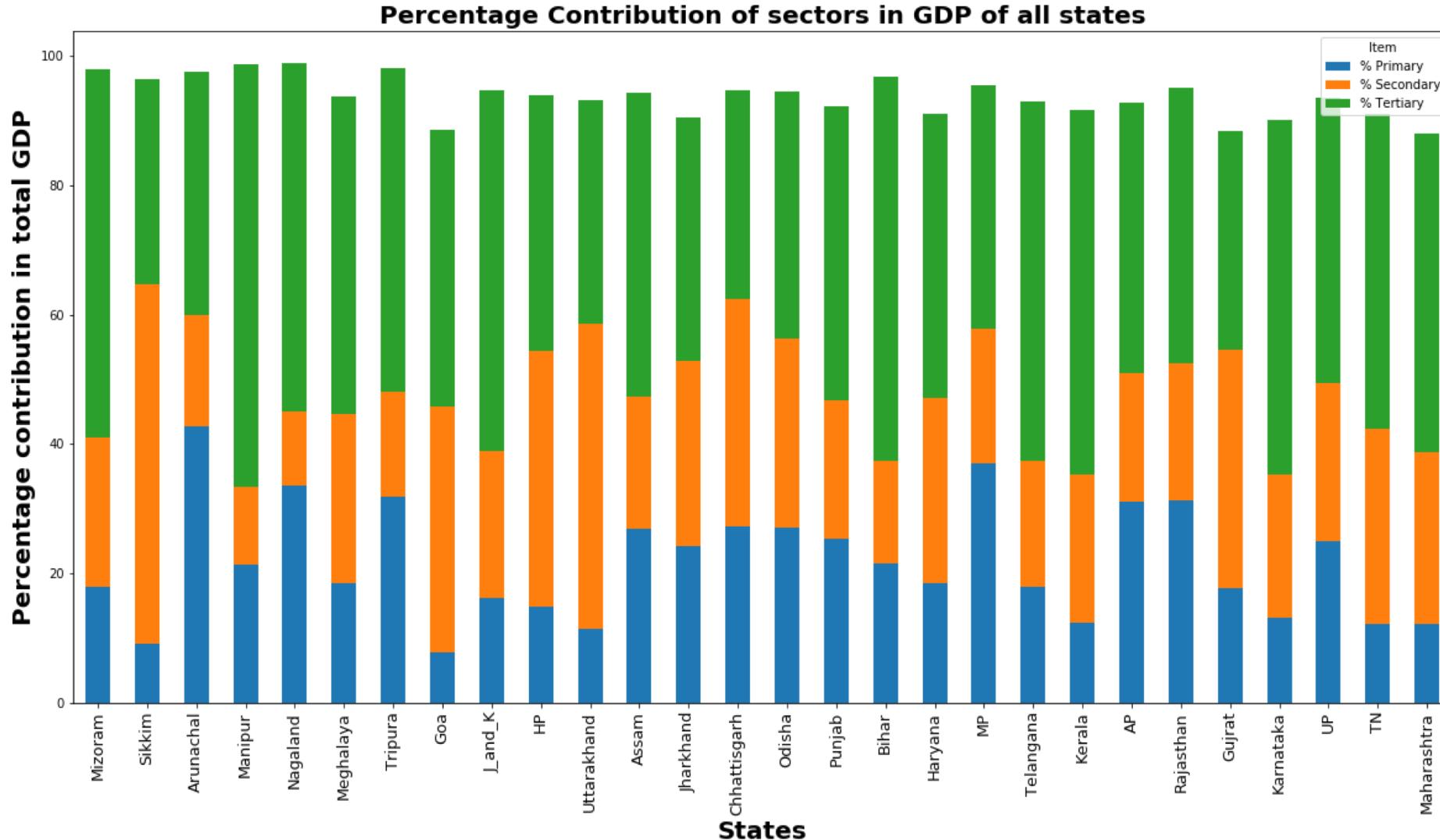
- Filtering Union Territories and selecting data only for year 2014-15 row as per the problem description
- Creating a new data frame by merging 33 states' data frames into one data frame

# Analyzing GDP Per Capita in all States



- The top 5 states having maximum GDP per capita are:
  - 1) Goa
  - 2) Sikkim
  - 3) Haryana
  - 4) Kerala
  - 5) Uttarakhand
- The bottom 5 states having minimum GDP per capita are:
  - 1) Bihar
  - 2) Uttar Pradesh
  - 3) Manipur
  - 4) Assam
  - 5) Jharkhand

# Analyzing Percentage Contribution of Sectors in GDP of all States



- The above plot is in the increasing order of GSDP as we move from Mizoram (Has the lowest GSDP) to Maharashtra (Has the highest GDP).
- In most of the states, percentage contribution in the GSDP is maximum by Tertiary sectors. While, states like Sikkim, Uttarakhand have Secondary sectors that contribute the most towards GSDP.

