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#### PROJECT DESCRIPTION

In this project, I aim to analyze loan application data to identify patterns that indicate the likelihood of loan default. Our company specializes in providing various types of loans to urban customers, and we face two main risks:

- 1. Losing business if we reject capable applicants who can repay the loan.
- 2. Incurring financial losses if we approve applicants who later default on their loans.

To address these challenges, I will use Exploratory Data Analysis (EDA) to gain insights into customer attributes and loan characteristics that influence default rates. The dataset includes information on loan applications, with outcomes such as approved, cancelled, refused, and unused offers. Additionally, it distinguishes between customers who have had payment difficulties and those who have not. The primary goal is to identify key factors that predict loan default. This will enable us to make informed decisions about loan approvals, such as denying risky applications, adjusting loan amounts, or applying higher interest rates for high-risk applicants



#### **APPROACH:**

- ☐ Import both the dataset into MS-Excel.
- □ Observed & understood the data to make plan of action for further analysis.
- ☐ I cleaned the data and handled missing data carefully by filling mean/median/mode values so that data become consistent while analyzing.
- ☐ Further, I used EDA(Exploratory Data analysis) techniques to performed univariate, bivariate and segmented univariate analysis.
- Moreover, I used Excel's charting tools, Graphs to visually represent insights and patterns in clear and concise way to inform decisionmaking on loan application.



# TECH-STACK USED

Microsoft Excel 2016, part of the Microsoft Office 2016 suite, is a powerful spreadsheet application widely used for data organization, analysis, and visualization. It supports large datasets and offers tools for sorting, filtering, and organizing information. Excel 2016 includes a wide range of built-in functions for calculations, advanced data analysis tools like Power Query and Power Pivot, and enhanced charting options such as bar, line, pie, waterfall, and treemap charts.

**SOFTWARE: MICROSOFT EXCEL 2016** 



## DATA CLEANING (APPLICATION\_DATA)

COLUMN 16384 ROWS 1048576 NULL COLUMN 50

There are 50 columns having null value percentage of more than 30% are identified and deleted after that I started the EDA.

Also removed all the irrelevant rows and columns. here all the irrelevant columns are mentioned.

OWN CAR AGE OCCUPATION TYPE **EXT SOURCE 1** APARTMENTS\_AVG BASEMENTAREA AVG YEARS BEGINEXPLUATATIO N AVG YEARS BUILD AVG COMMONAREA AVG **ELEVATORS AVG ENTRANCES AVG** FLOORSMAX AVG FLOORSMIN AVG LANDAREA AVG LIVINGAPARTMENTS AVG LIVINGAREA AVG NONLIVINGAPARTMENTS AV G NONLIVINGAREA AVG APARTMENTS MODE BASEMENTAREA MODE YEARS BEGINEXPLUATATIO N MODE YEARS BUILD MODE COMMONAREA MODE **ELEVATORS MODE ENTRANCES MODE** FLOORSMAX MODE FLOORSMIN MODE LANDAREA MODE

OWN CAR AGE OCCUPATION TYPE **EXT SOURCE 1** APARTMENTS AVG BASEMENTAREA AVG YEARS BEGINEXPLUATATIO N AVG YEARS BUILD AVG COMMONAREA AVG **ELEVATORS AVG** ENTRANCES AVG FLOORSMAX AVG FLOORSMIN\_AVG LANDAREA AVG LIVINGAPARTMENTS AVG LIVINGAREA AVG NONLIVINGAPARTMENTS AV G NONLIVINGAREA AVG APARTMENTS MODE BASEMENTAREA MODE YEARS BEGINEXPLUATATIO N MODE YEARS BUILD MODE COMMONAREA MODE **ELEVATORS\_MODE** ENTRANCES\_MODE FLOORSMAX MODE FLOORSMIN\_MODE

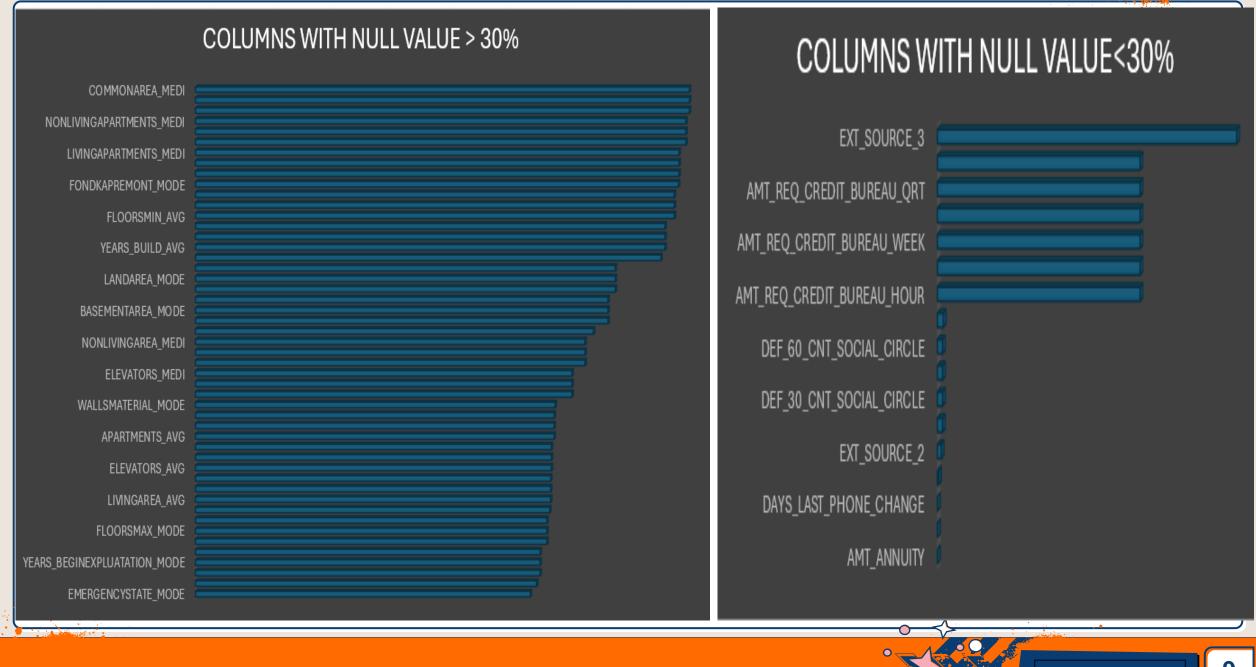
LANDAREA MODE

## DATA CLEANING (PRIEVIOUS\_DATA)

❖ similarly in previous data 11 columns having null value percentage of more than 30% are identified and deleted after that I started the EDA. Also remove all the irrelevant rows and columns RATE\_INTEREST\_PRIVILEGED
NAME\_TYPE\_SUITE
DAYS\_FIRST\_DRAWING
DAYS\_FIRST\_DUE
DAYS\_LAST\_DUE\_1ST\_VERSIO
N DAYS\_LAST\_DUE
DAYS\_TERMINATION
NFLAG\_INSURED\_ON\_APPROV
AL AMT\_DOWN\_PAYMENT
RATE\_DOWN\_PAYMENT
RATE\_INTEREST\_PRIMARY

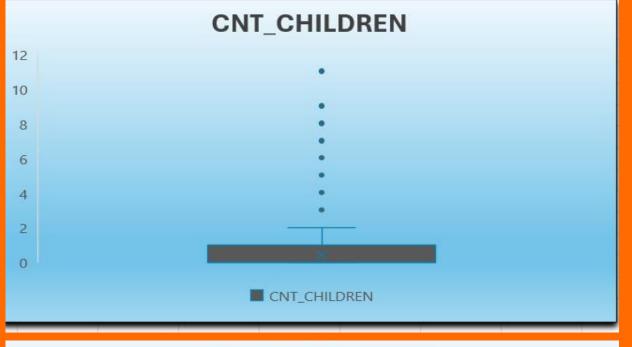
## A. IDENTIFY MISSING DATA AND DEAL WITH IT APPROPRIATELY

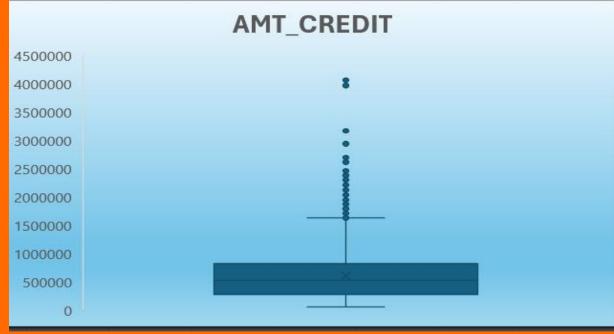
- Using COUNTA function and arithmetic function I calculated the percentage of null values in each columns.
- Then I removed the all columns with more than 30% null values. And filled the null value of the remaining columns with its median or mode depending upon the data type.
- I changed the three columns DAYS\_BIRTH,
   DAYS\_EMPLOYED, DAYS\_REGISTRATION from days to
   years using ABS function, keeping only the variable important
   for drawing the conclusion.

