

# Project Greenery by Team NSU Wheatstone

*Taoseef Ishtiaq*  
1612142042  
taoseef13@gmail.com  
Dept. of ECE,  
North South University

*Arif Ur Rahaman*  
Chowdhury Suhan  
1610437042  
arif.suhan@northsouth.  
edu  
Dept. of ECE,  
North South University

*Md Sajid Ahmed*  
ID 1610364042  
sajidahmed12@gmail.c  
om  
Dept. of ECE,  
North South University

*Md Rakib Imtiaz*  
1610294642  
imtiaz.ayon96@gmail.c  
om  
Dept. of ECE,  
North South University

## *Abstract:*

The document contains a short report regarding the term project of the course CSE 445, Summer 2018 semester of team NSU Wheatstone. The project has been entitled as “Project Greenery”. NSU Wheatstone intend to make reliable-efficient prediction of crops production and environmental impact on crops based on previous years’ data. The most important task of the project is to collect a good dataset with a moderate size of data from authentic-reliable source. If the dataset size is large enough, more accurate prediction can be generated. Also another goal of the project is to use various machine learning algorithms to visualize which algorithm gives more accurate prediction. The project is believed to be very helpful for the people in real life, especially for the farmers’ community of the country and also for the government as well.

## *Keywords:*

Crops production, Prediction, Environmental impact, Machine learning, Linear Regression, Logistic Regression, Random Forest, SVM, K Nearest Neighbor, Artificial Neural Network.

## *Introduction:*

Being an agricultural country, research on

agriculture, crops production, crops management, weather impact can play a high role in people’s lives. Machine Learning, one of the hottest topics in computer science of today’s world can be interesting and very useful in the agriculture field. Through machine learning we can make better prediction, assume some pattern or classify future data. Thus future production of crops can be possible through implementing various machine learning algorithms, which is believed to be beneficial for the farmers’ community, the government and other people related with agriculture field. In the project, we intend to predict area wise future production of major crops of Bangladesh and environmental impact on crops based on previous years’ data. To do so, we have collected data of some of the major crops produced in Bangladesh of last 45 years. The collected data is open source in the government’s portal. But we still look forward to collect more data on environmental variables effecting crops (meteorological data) to make better prediction on weather based impact on crops.

## *Problem we are working on and the Solution:*

It is a matter of fact that, not every year the production of crops remain same. Some years if there are ample production, some year farmers

might have to face losses. Also to make a perfect budget, the government also need to know which crops can produce more money for the country through production. That is why it is important to predict the production of crops in advance and also to predict if there is any type of environmental disaster such as: flood, drought, heavy rainfall can damage certain area's crops. Through machine learning we are focusing to solve this problem so that the farmers can get to know which crops can be safer to produce and gain high income and the prediction can be useful for the government also.

*Our goal:* The goal of our project is to make smart, efficient, useful prediction of production of the major crops of Bangladesh and also to predict future environmental impact on crops.

*Motivation for our work:* As ours is an agricultural country, research on agriculture can have huge impact on people's lives. Also country's economy is hugely dependent on agriculture and many people are engaged with this field. That is why we have chosen agriculture side in motivation of bringing some good research for the people engaged in this field. To make a background study, we have studied a number of research papers <sup>[1], [2], [3], [4], [5]</sup> (both journals and conference papers) where various branches of Artificial Intelligence especially Machine Learning has been used.

#### *Background:*

We have extracted necessary data from some of the open source dataset provided by the Govt. of Bangladesh<sup>[6], [7]</sup>. Our data sets contain data about agriculture and atmosphere related meteorological data of different areas of Bangladesh. They include data about daily and monthly rain falls, production of major crops in

different areas, crop suitability, humidity and land conditions of different areas of Bangladesh. Data sets in the site is collected by the Government. It has been made available to public by Bangladesh Bureau Statistics and Informatics Division. In this portal, there are publicly available datasets from more than 35 Ministries and related agencies. We are still working to collect more suitable datasets from authentic resources. The data achieved so far since 1971 to 2015, the parameters we have decided to use are: Area Name/District Name, Name of the crops, Year of Production, Amount of Production in Tons, Rainfall Data, Temperature Data and Area of Land. Based on our achieved data the crops we have primarily selected to predict are: Aus Rice, Aman Rice, Boro Rice, Jute, Potato and Wheat. We have collected rainfall data since 1948 to predict the future impact of rainfall, flood, drought etc. on crops.