# Categorizing states on the basis of GPD Per Capita

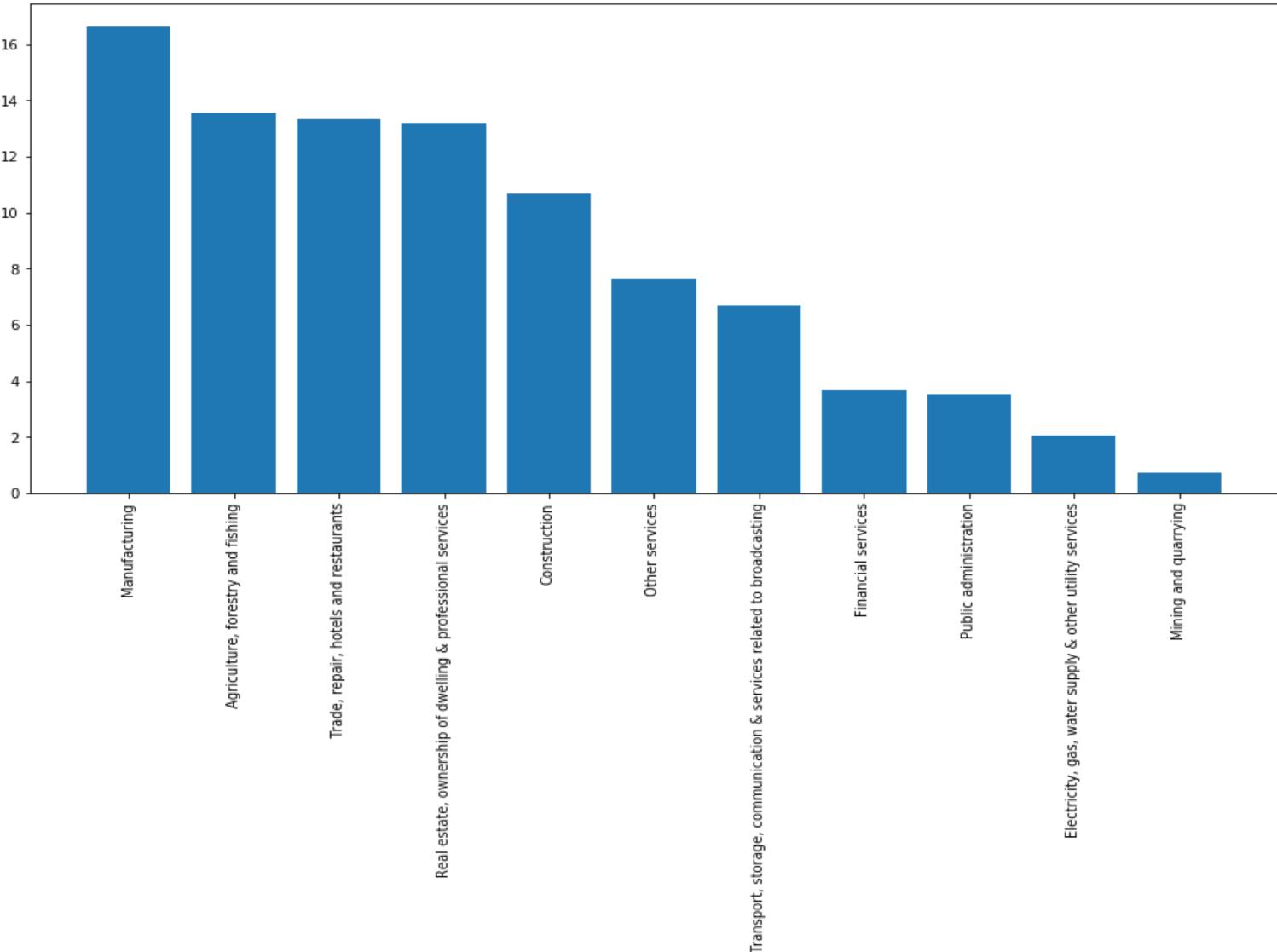
GDP Per Capita	States	Category	GDP Per Capita	States	Category	GDP Per Capita	States	Category	GDP Per Capita	States	Category
153076	Uttarakhand	C1	104977	AP	C2	63122	Odisha	C3	33954	Bihar	C4
154778	Kerala	C1	112718	Arunachal	C2	75840	J_and_K	C3	49450	UP	C4
164077	Haryana	C1	126606	Punjab	C2	76228	Meghalaya	C3	58442	Manipur	C4
240274	Sikkim	C1	139035	Telangana	C2	77358	Tripura	C3	60621	Assam	C4
271793	Goa	C1	141263	Gujrat	C2	81413	Mizoram	C3	62091	Jharkhand	C4
States lying between 85 <sup>th</sup> and 100 <sup>th</sup> percentile			145141	Karnataka	C2	84837	Rajasthan	C3	62989	MP	C4
			146503	TN	C2	86860	Chhattisgarh	C3	States lying below 20 <sup>th</sup> percentile		
			147330	HP	C2	89607	Nagaland	C3			
			152853	Maharashtra	C2	States lying between 20 <sup>th</sup> and 50 <sup>th</sup> percentile					
States lying between 50 <sup>th</sup> and 85 <sup>th</sup> percentile											

- Plotting the contribution of the sub-sectors as a percentage of the GSDP and finding the top 3/4/5 sub-sectors that contribute to approximately 80% of the GSDP of each category.