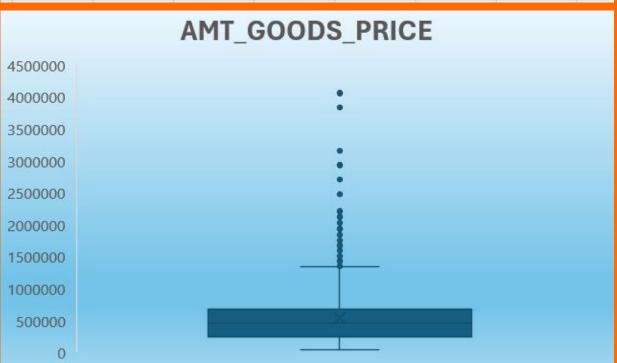


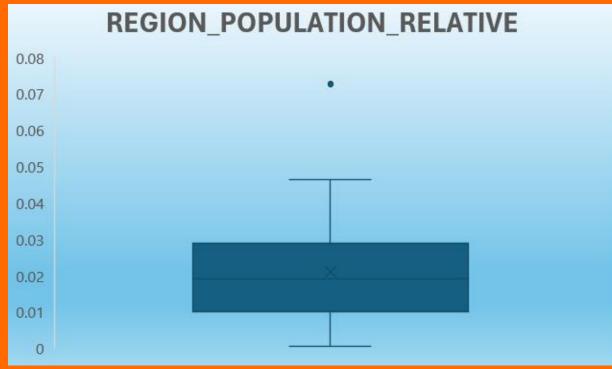
#### **B. IDENTIFY OUTLIERS IN THE DATASET**

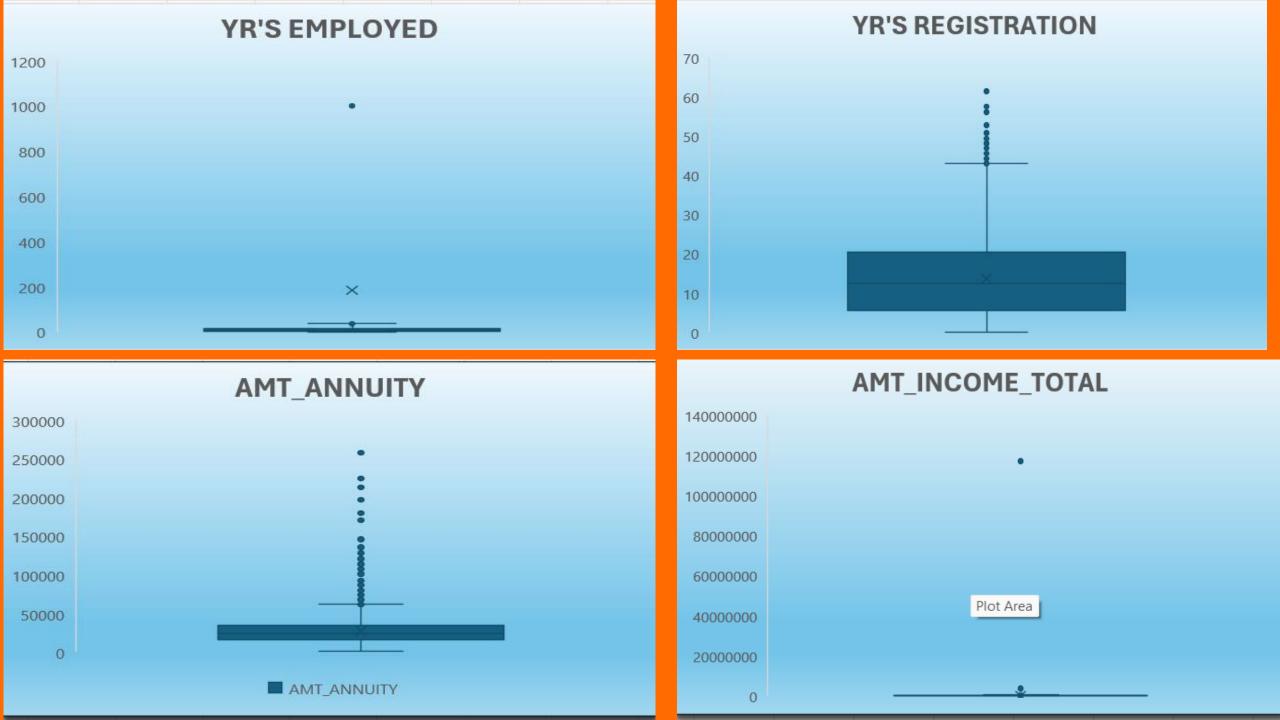
- An outlier is a single data point that goes far outside the average value of a group of statistics. Outliers may be exceptions that stand outside individual samples of populations as well. In a more general context, an outlier is an individual that is markedly different from the norm in some respect.
  - I found the presence of a few outliers in DAYS\_DECISION which indicated the time taken for the decision was too high. Which is not a good sign for any business.
  - Secondly, I found a large number of outliers in AMT\_GOODS\_PRICE, AMT\_APPLICATION, AMT\_CREDIT AND AMT\_ANNUITY.
  - I found a few outliers in CNT\_PAYMTENT.