#### *Dataset:*

We have collected our dataset from an open source portal of Bangladesh government. The data is about the last 45 years of production statistics of major crops. We need to extract the necessary data from the dataset and organize accordingly. To make weather based prediction, we have collected daily rainfall data since 1948, we need to synchronize the rainfall data correctly according to location basis, to use the data. Still we are looking for more reliable and recent data for both weather and crops related prediction, especially multi parameters weather based data, as we only have the rainfall data so far. The followings are some of the pictures of our raw dataset.

# Estimates of Aus Rice

Sl. No.	Districts Name	1985-86								1986-87							
		Local		HYV		Pajam		Total		Local		HYV		Pajam		Total	
		Area (acres)	Producti on (tons)	Area (acres)	Product ion (tons)	Area (acres)	Produ ction (tons)	Area (acres)	Product ion (tons)	Area (acres)	Product ion (tons)	Area (acres)	Product ion (tons)	Area (acres)	Product ion (tons)	Area (acres)	Product ion (tons)
1	Bandarban	12170	6130	4515	4380	0	0	16685	10510	16650	9770	3635	3570	0	0	20285	13340
2	Chittagong	72350	31855	80845	66510	6975	5208	160170	103573	81195	34850	58290	41880	5110	3770	144595	80500
3	Comilla	322075	102580	91235	57965	0	0	413310	160545	328630	125970	101315	76310	0	0	429945	202280
4	Khagrachari	5840	2300	10215	7740	3050	1905	19105	11945	3320	795	6855	6295	1645	1105	11820	8195
5	Noakhali	207040	69545	107500	80225	0	0	314540	149770	278000	102515	163345	102000	0	0	441345	204515
6	Rangamati	9540	4930	4685	4820	55	46	14280	9796	9685	5080	4480	3875	85	65	14250	9020
7	Sylhet	333435	99585	79845	61105	4210	2459	417490	163149	312400	117650	148660	104645	12770	7885	473830	230180
8	Dhaka	222485	78510	58730	44380	1640	798	282855	123688	272160	107880	54250	34440	3305	1535	329715	143855
9	Faridpur	554835	144830	6065	5015	0	0	560900	149845	592000	202180	10530	9480	0	0	602530	211660
10	Jamulpur	246625	84240	36685	35600	0	0	283310	119840	201355	87780	31420	20275	0	0	232775	108055
11	Kishoregonj	201810	74810	62850	51020	0	0	264660	125830	168900	66635	77835	58100	0	0	246735	124735
12	Mymensingh	295815	106185	139570	108620	5245	2916	440630	217721	280605	102840	144765	101475	5330	2680	430700	206995
13	Tangail	205870	65650	13325	10340	0	0	219195	75990	226300	69770	14020	9370	0	0	240320	79140
14	Barisal	403025	116620	75850	55345	0	0	478875	171965	432560	155940	85530	59665	0	0	518090	215605
15	Jessore	338735	113370	57855	43295	0	0	396590	156665	461215	176620	70875	63755	0	0	532090	240375
16	Khulna	73050	24950	10630	7200	0	0	83680	32150	73885	31715	10480	5715	0	0	84365	37430
17	Kushtia	258940	101230	68975	69115	0	0	327915	170345	320355	130585	75895	67220	0	0	396250	197805
18	Patuakhali	186870	55205	20890	15440	0	0	207760	70645	227905	72560	30100	15660	0	0	258005	88220
19	Bogra	121655	37465	57020	46820	0	0	178675	84285	129745	45035	58710	45885	0	0	188455	90920
20	Dinajpur	320725	123435	61815	46475	0	0	382540	169910	265310	105860	49800	39815	0	0	315110	145675
21	Pabna	336915	101035	3435	2895	0	0	340350	103930	259450	95385	2590	1995	0	0	262040	97380
22	Rajshahi	403880	134355	30250	19925	775	549	434905	154829	354355	143765	29115	24525	675	480	384145	168770
23	Rangpur	705935	227410	85765	62895	0	0	791700	290305	535350	192810	80185	52495	0	0	615535	245305
	<b>Bangladesh</b>	<b>5839620</b>	<b>1906225</b>	<b>1168550</b>	<b>907125</b>	<b>21950</b>	<b>13881</b>	<b>7030120</b>	<b>2827231</b>	<b>5831330</b>	<b>2183990</b>	<b>1312680</b>	<b>948445</b>	<b>28920</b>	<b>17520</b>	<b>7172930</b>	<b>3149955</b>