# Finding the top 3/4/5 sub-sectors that contribute to approximately 80% of the GSDP of C1 category

	States	Kerala	Haryana	Uttarakhand	Goa	Sikkim	Total	Percentage	Top 80%
	Item								
	<b>Manufacturing</b>	4273567	7.75692e+06	5.86625e+06	1177608	550697	19625045.0	16.6132	16.6132
	<b>Agriculture, forestry and fishing</b>	5930617	8.01524e+06	1.60142e+06	308507	137447	15993232.0	13.5388	30.152
	<b>Trade, repair, hotels and restaurants</b>	8557345	4.98632e+06	1.74311e+06	380927	70568	15738265.0	13.3229	43.4749
	<b>Real estate, ownership of dwelling &amp; professional services</b>	7287633	6.97018e+06	831307	407099	75330	15571552.0	13.1818	56.6567
	<b>Construction</b>	7314003	3.70257e+06	1.34273e+06	165819	82058	12607184.0	10.6724	67.3291
	<b>Other services</b>	5728645	2.00158e+06	982430	180431	149265	9042352.0	7.65463	74.9837
	<b>Transport, storage, communication &amp; services related to broadcasting</b>	4020934	2.56062e+06	1.06669e+06	189656	47347	7885253.0	6.67511	81.6588

# Plotting the contribution of the sub-sectors as a percentage of the GSDP of C1 Category



- From above data frame and plot, We can say for the states under C1 i.e., Kerala, Haryana, Uttarakhand, Goa and Sikkim, sub-sectors like:
  - --> Manufacturing
  - --> Agriculture, forestry and fishing
  - --> Trade, repair, hotels and restaurants
  - --> Real estate, ownership of dwelling & professional services
  - --> Construction
  - --> Other services
  - --> Transport, storage, communication & services related to broadcasting
- have contributed **81.65%** in the GDP.