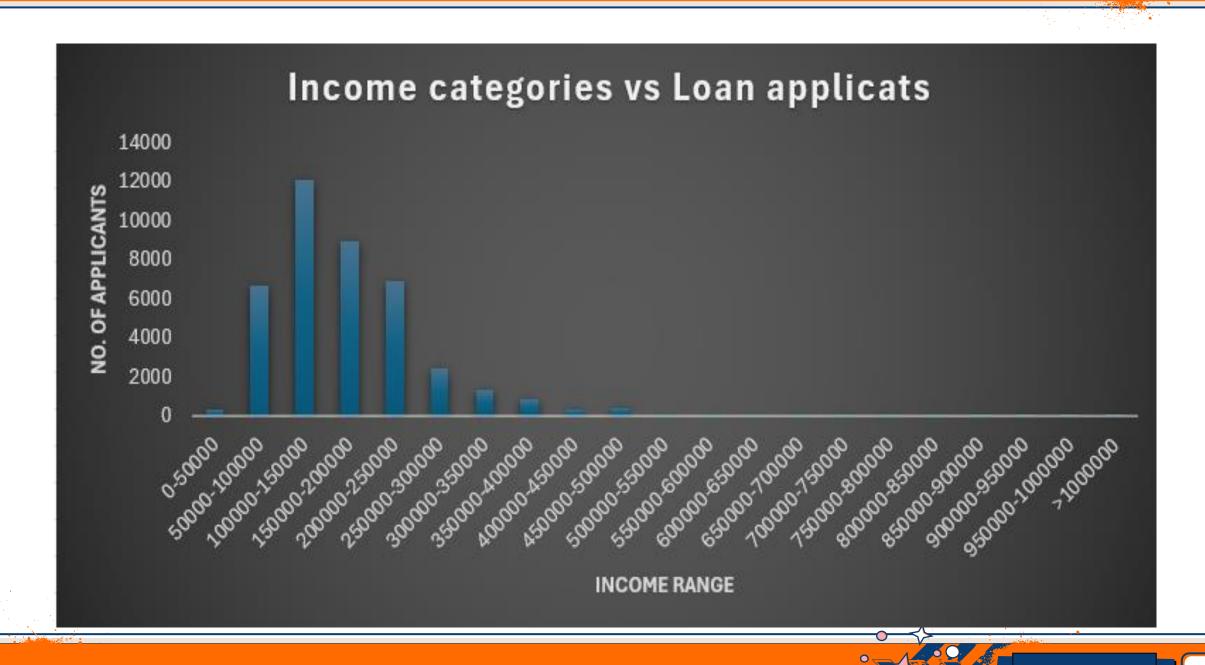
## C. ANALYZE DATA IMBALANCE

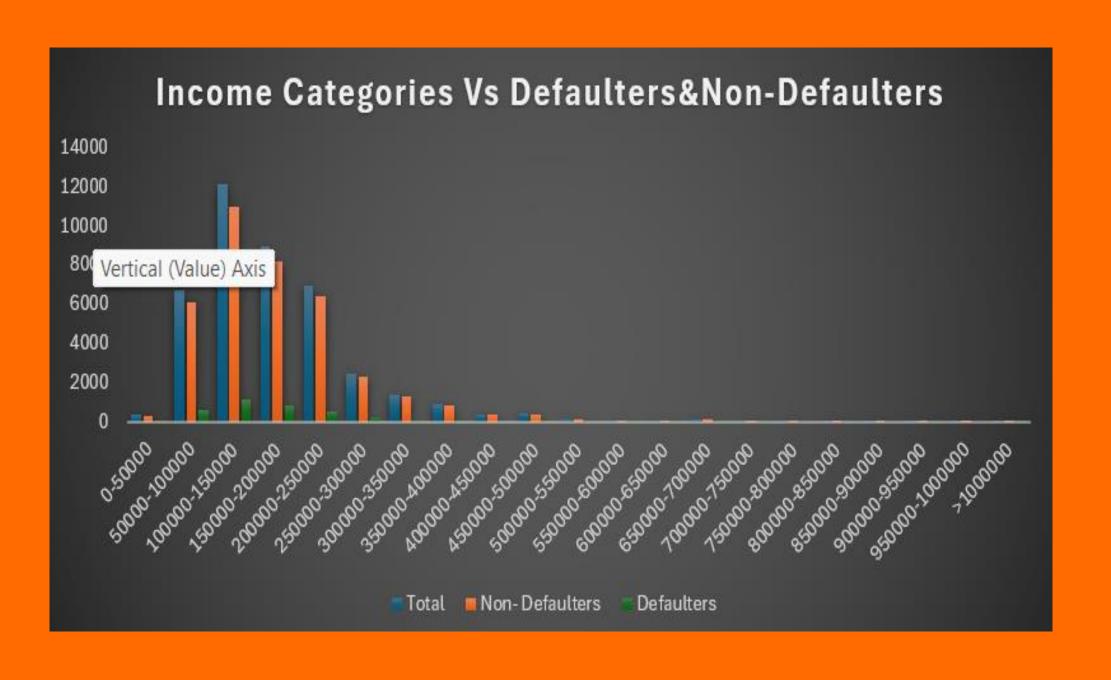
❖ Here We see that, we have 91% as loan repayers, 9% as Defaulters Which gives us a clear indication that the data is highly imbalanced



D) Perform
Univariate,
Segmented
Univariate and
Bivariate



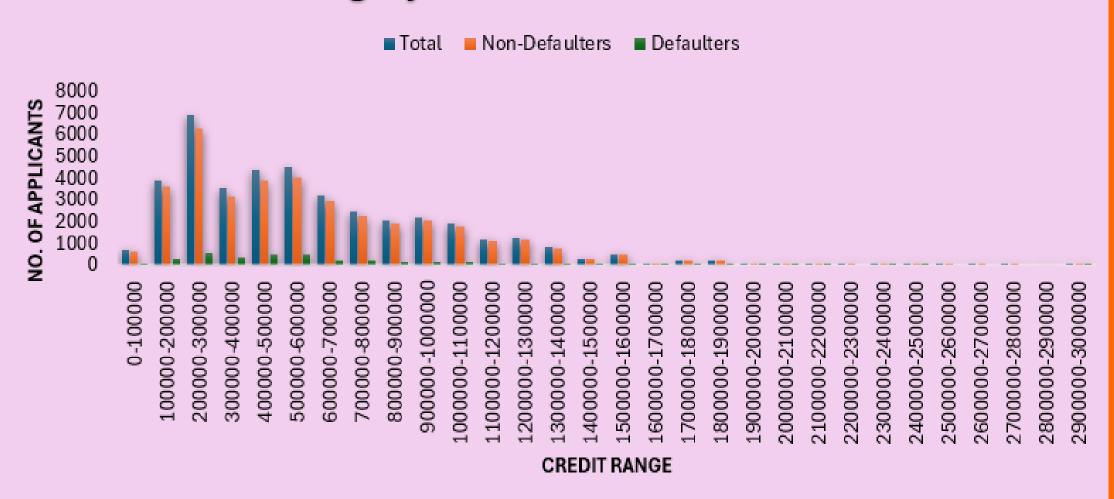




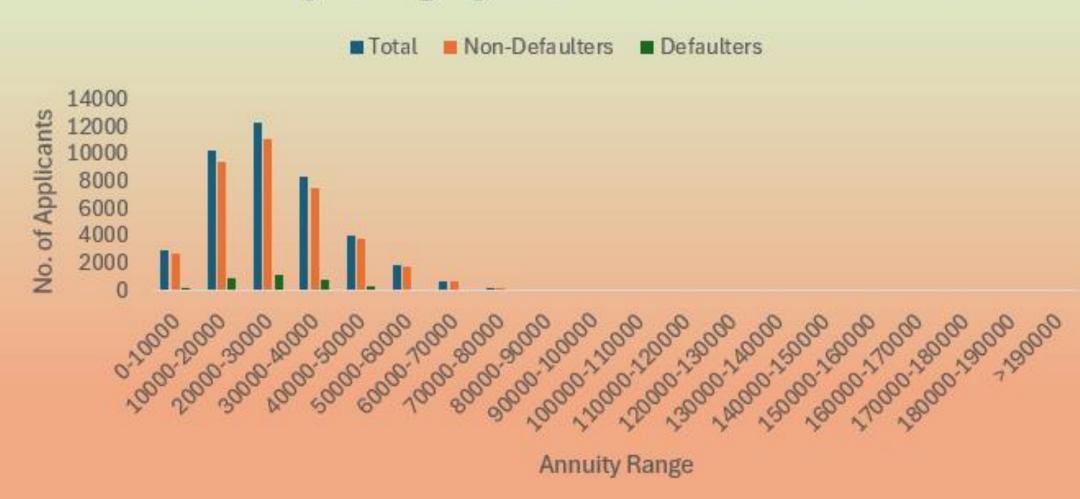
#### **Credit Category vs Loan Applicants**