# Estimates of Amon rice

Table:1.2.3																	
Sl. No.	Districts Name	1973-74								1974-75							
		Broadcast Aman		Local Transplant		HYV		Total		Broadcast Aman		Local Transplant		HYV		Total	
		Area (acres)	Productio n (tons)	Area (acres)	Product ion (tons)	Area (acres)	Product ion (tons)	Area (acres)	Producti on (tons)	Area (acres)	Producti on (tons)	Area (acres)	Producti on (tons)	Area (acres)	Producti on (tons)	Area (acres)	Producti on (tons)
1	Dhaka	486700	166420	175000	71815	65000	66680	726700	304915	460265	142520	203000	84365	30050	25530	693315	252415
2	Kishoregonj	180765	77015	259000	105925	115000	108250	554765	291190	125000	41680	327960	122885	24040	22630	477000	187195
3	Mymensingh	176300	72335	655520	302600	243435	245635	1075255	620570	105665	36325	744130	384380	127850	122305	977645	543010
4	Tangail	224585	65735	124510	76635	21715	23760	370810	166130	263170	91785	128525	60405	18000	21015	409695	173205
5	Faridpur	723800	234620	4645	1910	210	145	728655	236675	661450	181060	5540	3230	240	175	667230	184465
6	Chittagong	0	0	392225	190590	187735	181660	579960	372250	0	0	409540	220865	151010	122525	560550	343390
7	Chittagong H. T.	2280	750	37040	16670	23670	20915	62990	38335	1850	585	41815	19635	14530	12855	58195	33075
8	Noakhali	162900	51300	474350	153450	108200	92565	745450	297315	80300	23695	492310	182370	61310	53410	633920	259475
9	Comilla	565335	232935	175580	88855	183390	193350	924305	515140	453855	117625	188155	71375	88165	51635	730175	240635
10	Sylhet	517215	204790	445960	217305	154310	151960	1117485	574055	338100	115270	496380	224995	107480	102975	941960	443240
11	Rajshahi	329000	118680	575000	235155	69630	50975	973630	404810	383305	141770	636795	265095	54220	42830	1074320	449695
12	Dinajpur	23485	9675	637000	275105	216000	200070	876485	448480	17000	6830	705275	321935	128530	112455	858085	441220
13	Rangpur	84700	35620	944000	451905	270130	287495	1298830	775020	71445	25425	1036480	508135	168310	158980	1276235	692540
14	Bogra	10170	4470	423200	203175	141970	118235	575340	325880	8325	3680	456640	238155	103900	88175	568865	330010
15	Pabna	269880	72715	87000	37185	29550	24645	386430	134545	340675	92165	86665	39375	19460	15780	446800	147320
16	Khulna	109490	38370	752550	299275	51000	39565	913040	377210	64000	23030	784035	342000	39160	37995	887195	403025
17	Bakergonj	177435	50235	618765	182595	108250	101025	904450	333855	169665	47290	628300	208400	65100	45345	863065	301035
18	Patuakhali	0	0	576510	128930	11795	7500	588305	136430	0	0	579290	225920	7960	6545	857250	232465
19	Jessore	393430	139775	170000	72310	27500	29025	590930	241110	400000	165090	187370	88660	18630	18370	606000	272120
20	Kushtia	94500	39810	30000	15420	14500	13385	139000	68615	105380	38290	42350	23110	11080	9065	158810	70465
	Bangladesh	4531970	1615250	7557855	3126810	2042990	1956840	14132815	6698900	4049450	1294115	8180555	3635290	1239025	1070595	13469030	6000000