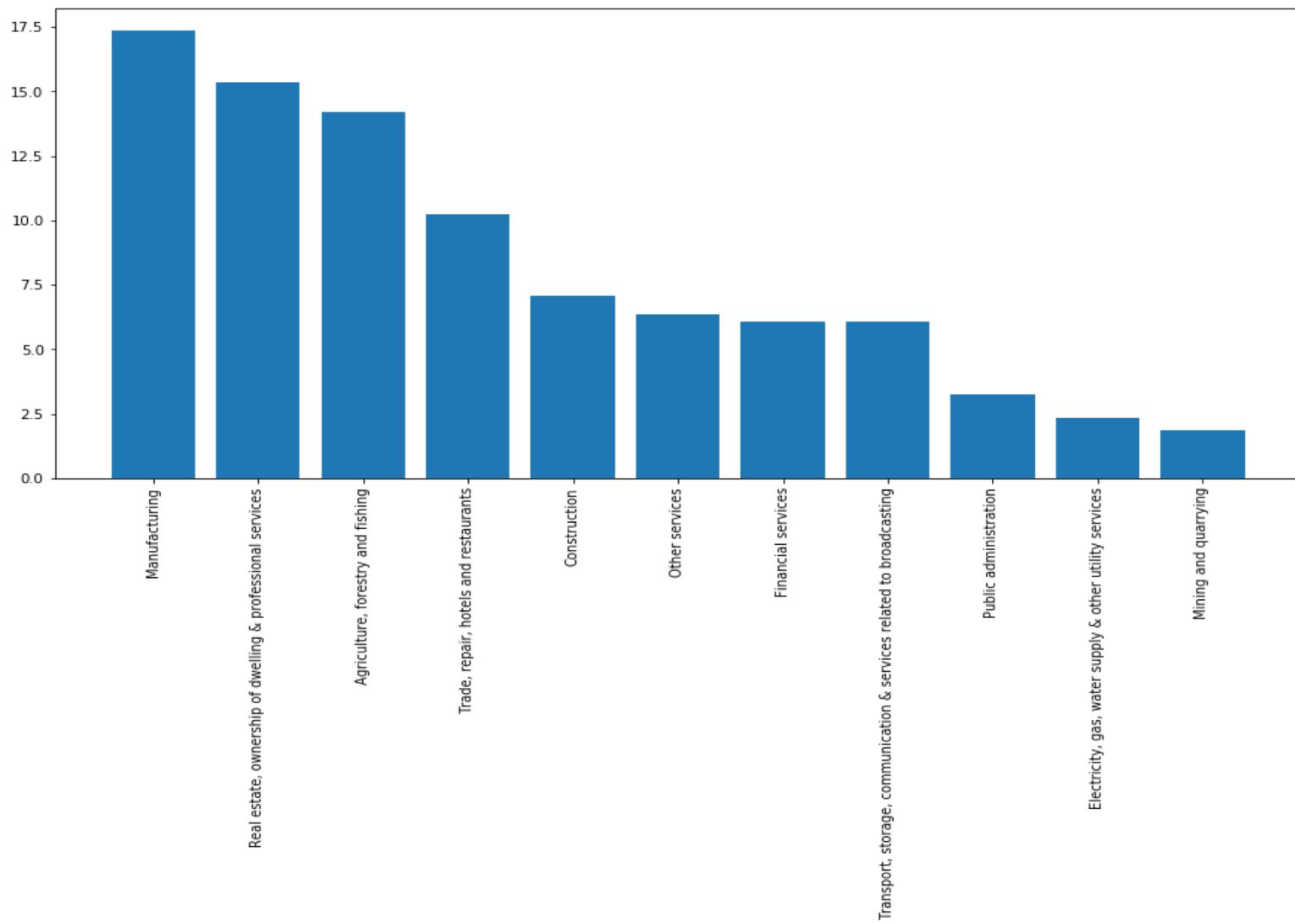
## Recommendations

- Manufacturing, Agriculture, Real states and Construction are the highest contributors, government can invest more on these sub-sectors to increase the contribution.
- Sub-sectors like Mining, Gas & Electricity contributes the least in GDP. Government should focus more on these sub-sectors by analyzing the need and target of these sub-sectors
- Government can invest on 5 star hotels for tourists in the places like Goa where hotels like Radisson blu, Roseate (Non Indian) have dominated the market to attract more contributions

# Finding the top 3/4/5 sub-sectors that contribute to approximately 80% of the GSDP of C2 category

States	Maharashtra	TN	Karnataka	Gujrat	AP	Telangana	Punjab	HP	Arunachal	Total	Percentage	Top 80%
Item												
<b>Manufacturing</b>	33660294	18914794	12953843	2.40875e+07	4672266	6353711	4790341	2543637	26120	108002544.0	17.3406	17.3406
<b>Real estate, ownership of dwelling &amp; professional services</b>	30718051	16830213	24766393	5.1795e+06	4405409	9478839	3142786	1125937	48418	95695548.0	15.3647	32.7053
<b>Agriculture, forestry and fishing</b>	16475655	13064238	11219422	1.377e+07	14819416	7591501	9285716	1514981	686117	88427015.0	14.1976	46.903
<b>Trade, repair, hotels and restaurants</b>	15839100	12895842	8991658	1.01787e+07	4233400	6494607	4419919	615496	60421	63729156.0	10.2322	57.1352
<b>Construction</b>	9450211	12216718	6104799	5.52602e+06	4664889	2854024	2202962	808256	147842	43975718.0	7.06064	64.1958
<b>Other services</b>	10806363	7430115	5308174	3.12341e+06	4215389	4158229	3303041	923164	218728	39486616.0	6.33988	70.5357
<b>Financial services</b>	16143324	5598498	4094169	4.60664e+06	1900863	3023729	2057520	362521	25207	37812475.0	6.07109	76.6068
<b>Transport, storage, communication &amp; services related to broadcasting</b>	9697246	7188320	5097652	4.55591e+06	5076984	3604741	1951809	552234	35203	37760099.0	6.06268	82.6695

# Plotting the contribution of the sub-sectors as a percentage of the GSDP of C2 Category



- From above data frame and plot, We can say for the states under C2 i.e., Maharashtra, Tamil Nadu, Karnataka, Gujrat, Andhra Pradesh, Telangana, Punjab, Himachal Pradesh and Arunachal Pradesh, sub-sectors like:
    - --> Manufacturing
    - --> Real estate, ownership of dwelling & professional services
    - --> Agriculture, forestry and fishing
    - --> Trade, repair, hotels and restaurants
    - --> Construction
    - --> Other services
    - --> Financial services
- have contributed **76.6%** in the GDP.