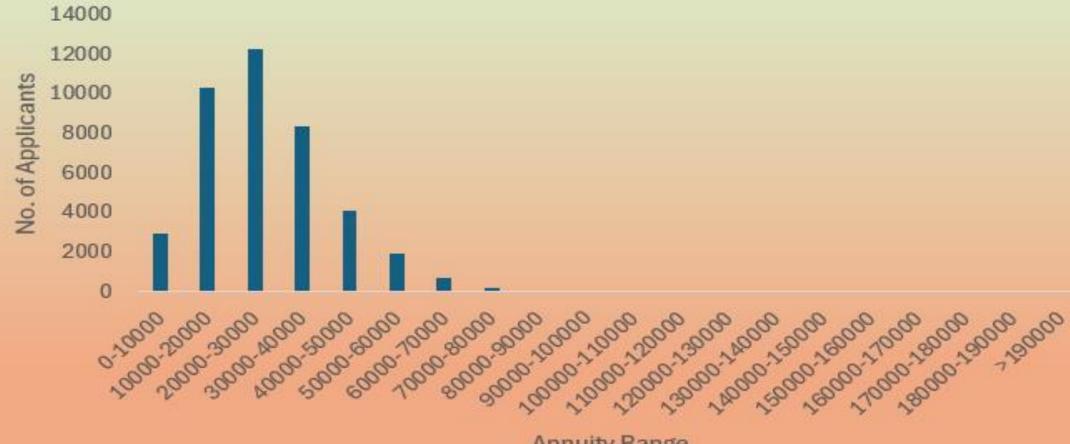
#### Credit Category Vs Defaulters&Non-Defaulters



#### Annuity Category Vs Defaulters & Non-Defaulters





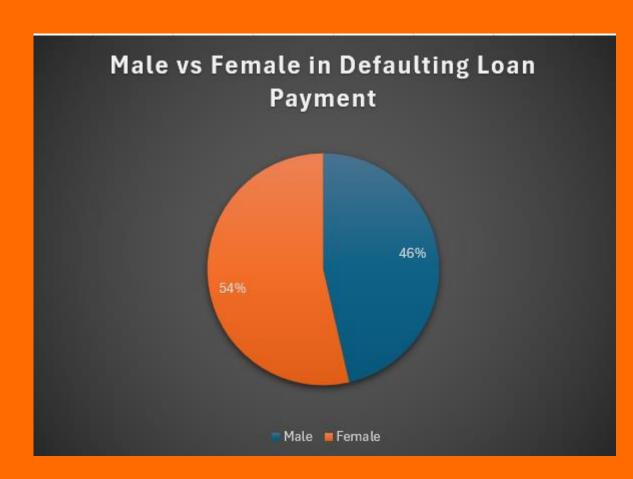


Annuity Range



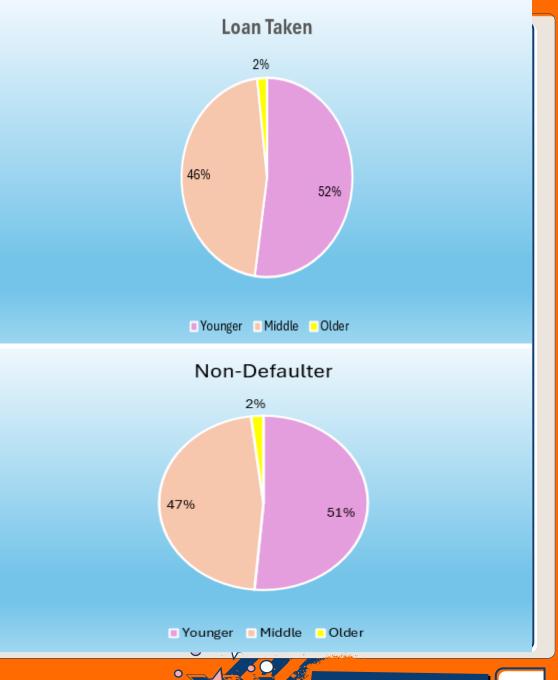
#### **Gender Ratio Defaulters**

Defaulter
1886
7%



Age Factor				
Age		Loan Taken	Non-Defaulter	Defaulter
20-40	Younger	20615	18502	2113
41-60	Middle	18073	16819	1254
>61	Older	728	688	40

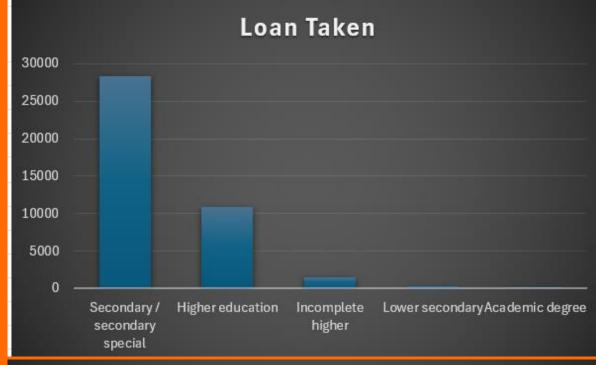
- Most loans takers are of age 20-40
- Consider age as a factor in assessing loan default risk, with younger individuals potentially requiring closer scrutiny.
- Company might consider tailoring its loan term or interest rates based on age group to manage default risks effectively.

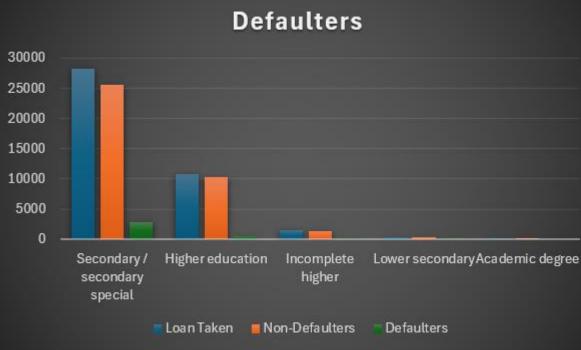


#### **Education Factor**

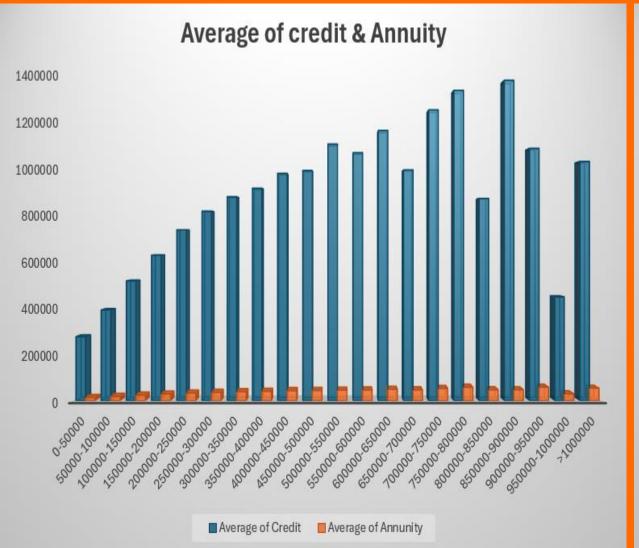
Education	Loan Taker	Non-Defau	Defaulters
Secondary / secondary s	28322	25541	2781
Higher education	10828	10284	544
Incomplete higher	1532	1396	136
Lower secondary	368	310	58
Academic degree	17	17	0

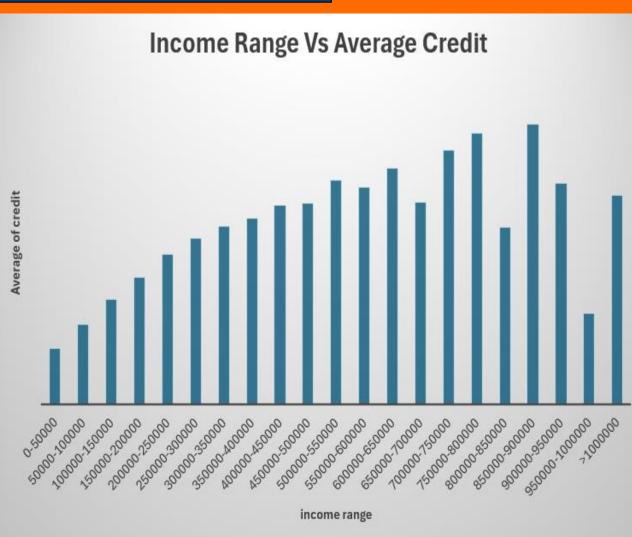
- Borrowers with an "Academic degree" show a 0% default rate.
- "Higher education" and "Incomplete higher" category have relatively low default rates, at category