Estimates of Jute																			
Table:2.3																			
Sl. No.	Districts Name	1975-76						1976-77						1977-78					
		Jute		Mesta		Total		Jute		Mesta		Total		Jute		Mesta		Total	
		Area in Acre	Producti on in Bales	Area in Acre	Produc tion in Bales	Area in Acre	Producti on in Bales	Area in Acre	Producti on in Bales	Area in Acre	Produc tion in Bales	Area in Acre	Producti on in Bales	Area in Acre	Productio n in Bales	Area in Acre	Produc tion in Bales	Area in Acre	Productio n in Bales
1	Dhaka	94415	347390	980	3240	95395	350630	138500	516605	1960	6665	140460	523270	150705	559116	2450	7570	153155	566686
2	Kishoregonj	138510	438060	0	0	138510	438060	98970	238515	0	0	98970	238515	103830	205583	0	0	103830	205583
3	Mymensingh	177775	545695	3010	8265	180785	553960	229175	623355	1675	12155	230850	635510	264575	740810	2965	7412	267540	748222
4	Tangail	74060	250310	1355	2800	75415	253110	113485	363150	2400	4440	115885	367590	131005	394325	3000	6180	134005	400505
5	Faridpur	113090	381030	1185	2325	114275	383355	133790	508400	1200	2450	134990	510850	172475	534673	1435	2698	173910	537371
6	Chittagong	295	750	10	20	305	770	295	755	10	15	305	770	180	482	10	21	190	503
7	Chittagong H.T.	630	1690	65	175	695	1865	485	1140	65	160	550	1300	425	999	55	135	480	1134
8	Noakhali	10870	31910	0	0	10870	31910	13035	35715	0	0	13035	35715	9500	20710	0	0	9500	20710
9	Comilla	71745	263975	0	0	71745	263975	85175	246155	0	0	85175	246155	80455	867915	0	0	80455	867915
10	Sylhet	13335	27285	0	0	13335	27285	12220	24320	0	0	12220	24320	5200	5200	0	0	5200	5200
11	Rajshahi	41220	25255	495	1565	41715	26820	51905	148965	550	1630	52455	150595	62560	184552	625	1737	63185	186289
12	Dinajpur	65960	167330	1425	2685	67385	170015	61010	145815	1420	2670	62430	148485	69010	191848	1300	2600	70310	194448
13	Rangpur	273055	764800	10510	31505	283565	796305	315045	941985	7780	24740	322825	966725	326225	1014560	7800	28800	334025	1042640
14	Bogra	32975	90320	515	1055	33490	91375	45120	114155	570	1110	45690	115265	48185	129136	595	1297	48780	130433
15	Pabna	46250	128105	775	2135	47025	130240	60950	179195	990	2730	61190	181925	72825	220660	990	2930	73815	223590
16	Khulna	14985	42895	50	75	15035	42970	33040	97470	110	155	33150	97625	44260	114191	405	644	44665	114835
17	Bakergonj	8770	16950	490	830	9260	17780	10180	20565	585	725	10765	21290	15600	27300	735	1088	16335	28388
18	Pataukhali	1105	1935	0	0	1105	1935	1250	1900	0	0	1250	1900	1200	1713	0	0	1200	1713
19	Jessore	67685	229540	1205	4035	68890	233575	141670	454760	1800	5670	143470	460430	172035	533309	3950	11534	175985	544843
20	Kushia	30595	82535	605	1620	31200	84155	58130	143000	850	2075	58980	145075	74975	212179	305	1363	75480	213542
Bangladesh		1277325	3837760	22675	62330	1300000	3900090	1603430	4805920	21965	67390	1625395	4873130	1085225	5592661	26820	75280	1832045	6034505