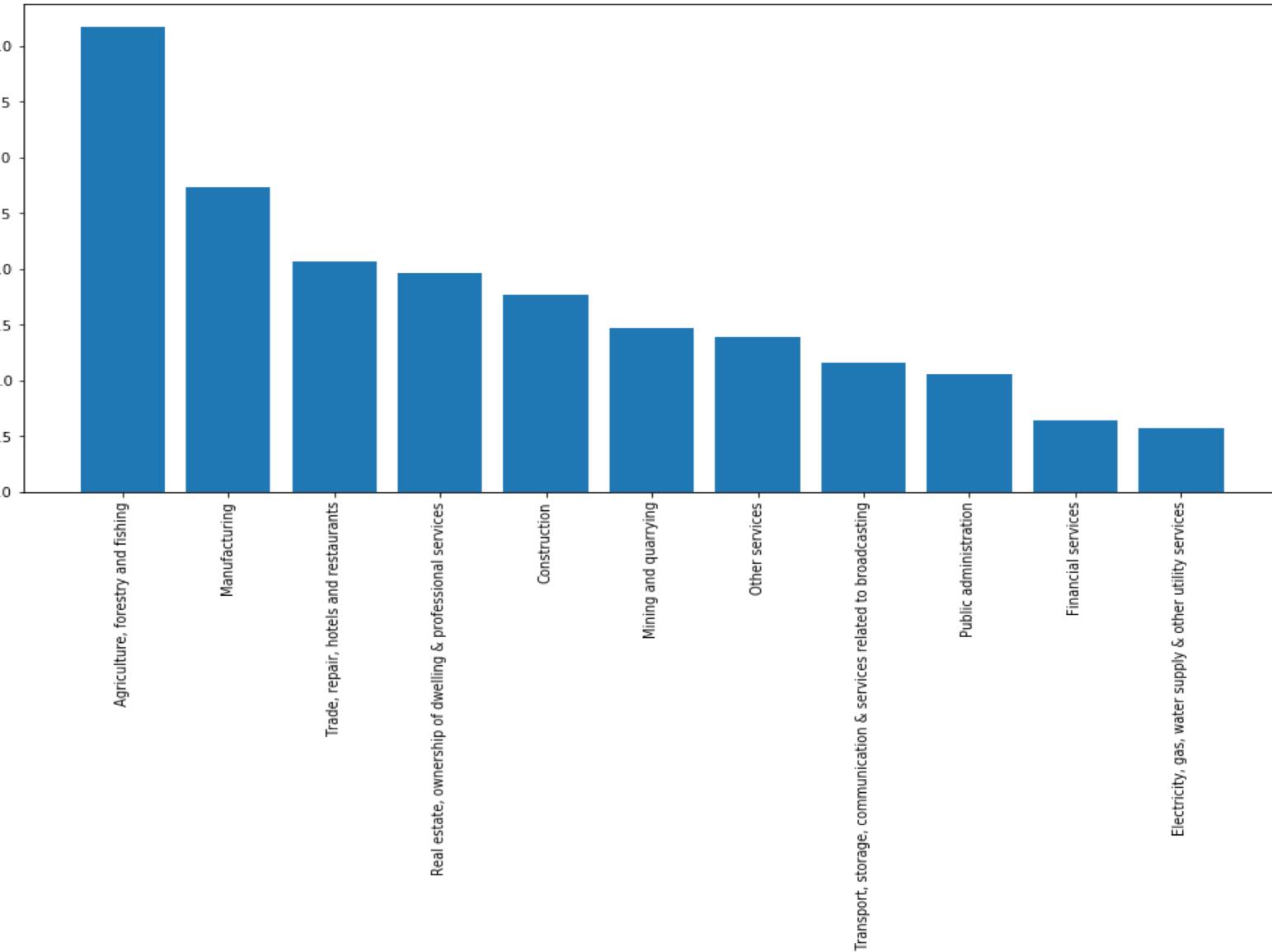
## Recommendations

- Manufacturing, Agriculture, Real estates and Trade, Repairs, Hotels are the highest contributors. Government can invest more on these sub-sectors to increase the contribution.
- Sub-sectors like Mining, Gas & Electricity contributes the least in GDP. Government should focus more on these sub-sectors by analyzing the need and target of these sub-sectors
- Government can set up new plants for production of Gas and Electricity

# Finding the top 3/4/5 sub-sectors that contribute to approximately 80% of the GSDP of C3 category

	States	Rajasthan	Odisha	Chhattisgarh	J_and_K	Tripura	Meghalaya	Nagaland	Mizoram	Total	Percentage	Top 80%
	Item											
<b>Agriculture, forestry and fishing</b>	15044394	4657383	3948847	1586705	799825	366521	607897	164630	27176202.0	20.8339	20.8339	
<b>Manufacturing</b>	6552580	5297939	4370593	893207	228625	433213	18346	7283	17801786.0	13.6472	34.4811	
<b>Trade, repair, hotels and restaurants</b>	7297290	2703923	1535571	889931	390423	383974	140781	105641	13447534.0	10.3092	44.7903	
<b>Real estate, ownership of dwelling &amp; professional services</b>	6451997	1994473	2462166	1340082	190704	150409	159651	45035	12794517.0	9.80856	54.5988	
<b>Construction</b>	5353326	2147271	2669855	785503	177899	150256	156072	111249	11551431.0	8.85558	63.4544	
<b>Mining and quarrying</b>	4069385	2787414	2451970	33621	142391	84529	8280	7438	9585028.0	7.34809	70.8025	
<b>Other services</b>	4164287	1879738	1112232	946826	323287	214211	259186	150489	9050256.0	6.93812	77.7406	
<b>Transport, storage, communication &amp; services related to broadcasting</b>	3814461	1758042	871770	712552	155956	148189	77521	45217	7583708.0	5.81384	83.5545	
<b>Public administration</b>	2460364	1152119	867982	1349880	338244	239782	295424	179516	6883311.0	5.2769	88.8314	
<b>Financial services</b>	1827413	1018384	739057	374011	86094	64091	60393	21185	4190628.0	3.21263	92.044	
<b>Electricity, gas, water supply &amp; other utility services</b>	1122888	564063	1198438	597421	77870	54473	37944	104953	3758050.0	2.881	94.925	