#### **Bivariate Analysis**





#### **E. IDENTIFY TOP CORRELATIONS:**

Top Correlation of Defaulters														
Rank 💌	Variable 1	Variable 2 <b>▼</b>	Correla <del>↓</del> ↓											
1	AMT_GOODS_PRICE	AMT_CREDIT	0.981928											
2	REGION_RATING_CLIENT	REGION_RATING_CLIENT_W_CITY	0.948021											
3	CNT_FAM_MEMBERS	CNT_CHILDREN	0.8956											
4	DEF_60_CNT_SOCIAL_CIRCLE	DEF_30_CNT_SOCIAL_CIRCLE	0.891467											
5	LIVE_REGION_NOT_WORK_REGION	REG_REGION_NOT_WORK_REGION	0.805583											
6	LIVE_CITY_NOT_WORK_CITY	REG_CITY_NOT_WORK_CITY	0.773107											
7	AMT_ANNUITY	AMT_GOODS_PRICE	0.746422											
8	AMT_ANNUITY	AMT_CREDIT	0.745132											

Top correlation of Non-Defaulters													
Rank 💌	Variable 1	Variable 2 <b>▼</b>	Correlation 🕌										
1	AMT_GOODS_PRICE	AMT_CREDIT	0.98635817										
2	REGION_RATING_CLIENT_W_CITY	REGION_RATING_CLIENT	0.950286525										
3	CNT_CHILDREN	CNT_FAM_MEMBERS	0.893735596										
4	REG_REGION_NOT_WORK_REGION -	LIVE_REGION_NOT_WORK_REGION	0.860167703										
5	DEF_30_CNT_SOCIAL_CIRCLE	DEF_60_CNT_SOCIAL_CIRCLE	0.853040752										
6	REG_CITY_NOT_WORK_CITY	LIVE_CITY_NOT_WORK_CITY	0.815604978										
7	REGION_RATING_CLIENT	AMT_GOODS_PRICE	0.765201743										
8	AMT_ANNUITY	AMT_GOODS_PRICE	0.765201743										
9	AMT_CREDIT	AMT_ANNUITY	0.760827873										