### Estimates of Wheat

Table:4.9													
Sl No	District Name	1990-91		1991-92		1992-93		1993-94		1994-95		1995-96	
		Area in Acre	Production in M tons	Area in Acre	Production in M tons	Area in Acre	Production in M tons	Area in Acre	Production in M tons	Area in Acre	Production in M tons	Area in Acre	Production in M tons
1	Bandarban	0	0	15	10	120	70	0	0	0	0	0	0
2	Chittagonj	0	0	15	10	30	10	40	20	140	70	260	130
3	Comilla	136430	81130	103040	76730	108410	85210	112450	92250	110500	103900	115590	104110
4	Khagrachari	0	0	0	0	10	10	0	0	0	0	0	0
5	Noakhali	810	210	1080	410	2240	1070	3090	2130	4750	2790	1320	700
6	Rangamati	10	0	40	10	70	60	210	180	150	130	20	20
7	Sylhet	21070	12140	18560	10840	19580	14470	18610	10900	19180	12980	9870	7040
8	Dhaka	79530	50230	76450	61290	79740	57410	77320	57660	80430	59920	84420	69240
9	Faridpur	112820	67550	110100	72980	112350	664380	94180	71850	102500	69060	124690	89640
10	Jamalpur	57450	39270	57910	42060	69420	51160	63340	45340	65180	51870	68810	52450
11	Kishoregonj	26510	17470	31440	23940	33650	25000	34450	24650	32910	23320	35700	26460
12	Mymensingh	30600	20300	25290	19390	33010	23600	31800	22250	29340	19770	35740	24490
13	Tangail	47460	28590	47170	33660	52890	41890	58860	42600	54890	42620	61200	46720
14	Barisal	9850	4790	8860	4660	11450	8380	12430	8620	14900	11140	14380	10150
15	Jessore	106010	74230	103040	75490	122510	98250	125000	95500	148550	133520	161840	141540
16	Khulna	7760	5070	8110	5740	4410	3640	6650	6260	8110	7360	12460	10970
17	Kustia	111310	72380	113200	80530	121100	117590	113260	98710	117410	104130	124770	107540
18	Patuakhali	540	240	190	80	760	220	1250	610	5	3	5	3
19	Bogra	51470	40670	39930	33700	39590	35390	41150	36830	400990	39670	48700	46860
20	Dinajpur	206970	156600	184920	146390	230760	171450	213690	152900	221290	158840	230650	168750
21	Pabna	175500	118640	184190	137770	204580	139110	198610	133510	210980	144590	237860	162300
22	Rajshahi	125510	92290	142500	104670	149520	124400	150310	119220	151210	122480	180590	154100
23	Rangpur	172440	122490	163940	134690	177730	112860	163420	109060	166620	136830	180560	145920
<b>Bangladesh</b>		<b>1480050</b>	<b>1004290</b>	<b>1419990</b>	<b>1065050</b>	<b>1573930</b>	<b>1775630</b>	<b>1520120</b>	<b>1131050</b>	<b>1940035</b>	<b>1244993</b>	<b>1729435</b>	<b>1369133</b>

### Estimates of Potato

1988-1989

Table:3.11									
Sl No	District Name	Local		HYV		Indian		Total	
		Area in Acre	Production in M tons	Area in Acre	Production in M tons	Area in Acre	Production in M tons	Area in Acre	Production in M tons
1	Bandarban	654	3372	203	874	0	0	857	4246
2	Chittagonj	4347	21157	0	0	0	0	4347	21157
3	Comilla	2217	7120	43183	244653	0	0	45400	251773
4	Khagrachari	0	0	244	561	0	0	244	561
5	Noakhali	352	1005	1733	7133	0	0	2085	8138
6	Rangamati	320	806	164	442	0	0	484	1248
7	Sylhet	7313	23933	4805	18172	0	0	12118	42105
8	Dhaka	1258	3562	35924	244325	0	0	37182	247887
9	Faridpur	1265	3953	755	3750	0	0	2020	7703
10	jamalpur	1243	3484	4572	18906	0	0	5815	22390
11	Kishoregonj	7910	15594	4335	16190	0	0	12245	31784
12	Mymensingh	6302	13045	1581	5916	0	0	7883	18961
13	Tangail	4470	10075	3445	12161	0	0	7915	22236
14	Barisal	2288	9679	2800	2886	0	0	5088	12565
15	Jessore	442	1197	5270	21401	0	0	5712	22598
16	Khulna	160	176	3570	10736	0	0	3730	10912
17	Kustia	730	2210	2245	8899	115	334	3090	11443
18	Patuakhali	0	0	1232	2994	0	0	1232	2994
19	Bogra	21525	52097	8670	28406	0	0	30195	80503
20	Dinajpur	14966	43436	11700	45681	381	987	27047	90104
21	Pabna	10116	30181	3192	10480	0	0	13308	40661
22	Rajshahi	72658	34585	10969	33956	3711	10721	87338	79262
23	Rangpur	8653	17660	13075	40467	0	0	21728	58127
<b>Bangladesh</b>		<b>169189</b>	<b>298327</b>	<b>163667</b>	<b>778989</b>	<b>4207</b>	<b>12042</b>	<b>337063</b>	<b>1089358</b>