# Plotting the contribution of the sub-sectors as a percentage of the GSDP of C3 Category



- From above data frame and plot, We can say for the states under C3 i.e., Rajasthan, Odisha, Chhattisgarh, Jammu and Kashmir, Tripura, Meghalaya, Nagaland, Mizoram, sub-sectors like:
  - --> Agriculture, forestry and fishing
  - --> Manufacturing
  - --> Trade, repair, hotels and restaurants
  - --> Real estate, ownership of dwelling & professional services
  - --> Construction
  - --> Mining and Quarrying
  - --> Other services
- have contributed **77.8%** in the GDP.

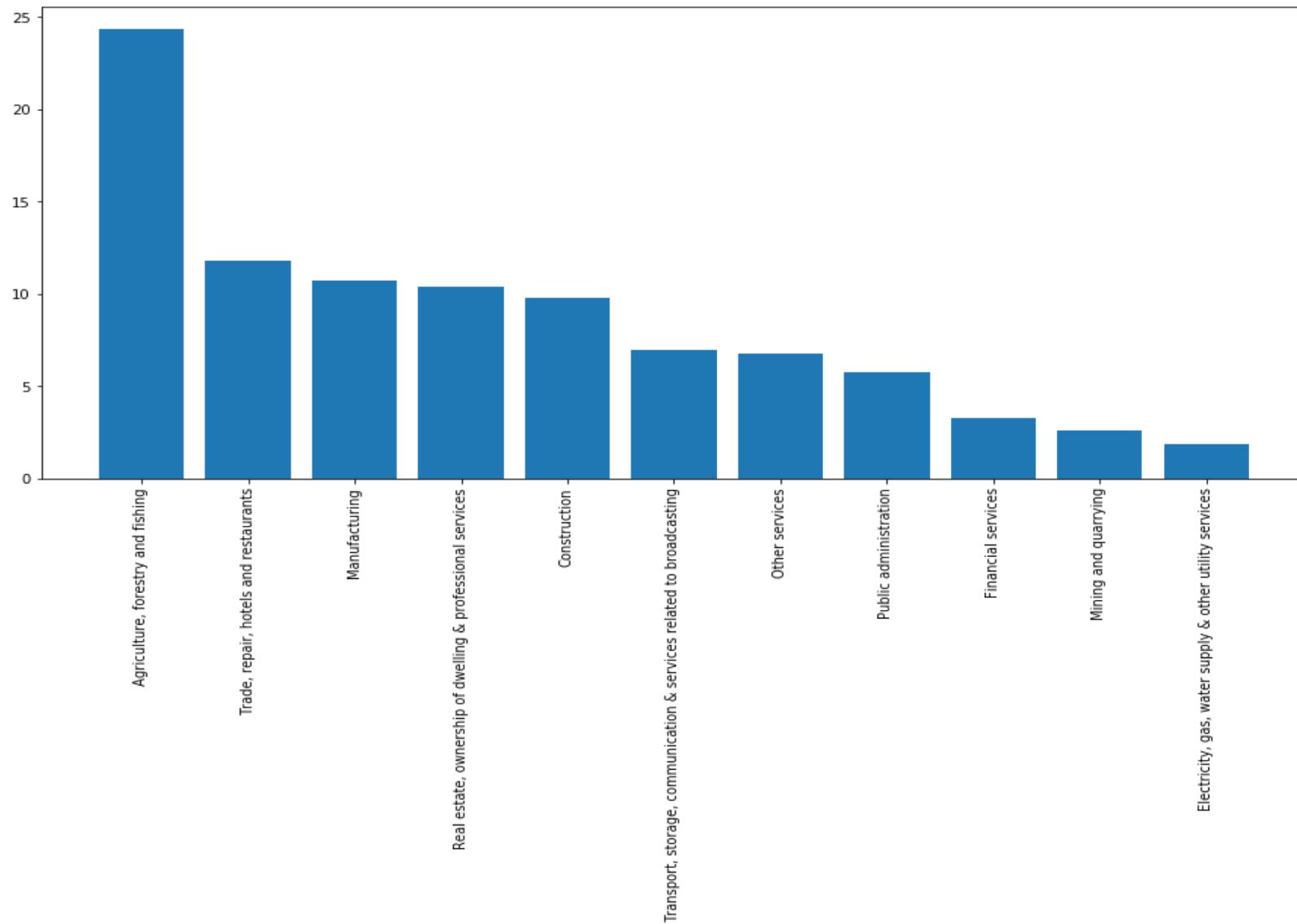
## Recommendations

- Agriculture have dominated all the other sub-sectors in C3 category. Government can invest more on Agriculture by investing on institutions for Agriculture studies.
- Government can also introduce schemes for farmers that'll make them more efficient towards their land and will empower their coming generations.

# Finding the top 3/4/5 sub-sectors that contribute to approximately 80% of the GSDP of C4 category

	States	UP	MP	Bihar	Jharkhand	Assam	Manipur	Total	Percentage	Top 80%
	Item									
	<b>Agriculture, forestry and fishing</b>	25097754	16235647	7951890	3211065	3855548	383140	56735044.0	24.3235	24.3235
	<b>Trade, repair, hotels and restaurants</b>	9437243	5357515	7448373	1991359	2987155	262950	27484595.0	11.7832	36.1067
	<b>Manufacturing</b>	12261649	4368833	2189965	4114148	2002936	49501	24987032.0	10.7125	46.8192
	<b>Real estate, ownership of dwelling &amp; professional services</b>	14548185	2660123	3740641	1656784	1412466	159335	24177534.0	10.3654	57.1846
	<b>Construction</b>	11256450	4403151	3449763	1789834	1733568	143182	22775948.0	9.76452	66.9491
	<b>Transport, storage, communication &amp; services related to broadcasting</b>	7404509	2865802	3147173	1470022	1194568	109726	16191800.0	6.94176	73.8909
	<b>Other services</b>	5034623	2747805	4587589	1375410	1795658	317930	15859015.0	6.79909	80.6899