#### **Non-Defaulters Correlation:**

EAG_MOBIL	0.003376077	0.00254311	0.004263478 0.00070066	0.004159523	0.003629664 0.00661573 0.004667144	-0.000181687 0.005949554 1																
TLAG_EMP_PHONE	0.004774558	0.001040100	-0.003321741 -0.00000997	-0.002120200	0.003952304 -0.0082406 0.000482146	0.001072225 -0.00942347 -3.7666-05	1															
FLAG_WORK_PHONE	-0.003346519	-0.001009347	-0.034281389 -0.05342859	-0.00965972	-0.019062959 -0.0109745 0.013544183	-0.013564483 0.014735981 0.00290645	0.004110390	1														
FLAG_CONT_MOBILE	0.000874967	-0.016304619	0.027480203 0.026055469	0.024835936	-0.000171892 0.00180144 0.001232114	-0.005354334 0.000519242 -0.0002572	-0.000363671	0.028060205	4													
FLAG_PHONE	-0.028000287	0.011901690	0.022918689 0.008119793			0.065065531 0.028924793 0.00319791		0.347920993	0.004550811													
FLAG_EMAIL	0.011251269	0.070193900	0.00476983 0.057543405			-0.022016867 -0.0135195 0.00133979		-0.028412816	-0.011295577 0.01911523 1													
INT_FAM_MEMBERS	0.093735596	-0.0000842483	0.036171529 0.042829942	0.034141373	-0.031006544 -0.1803316 -0.03596343	-0.15121213 0.114272484 0.00140675	0.001909469	0.013660741	-0.000126002 -0.01546 0.00697509	1												
REGION_RATING_CLIENT	0.006042176		-0.105744009 -0.13049337			0.000851932 0.03222207 0.00070066		-0.053428591	0.026055469 0.00811979 0.0575434	0.042029942												
REGION RATING CLIENT W.CIT		-0.222990306			-0.540963979 -0.0486246 0.041634134		0.000152164	0.020396081	0.014808684 -0.0839423 -0.0590957		0.950266525	- 1										
HOUR_APPR_PROCESS_START	-0.031375448	0.062155852	0.042415202 0.032978892	0.052014707		0.022382729 -0.01191095 -0.0012185		0.014612502	0.00588292 0.06277691 0.01892181		-0.27763548	-0.256154361	- 1									
REG_REGION_NOT_LINE_REGION	-0.02122761	0.07707556	0.024088054 0.042248024	0.02665031		-0.016019266 -0.02421754 0.0006736	0.000952625	0.058983423	0.002329079 0.0076395 0.01389176	-0.023633676	-0.039812177	-0.03512971	0.050755816	1								
REG_REGION_NOT_WORK_REG		0.150267056	0.052029517 0.076135793	0.050710508		-0.014656288 -0.02015984 0.00131733		0.044670248	-0.000695037 -0.001813 0.03653304	-0.016520365	-0.155698171	-0.147243016	0.070000294	0.46371067	- 1							
INE REGION NOT WORK REGI		0.142726266	0.052033499 0.070788918	0.052444030		-0.001016713 -0.00809165 0.00117015		0.019531518	-0.001118216 -0.0051502 0.03858094	-0.005604477	-0.160978898	-0.15361492	0.055962567	0.080065956	0.860167703	1						
REG_CITY_NOT_LINE_CITY	-0.001341646	-0.005244989	-0.032441358 -0.01779718	-0.031000334		-0.052540252 -0.05453951 0.00161015		0.006008159	0.000471297 -0.0418792 0.00295255	-0.009857013	0.042147789	0.054786528	0.014335786	0.006602929	0.14744132	0.013043621	- 1					
REG_CITY_NOT_WORK_CITY	191000800.0	-0.029395219	-0.036075471 -0.03108411	-0.038105486		-0.048038224 -0.03645303 0.00349284	0.004515375	0.067666268	0.000890329 -0.0441128 -0.0118253	0.016836982	0.018721279	0.012053661	0.003629227	0.142331915	0.217369700	0.165427416	0.447362842	- 1				
IME_CITY_NOT_WORK_CITY	0.01529858	-0.017596755	-0.014437677 -0.01552524	-0.015274782		-0.019570201 -0.00396603 0.00270483		0.060806048	0.002660871 -0.0254794 -0.0138377	0.031482787	-0.011730398	0.006614832	-0.005790005	-0.00532578	0.173511626	0.218933312	0.000919123	0.615601978	1			
DIT_SOURCE_2	-0.024804106	0.157592079	0.143029983 0.131789222	0.150147083		0.075749606 0.061074607 -0.0011126		-0.025484579	-0.003335716 0.06326453 0.0216576	-0.003042637	-0.299225456	-0.294609203	0.14805993	0.016781786	0.029409365	0.020036695	-0.047126335	-0.089337779	-0.071250221			
DXT_SOURCE_3	-0.01515535	-0.000446702	0.016896373 0.036013011	0.010131991		0.086551796 0.086764284 -0.0005594		-0.000502104	0.011780224 -0.016432 -0.0513679	0.002529350	0.002749174	0.005019694	-0.011934118	-0.037933175	-0.033534056	-0.017448785	-0.056525463	-0.0377116	-0.000374591 0.00019711			
DBS 10 CNT SOCIAL CRICLE	0.020302799	-0.000160788000	-0.003083082 -0.01253284	-0.003651531		-0.017619762 0.009077835 0.00318892	0.002899335	-0.015939914	0.006196002 -0.0000573 -0.0006504	0.026582952	0.005802405	0.002914957	-0.005594358	-0.017187759	-0.027665082	-0.022123441	-0.005448048	-0.005327975	-0.001566525 -0.02191133 -0.003111791			
DEF 30 ONT SOCIAL CIRCLE	0.001596677	-0.032942435 -0.034754311	-0.016637802 -0.02253726 -0.002758599 -0.01221757	-0.018242423 -0.00340683		-0.008043907 -0.00917942 0.00161055 -0.017610276 0.009490502 0.00317778		-0.010710954 -0.016511337	0.001668285 -0.0215626 -0.6676-05 0.006120153 -0.0298229 -0.0031736	0.000664041	0.009079214	0.006866681	-0.001614992 -0.005645732	-0.008960552 -0.01729162	-0.007941157 -0.027891066	-0.005929842 -0.022291868	0.005544693	0.006149608 -0.005353785	-0.001657189 -0.029031979 -0.030572738 -0.001476222 -0.0214529 -0.00334988	0.30078454	0.311309121	
DEF 60 CNT SOCIAL CIRCLE	-0.000361995	-0.000090062	-0.020419982 -0.0249794	-0.021464651		-0.011579482 -0.00959006 0.00137053		-0.007974017	0.005385129 -0.0230777 0.00033914	-0.002027551	0.013001651	0.009732223	-0.005916027	-0.010347659	-0.013423602	-0.011766607	0.006044524	0.000672013	0.003874707 -0.034565168 -0.029125074	0.233552903	0.853040752	0.235795400
DAYS LAST PHONE CHANGE	-0.001492601	0.039901300	0.072724145 0.065528991	0.076029009		0.070541372 0.108975026 0.00612637		0.044506748	0.028582334 0.07162926 0.02128244	0.023431107	-0.021399402	-0.021319801	0.007035073	-0.037041778	-0.013577605	-0.001792116	-0.058401809	-0.056794366	-0.028307578 0.190978526 0.071468234	0.016270894	-0.004254269	0.017123047
FLAG DOCUMENT 2	0.010203010	-0.002091500	0.010328028 0.00158807	0.012070696		0.001317061 0.005253938 2.66336-05		-0.002906452	0.00025715 -0.0021979 -0.0012298	0.009596687	-0.000022541	-0.000107595	-0.001929377	-0.000673590	-0.001317302	-0.001170150	-0.001610151	-0.00019201	-0.002704802 -0.001095609 0.000559366	-0.003188915	-0.001610554	-0.003177775
FLAG DOCUMENT 3	-0.001019621	-0.112120419	0.094011213 0.076960043	0.056266399		0.022517612 0.021732936 0.00914727		-0.003763541	0.002167102 -0.0055062 -0.0019279	0.005045344	0.004306455	0.091850375	-0.058092482	-0.056795617	-0.059020957	-0.010235155	-0.030005359	-0.010190615	0.001629861 -0.025910073 0.008653275	0.040165757	0.024212949	0.040543295
RAG DOCUMENT 4	-0.007865753	-0.000629495	0.00392641 0.003626322	0.00392409		0.000009052 0.001319347 7.99066-05	0.000113006	-0.008720284	0.000771534 0.00190252 -0.0010198	-0.007666697	-0.004332276	-0.003723909	0.001032467	-0.002021011	-0.003952417	-0.003511734	0.001219868	-0.001869142	0.00025295 -0.001733633 -0.000346605	-0.000000107	-0.001832177	-0.006766622
RAG DOCUMENT S	-0.027374626	0.010265533	-0.000057049 -0.00009639	-0.002665309		0.007832391 0.003479546 0.00067666	0.000957235	0.004623672	0.006535399 0.07880003 -0.0017804	-0.024522009	-0.009013022	-0.016617476	0.024228391	0.011849628	0.014785348	0.000554666	0.003391523	0.003335142	0.004596518 -0.004667904 -0.005250764	-0.014663045	-0.007849057	-0.014572944