Estimates of Aus Rice							
Table 1.1.23							
Zila/Division		2014-2015					
		Local		HYV		Total	
		Area (acres)	Production (M.tons)	Area (acres)	Production (M.tons)	Area (acres)	Production (M.tons)
1	Bandarban	13927	9030	5086	4841	19013	13871
2	Chittagong	17423	11056	91152	96970	108575	108026
3	Cox's Bazar	20	14	4385	4095	4405	4110
4	Comilla	506	257	169455	172048	169961	172306
5	Chandpur	2791	1224	26517	24745	29308	25969
6	Brahmanbaria	2121	1037	9593	9063	11714	10100
7	Khagrachari	2292	1369	4114	3319	6406	4687
8	Noakhali	68007	37824	64745	55585	132752	93409
9	Lakshimpur	36590	20077	43446	37721	80036	57799
10	Feni	10144	6778	19125	19560	29269	26338
11	Rangamati	15322	9437	1919	1977	17241	11414
1	<b>Chittagong Division</b>	<b>169143</b>	<b>98104</b>	<b>439537</b>	<b>429926</b>	<b>608680</b>	<b>528030</b>
12	Sylhet	13228	7703	80361	90890	93589	98593
13	Maulvibazar	3320	1887	73570	79914	76890	81801
14	Sunamgonj	1502	1155	9678	10440	11180	11595
15	Hobigonj	859	484	85169	82975	86028	83460
2	<b>Sylhet Division</b>	<b>18909</b>	<b>11229</b>	<b>248778</b>	<b>264219</b>	<b>267687</b>	<b>275448</b>
16	Dhaka	45	20	1666	1393	1711	1413
17	Gazipur	0	0	4131	4071	4131	4071
18	Manikgonj	484	201	1493	1421	1977	1622
19	Munsigonj	163	69	702	752	865	821
20	Narayangonj	0	0	51	49	51	49
21	Narsingdi	31	14	708	460	739	474
22	Faridpur	12591	6984	4035	3615	16626	10599
23	Rajbari	4845	2071	420	394	5265	2465
24	Madaripur	3327	1739	428	292	3755	2031
25	Gopalganj	3477	1443	3121	2509	6598	3953
26	Shariatpur	19052	9245	3480	2798	22532	12043
27	Jamalpur	759	385	2803	2145	3562	2530
28	Sherpur	3343	1871	9995	9066	13338	10937
29	Kishoregonj	1151	649	46180	44991	47331	45640
30	Netrokona	81	64	451	266	532	330
31	Mymensingh	145	80	65513	62847	65658	62928
32	Tangail	812	483	90	63	902	546
3	<b>Dhaka Division</b>	<b>50306</b>	<b>25318</b>	<b>145267</b>	<b>137132</b>	<b>195573</b>	<b>162450</b>