	<b>Public administration</b>	6152124	2497321	2078171	1088325	1373611	297078	13486630.0	5.782	86.4719
	<b>Financial services</b>	3392275	1988794	1178022	551441	543651	30315	7684498.0	3.2945	89.7664
	<b>Mining and quarrying</b>	901501	1618373	68107	2037289	1471149	NaN	6096419.0	2.61366	92.3801
	<b>Electricity, gas, water supply &amp; other utility services</b>	2030625	1272905	345168	337489	296587	27490	4310264.0	1.8479	94.228

# Plotting the contribution of the sub-sectors as a percentage of the GSDP of C4 Category



- From above data frame and plot, We can say for the states under C4 i.e., Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, Assam and Manipur sub-sectors like:
  - --> Agriculture, forestry and fishing
  - --> Trade, repair, hotels and restaurants
  - --> Manufacturing
  - --> Real estate, ownership of dwelling & professional services
  - --> Construction
  - --> Transport, storage, communication & services related to broadcasting
  - --> Other services
- have contributed **80.68%** in the GDP.

# Recommendations

- Like C3, same recommendations can also be applied for C4.
- Apart from Agriculture, government should focus on Secondary and Tertiary sectors by empowering students. As education is the way to contribute more by both the sectors.
- Government can invest more on institutions to avail education even for poor students.

# Questions

- **How does the GDP distribution of the top states (C1) differ from the others?**
  - Top contributing sub sectors of these states don't show much difference in the contribution towards GDP. They contribute in the range of 13-16%. Whereas in other categories, range varies from 7-15%
- **Which sub-sectors seem to be correlated with high GDP?**
  - Sub-Sectors like Manufacturing, Real States and Agriculture seem to be correlated with high GDP.

# Data Exploration

## Data II

### Columns of Dataset:

1. Staes
2. Primary Dropout rates
3. Upper Primary Dropout rates
4. Secondary Dropout rates
5. Senior Secondary Dropout rates