FLAG DOCUMENT 6	-0.041090272	-0.007960752	0.023951297 0.012196565	0.022567660		0.039201737 0.011311219 0.00019986		0.003067096	0.001020306 0.02110019 -0.0000301	-0.010900712	0.001545010	-0.00256807	-0.015304562	-0.006155052	-0.010027569	-0.01036627	-0.015570795	-0.014643454	-0.003517512 0.001091501 0.005150306	0.000473604	-0.002771921	0.003972414
TLAG DOCUMENT 7	-0.006082518	0.012024301	-0.002382424 0.004164494	-0.003017705		0.007668484 0.002557408 8.4236-05	0.00011912	-0.005074872	0.000813279 0.01904843 -0.0042373	-0.006109066	-0.010595092	-0.0100200089	0.000000929	0.010507113	0.016265497	0.011431269	0.000648048	-0.002801998	-0.001501961 0.001130321 0.001161569	-0.007924450	-0.00509060	-0.007870908
FLAG DOCUMENT 8	0.031974743	0.171950001	0.079500535 0.129311252	0.077037943		-0.026341572 0.01762702 -0.0157011	0.002390057	-0.00075047	-0.016134284 0.00506357 0.02023888	0.037319232	-0.005301241	-0.000010701	0.024679432	0.020050190	0.050591673	0.053230065	0.00730515	0.014365723	0.019441001 0.043246376 -0.005024184	-0.021112371	-0.019890736	-0.021097945
FLAG DOCUMENT 9	-0.014544500	0.049296587	0.020424269 0.037426549	0.020947792		-0.001491072 -0.02188856 0.00034389		0.00378013	-0.01283187 0.01070784 0.01570923	-0.016452000	-0.035567315	-0.034720046	0.01242874	0.001964690	0.019041653	0.005357484	0.011661778	0.000941400	-0.006613329 0.018334705 -0.007861343	-0.00999502	-0.002030090	-0.010659475
TLAG DOCUMENT 10	#DMO!	4DM01	MONO! MONO!	#DMO!	POMO! POMO! POMO!	MONO! MONO! MONO!	#DMO!	#DMO!	MONO! MONO! MONO!	#DMO	#DMD!	#DMC	#DW01	MONO!	#DMO!	#DMB!	#DMBI	#DMO!	WONEL WOMEN WOMEN	#DMD!	#DMD!	#DMO!
RAG DOCUMENT 11	-0.015091665	0.00255027	0.042527704 -0.00185189	0.050013003	0.022194511 -0.0326546 -0.02717101	-0.012521453 -0.00876146 0.00037287	0.000527322	0.126556694	0.003600224 -0.5166-05 -0.0126641	-0.015745036	-0.001617245	-0.008831257	0.008697693	0.117600111	0.060500506	0.011096545	0.062162582	0.029002395	-0.001526817 -0.001086814 -0.01055368	-0.000016490	0.00014292	-0.008539512
FLAG DOCUMENT 12	<b>FOND!</b>	#DMO!	FDMDI FDMDI	#DMO!	#DMO! #DMO! #DMO!	FOND FOND FOND	#DM0!	#DM01	MONO! MONO! MONO!	#DMO!	#DMID!	#DMO!	#DM01	POMO	#DM0!	#DMBI	FOND	PDMOI	MONO! MONO! MONO!	#DMD!	#DMO!	#DM01
FLAG DOCUMENT 13	0.000781264	0.050006751	0.054021218 0.022518124	0.055906392	0.028035842 -0.0132193 -0.00480795	-0.010107812 5.10260E-05 0.000033333	0.000471405	-0.001421138	-0.096740102 0.00713678 -0.0014478	0.002256429	-0.001567552	-0.030813352	0.027247530	0.001247793	0.011155677	0.014142666	-0.008502676	-0.005721328	-0.003644033 0.024231964 0.0029196	0.000106299	-0.010/019/9	0.000216378
FLAG_DOCUMENT_14	-0.013885789	0.049631834	0.011206932 0.032563318	0.043266724	0.005260055 -0.0226884 -0.01401202	-0.001276163 -2.60186-05 0.00032792	0.000463758	-0.013150323	-0.056096471 0.00949716 0.00599538	-0.019115526	-0.047500674	-0.016713106	0.018083926	0.001542832	0.017143065	0.016802026	-0.002005123	-0.00357263	-0.004647725 0.019903097 -0.006311141	0.000100146	0.001975933	1.71667E-05
FLAG_DOCUMENT_15	0.009786861	0.028794847	0.034431493 0.000200904	0.035116861	0.013252467 0.00018392 -0.00567221	-0.004536486 0.0076324 0.00046853	0.000238336	0.000702244	0.001627208 -0.0001787 -0.008478	0.01285707	-0.0052342	-0.005522678	0.012690617	0.002098655	0.005290755	0.003947852	-0.001574734	0.001692445	0.008696258 -0.000165922 0.007678908	-0.001082614	-0.004422372	-0.001213614
FLAG_DOCUMENT_16	0.00484153	0.013504326	0.065540055 0.003383792	0.06117714		-0.023505661 0.003786914 0.00057851	0.00081815	-0.001059119	-0.028291883 0.00897668 -0.0202014	0.002525381	-0.001653962	-0.007092774	0.013996537	-0.01088308	-0.004523914	-0.000009934	-0.013824022	-0.01827708	-0.008439614 0.012147797 0.010918587	0.002499756	-0.006653273	0.002493548
FLAG_DOCUMENT_17	-0.005374295	0.003942944	0.001873035 -0.00368136	0.001746862		-0.0030007 -0.01313693 9.9667E-05		-0.001197853	-0.026790922 -0.0027246 -0.0050139	-0.000205702	-0.001207047	-0.000102651	0.004980883	0.016976769	0.006582751	-0.001380194	-0.001173892	-0.002698908	-0.003H122B5 -0.003992326 -0.00070B22H	-0.001583934	-0.006027185	-0.001454513
FLAG_DOCUMENT_18	-0.013294596	-0.00560816	0.020169782 -0.0223217	0.023871024		-0.02201792 -0.00552116 -0.0504394		0.002188536	-0.042525811 -0.0023077 -0.0114229	-0.020030667	-0.00536567	-0.0057729	0.019746513	0.007139517	0.001613487	0.00362028	0.018955935	-0.002160141	-0.014604862 0.000600245 -0.01677434	0.00654165	0.005860748	0.006651478
FLAG_DOCUMENT_19	-0.000495461	-0.000215642	0.002047407 0.009576500	0.030904059		-0.002428749 0.004447695 0.00015072		0.011300666	0.001455264 0.01451645 -0.0075821	-0.001150217	0.001744417	0.001195356	0.00027735	-0.003812022	0.00097002	0.006069017	-0.009112152	-0.005829765	-0.001989179 0.005617537 -0.000120556	0.002495812	-0.004814962	0.002732983
FLAG_DOCUMENT_20	0.004251853	-0.005/89939	0.027398408 0.008592181	0.026023995		-0.002217875 -0.00116363 0.00013051		0.00054384	0.001260161 -0.0086109 0.00209923	0.004340032	0.006662473	0.007805338	-0.001955535	-0.003300956	-0.006455559	-0.005735784	-0.007890514	0.000839655	0.004664436 -0.001916786 -0.019726141	0.003905169	0.006999725	0.004125326
FLAG_DOCUMENT_21	-0.005370942	-0.007408935	-0.020292825 -0.02353319			-0.001221166 -0.01350954 0.00011612		0.001176264	0.001121162 0.00157152 -0.0058414	-0.011183276	0.00090969	0.001871997	0.006035125	0.00629048	-0.000001981	-0.005103111	-0.002855143	0.007253679	0.008367902 -0.013548244 -0.016823291	-0.003973257	-0.004232544	-0.003840514
AMT_REQ_CREDIT_BUREAU_HO		0.000420954	-0.00554513H 0.00666758B	-0.005082051		0.001191901 -0.00286825 0.0003978		-0.011959233	-0.002750157 -0.0104035 0.0029145	0.001368061	0.004163004	0.003580488	-0.007609628	-0.002393751	-0.000514294	0.002285748	0.001330119	0.003628361	0.00347522 0.003620011 0.002821387	0.000140777	-0.003968122	0.000274136
AMT_REQ_CREDIT_BUREAU_D/		0.010011873	0.01196837 0.006956183	0.011604153		0.00281259 -0.003912 0.00031481		-0.00644202	-0.018304147 0.00307219 0.00597232	-0.003339112	0.000055609	0.000825484	0.01132992	-0.005895682	0.001029369	0.003378567	0.001489278	0.00019759	-0.001010252 0.002808433 -0.001193203	0.00175266	0.002827813	0.001510436
AMT_REQ_CREDIT_BUREAU_WI		0.007392299	0.005901074 0.019100652	0.006546236		0.002764805 0.010338205 0.00080372		-0.001008925	-0.018692911 0.00660311 0.02501095	0.004272521	-1.920166-05	-0.002091706	-0.006982922	-0.005529085	0.002919606	0.005315631	-0.002659627	0.000626543	0.001162451 0.00993634 -0.025909215	-0.001517303	-0.003179015	-0.00512457
AMT_REQ_CREDIT_BUREAU_MC		0.073042571	0.063524501 0.03559913			0.017786388 0.026273547 0.00141085		-0.015018676	0.006036908 0.01973239 0.0175057	-0.015093817	-0.066687342	-0.064412679	0.021066108	-0.010598729	0.000772079	0.007241084	-0.017564362	-0.02280237	-0.012792123 0.052140608 -0.008950292	0.000044907	0.008752334	0.008031051
AMT_REQ_CREDIT_BUREAU_QE	-0.001189641	0.014862537	0.028148451 0.012935444	0.029047785	-0.013872566 0.01666859 0.003802427	-0.00347929 0.021116029 0.00203192	-0.010022405	-0.0239T255T	0.002578021 -0.0089788 0.01773647	0.0009843	0.010547026	0.009838678	0.001630094	-0.000791758	-0.000010964	-0.012290136	-0.000702217	-0.000219072	-0.002303934 -0.001269481 -0.032077295	0.005861228	0.004924317	0.005744302