Station	Year	Month	Days ---1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
Bogra	1948	1	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	
Bogra	1948	2	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bogra	1948	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	
Bogra	1948	4	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	41	3	20	0	21	0	0	0	0	0	
Bogra	1948	5	0	24	0	0	0	0	0	0	0	2	5	8	0	14	0	9	65	0	55	0	21	9	7	24	31	14	
Bogra	1948	6	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	
Bogra	1948	7	1	8	6	5	14	6	30	10	4	3	3	2	3	43	53	2	0	2	5	6	0	6	19	30	2	0	15
Bogra	1948	8	41	32	118	31	6	30	10	4	0	3	0	0	0	4	17	7	19	36	0	8	3	0	0	0	0	2	
Bogra	1948	9	3	11	13	1	0	0	11	1	27	8	29	36	9	2	2	0	0	0	0	0	4	3	0	1	0	0	
Bogra	1948	10	12	5	169	36	0	0	0	0	0	1	31	32	0	0	0	0	0	0	0	0	0	0	18	0	0	0	
Bogra	1948	11	0	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bogra	1948	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comilla	1948	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comilla	1948	2	0	0	0	3	0	109	70	0	0	0	0	0	0	4	3	5	0	0	0	0	0	0	0	0	0	0	
Comilla	1948	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	1	0	0	0	0	0	19	0	0	0	0	
Comilla	1948	4	0	0	0	0	0	13	0	0	0	0	0	0	0	0	3	0	9	0	54	2	101	23	0	15	0	54	
Comilla	1948	5	0	26	11	20	0	0	13	10	3	2	0	0	0	0	3	0	0	0	8	0	5	31	0	0	5	27	
Comilla	1948	6	0	0	0	8	46	0	0	0	0	0	0	0	1	16	7	6	0	41	155	105	11	45	71	65	5	0	
Comilla	1948	7	4	37	48	4	5	0	16	0	16	0	70	6	65	53	134	205	59	18	9	30	4	6	55	0	26	3	
Comilla	1948	8	57	37	57	4	0	22	0	3	17	0	10	2	64	0	0	0	0	11	0	0	17	28	3	5	0	7	
Comilla	1948	9	0	35	0	2	0	0	8	4	54	16	48	0	8	16	0	0	0	0	0	0	7	2	40	0	96	0	44
Comilla	1948	10	21	76	54	23	0	0	0	0	0	0	0	2	0	3	0	0	0	0	0	0	0	28	12	0	0	0	
Comilla	1948	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comilla	1948	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cox's Bazar	1948	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cox's Bazar	1948	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cox's Bazar	1948	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cox's Bazar	1948	4	0	0	0	0	0	0	6	0	21	0	0	0	0	0	0	0	0	0	0	10	36	5	64	0	32	0	12
Cox's Bazar	1948	5	1	7	0	***	0	4	89	20	2	0	0	1	10	8	0	0	0	52	28	61	0	51	8	0	20	32	
Cox's Bazar	1948	6	0	0	0	5	33	0	2	0	0	0	0	3	5	15	156	67	45	11	13	1	3	0	24	23	63	60	
Cox's Bazar	1948	7	22	2	2	1	0	1	2	0	9	25	52	33	34	99	18	14	8	21	56	178	118	101	5	29	41	4	
Cox's Bazar	1948	8	93	77	143	16	33	19	2	0	1	1	4	0	0	8	45	51	125	258	0	1	0	0	0	0	16	0	
Cox's Bazar	1948	9	6	6	24	2	0	13	2	1	6	23	57	24	17	46	3	0	0	2	0	3	0	1	0	0	8	0	
Cox's Bazar	1948	10	80	4	25	3	0	0	2	2	0	21	23	12	17	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cox's Bazar	1948	11	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	
Cox's Bazar	1948	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

*Preferred Algorithms:* Our project has both classification and regression problem. To predict the name of the area suitable for certain crops production and the future temperature variable results, we have put these problems in

classification problem. For better understanding we need to level the temperature variables accordingly such as: Heavy rainfall, low rainfall, medium rainfall and also for other variables, to make the result more understandable to

common people. That is why we have put this prediction in classification problem. The prediction of land of the area, production amount has been put into regression problem. So for the regression problem we intend to use Linear Regression, Logistic Regression and Random Forest algorithms. As we are doing the project while doing our course on machine learning, basic algorithm like linear regression for multi variables will be good for our understanding and we can also compare results with more advanced algorithms like the other two. Logistic regression might be better for us for ranking and probability estimation of crops production and area selection. We have chosen to use Random Forest Algorithm because, so far from our study, we have found that random forest algorithm is good for solving over-fitting problems and it gives low variance. To solve the classification problem, we intend to use K Nearest Neighbor, SVM and Artificial Neural Network algorithms. KNN is robust for noisy training data and the algorithm is effective when the training data is large, which is very suitable for our dataset. We are using SVM because it has a regularization parameter, which makes us think about avoiding over-fitting, it uses the kernel trick, so we can build in expert knowledge about the problem via engineering the kernel. SVM is also defined by a convex optimization problem (no local minima) for which there are efficient methods such as: SMO. Artificial Neural Network or ANN has the ability to learn and model non-linear and complex relationships, which is very useful in the context of our dataset. Also ANN can generalize, after learning from the initial inputs and their relationships, it can infer unseen relationships on unseen data as well, thus making the model generalize and predict on unseen data. Our aim is to make results using these 3-3 algorithms and check which

algorithms give us better accuracy, low cost and better prediction.

#### *Conclusion:*

The project is about to make reliable-effecient prediction of future prdocuton of crops and environmental impact on crops, so that the research can be useful for the people of Bangladesh escpecially for the farmers' community and the government as well. The first challenge of the project is to collect authentic-reliaable dataset from good sources and train the model. Next the accuracy has to be checked and last we need to figure out which algorithm generates more correct prediction with better accuracy