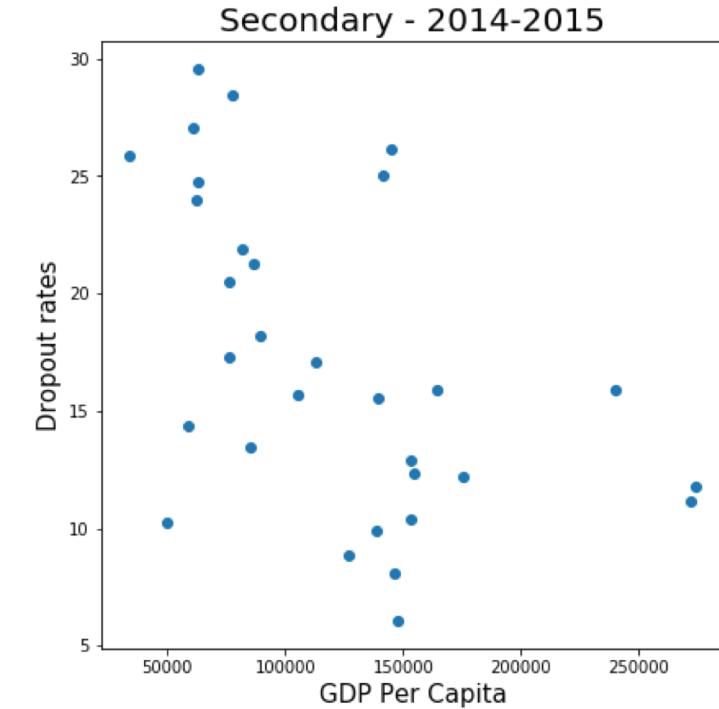
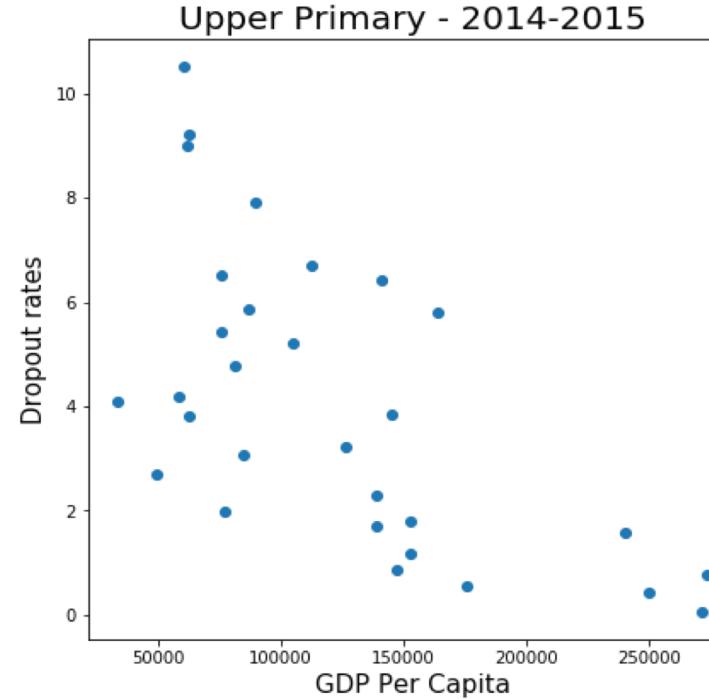
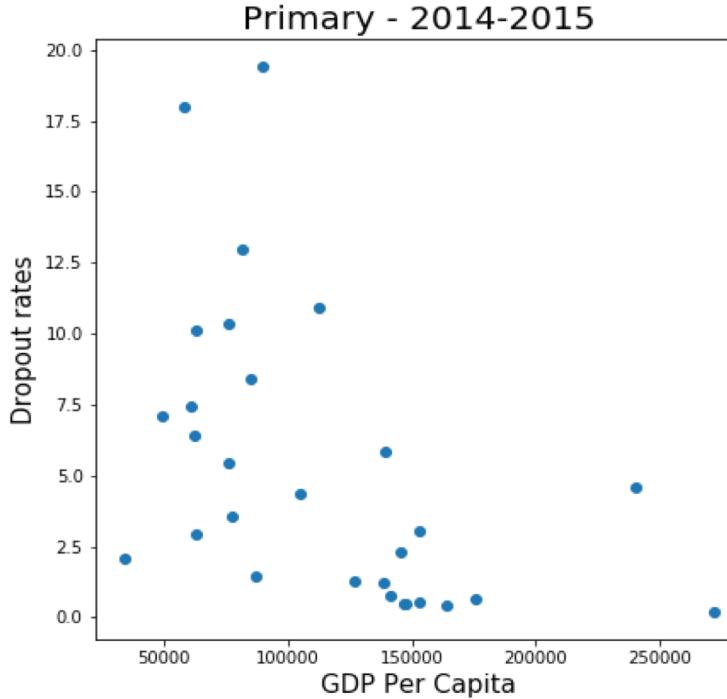
### Problem Statements:

- Analyse if there is any correlation of GDP per capita with dropout rates in education (primary, upper primary and secondary) for the year 2014-2015 for each state.

# Data Cleaning and Manipulation

- Selecting data only for year 2014-15 row as per the problem description
- Merging data with data 1-B that has per capita GDP for different states

# Analysing Drop out Rates with GDP Per Capita of different states



- For Primary and Secondary, plots are random.
- We can say that most of the states having low GDP per capita shows higher drop out rates.
- In Upper Secondary, We can see the decrease in drop out rates as GDP per capita increases.
- More interestingly, Upper Secondary shows not so big drop out rates even for the states having low GPD per capita