#### **Defaulters Correlation:**

	CNT_CHILDRE! AN	IT_INCOME_TOTAMT_CREDI ANT_ANNUIT A	AMT_GOODS_PRE RE	GION_POPULATION_RELA Client_Age Yrs_Employe \	Yrs_Registratio: Yrs_id_publis FL.	AG_MOE FLAG_EMP_PH	FLAG_WORK_PHO FL	AG_CONT_MOBIFLAG_PHONFLAG_EMAIC	T_FAM_MEMBEI REG	ION_RATING_CLIE REC	CION_RATING_CLIENT_W_C HOU	R_APPR_PROCESS_ST. REG	REGION NOT LIVE REG REG	REGION_NOT_WORK_REG LIVE	REGION_NOT_WORK_REC REC	CITY_NOT_LIVE_CREG	CITY_NOT_WORK_C LIVE	E_CITY_NOT_WORK_CEXT_SO	URCE, EXT_SOURCE, OBS	30 CNT BOOTAL CIRC DEF 30 CN
CNT_CHILDREN	1																			
AMT_INCOME_TOTAL  AMT_CREDIT	-0.038026211 0.004404816	0.312173844																		
ANT_ANNUITY	0.007291927	0.371245075 0.746132112																		
AMT GOODS PRICE	-0.003004678	0.313728831 0.981928143 0.748422447	1																	
REGION POPULATION RELATI	-0.013768424	0.098758897 0.055597704 0.08588731	0.081151451	1																
Client_Age	-0.169514751	0.087629893 0.194437534 0.086228175		0.013409076																
Yrs_Employed	-0.01238009	0.022801082 0.105109889 0.054428788	0.113070145	-0.001640823 0.305741728																
Yrs_Registration Yrs_id_publish	-0.131994495 0.111080858	-0.002983807 0.042508313 -0.012558948 0.037532801 0.054409392 0.050271371	0.041100465	0.048988518 0.239889934 0.1508952 0.008005888 0.125405421 0.099252808																
FLAG MOBIL	A 2	#DIV/0: #DIV/0: #DIV/0:	40xV/0t	#DIV/0: #DIV/0: #DIV/0:		DIV/0:														
FLAG_EMP_PHONE	/A 🖟 🗀	#DIV/0: #DIV/0: #DIV/0:			#DIV/0: #DIV/0: #	Orv/or #Orv/or														
FLAG_WORK_PHONE	41168	-0.099298959 -0.05398719 -0.058408023	-0.026160664	-0.027465876 -0.0598259 0.010872911			1													
FLAG_CONT_MOBILE	0.007493734	-0.056294138 0.030351857 0.039523104	0.02700438	0.002007354 0.025658022 0.008828731			0.017334927	1												
FLAG_PHONE	-0.003386652 0.00552532	0.007844835 0.031813347 0.0074097	0.046284121	0.082184434 0.035470804 0.070787098			0.336079898	0.015850800												
FLAG_EMAIL CNT FAM MEMBERS	0.00552532	0.079819098 -0.00828381 0.098213289 -0.02982832 0.049892182 0.04893887	0.044282728	0.052208114 -0.05897284 -0.032381831 -0.018834882 -0.10883804 0.011257788			0.004978452	0.007319155 0.027841737 -0.00213342 0.009276292 -0.0091129												
REGION RATING CLIENT	0.088584387	-0.160225589 -0.04798923 -0.084618178		-0.439888838 -0.05130357 -0.003813733			0.024420617	0.029299995 -0.056479496 -0.02837053	0.067990523	1										
REGION RATING CLIENT W. C.	0.088184579	-0.168885987 -0.05035811 -0.085320242	-0.08229812	-0.499271312 -0.04718874 0.00028359			0.030900217	0.028265353 -0.048712049 -0.02497333	0.089853845	0.948020808	1									
HOUR_APPR_PROCESS_START	-0.028316526	0.080162205 0.047723298 0.038563628		0.157891399 -0.03705794 0.016151137	0.085340507 0.002581893 4	DIV/0: 4DIV/0:	0.040891298	-0.019727135 0.083434841 -0.01035838	-0.039990952	-0.276228359	-0.249231103	1								
REG_REGION_NOT_LIVE_REGION_NOT	-0.023002919	0.053977901 0.008100489 0.029105588	0.007101455	-1.27345E-08 -0.02538841 -0.039793874			0.08804000	0.004250257 0.017708635 0.014257225	-0.010380539	-0.038748159	-0.03472725	0.053773856	1							
REG_REGION_NOT_WORK_REC	-0.02195603 -0.013876568	0.103557058 0.027216838 0.062818511	0.029248955	0.021144356 -0.03236651 -0.070872835			0.085453502	0.007130291 0.028978208 0.012027109	-0.024885129	-0.111423763	-0.108871445	0.078335913	0.535519117	1						
REG CITY NOT LIVE CITY	-0.013876366 -0.015516758	0.105570951 0.038899856 0.072919945 -0.015608392 -0.0506848 -0.022618888	0.040182211	0.084372174 -0.01508557 -0.049838788 -0.035041409 -0.12580141 -0.098813278			0.05810231	0.008053709 0.033028114 0.002817857 0.011110456 -0.037701223 -0.00489882	-0.024873734 -0.010830581	-0.132464192 0.045699328	-0.127398895 0.055788055	0.088230801	0.100237712 0.334558019	0.181688194	0.020083817					
REG CITY NOT WORK CITY	-0.000788967	-0.032745594 -0.03923058 -0.01935929	-0.043893025	-0.045820768 -0.10789813 -0.130518219			0.098208082	0.021164492 -0.000910383 -0.01424598	0.001756461	0.016231293	0.044385078	-0.010910006	0.146277732	0.214932898	0.144631087	0.472781599	1			
LIVE CITY NOT WORK CITY	0.017298451	-0.018222592 -0.00408721 -0.002939277	-0.010328456	-0.025828959 -0.03390817 -0.070098942			0.088818227	0.017002704 0.033015747 -0.01842894	0.017225181	-0.008956487	0.013735232	-0.024825178	-0.011361866	0.155832432	0.208098954	-0.034883281	0.773107352	1		
EXT_SOURCE_2	-0.025004981	0.116520912 0.113463669 0.103480569	0.127259953	0.157475877 0.163842312 0.10075083	0.084750892 0.047820388 4	DIV/0: 4DIV/0:	-0.025632197	-0.009050839 0.030177355 0.037759842	-0.000498947	-0.241401774	-0.24202511	0.128799217	0.024991193	0.021909077	0.017377013	-0.070409228	-0.10686189	-0.077951401	1	
EXT_SOURCE_3	0.00281989	-0.058903187 0.04753482 0.021729562	0.050274583	-0.028018518 0.118518243 0.078331438			-0.030856828	0.030898585 -0.017293149 -0.0555413	-0.003526791	0.033541288	0.028143491	-0.022994463	-0.024801599	-0.022880482	-0.008718788	-0.033142008	-0.024341641	-0.001973983 0.0415		
OBS 30 CNT SOCIAL CIRCLE	0.026093013	-0.020038999 0.031064838 0.012729852	0.028834848	-0.012352115 0.008111402 0.044734843			-0.072201177	0.010834838 -0.05907034 -0.01755351	0.048582841	0.024572205	0.017708342	-0.027155558 0.014998075	-0.031587148 n.009950300	-0.034029516 0.004422915	-0.02198038	-0.053821754	-0.044235502	-0.025089878 0.0422		1
DEF 30 ONT SOCIAL CIRCLE OBS 60 ONT SOCIAL CIRCLE	-0.010472288 0.023082951	-0.045871551 -0.0387998 -0.035075818 -0.018809877 0.031999129 0.013150337	-0.031456725 0.02922962	0.018822572 0.001480454 -0.002978817 -0.010832223 0.007823385 0.045377158			-0.028594589 -0.072001614	-0.025458884 -0.027821883 -0.02238928 0.010502889 -0.059737441 -0.01607724	0.044127858	0.014878595	0.011785744	-0.027367523	-0.031534421	-0.033342073	-0.004214735 -0.021011882	0.005180799	-0.008332874 -0.044231994	-0.023859878 -0.0177 -0.023818511 0.0435		0.352083249
DEF 60 CNT SOCIAL CIRCLE	-0.017589841	-0.033290582 -0.03983972 -0.039111708		0.017819883 0.008382514 -0.003843277			-0.02812199	-0.033052387 -0.024767623 -0.02259523	-0.007273201	-0.000657009	-0.000432137	0.018736756	0.005480381	0.007688636	0.00208124	0.004882031	-0.008279551	-0.021518798 -0.0120		0.285518768
DAYS LAST PHONE CHANGE	-0.002662131	0.091538841 0.11445685 0.094459801	0.115732477	0.084244329 0.153817578 0.137988047			0.003491484	0.017279439 0.088970923 -0.02710376	0.011346906	-0.035721235	-0.034931809	0.033628148	-0.023345148	-0.021088432	-0.010894141	-0.073721622	-0.077534813	-0.042589814 0.204		0.013718105
FLAG_DOCUMENT_2	-0.01145642	-0.001436883 0.038452807 0.0147693	0.048282214	-0.018123198 0.03546585 -0.006297088			-0.010005481	0.00040234 -0.009039825 -0.00422452	-0.021671977	-0.005645462	-0.004956265	-0.003876348	-0.00245319	-0.004115505	-0.003494117	-0.006412802	-0.012215852	-0.009813728 0.0171	141672 0.010467003	-0.010901148
FLAG_DOCUMENT_3	-0.007198748	-0.098028928 0.027798234 0.044934734	0.00098598	-0.03585 0.028021803 0.048172849			-0.003855005	-0.013484802 -0.02911383 0.004823819	-0.001190312	0.04504008	0.048435681	-0.032872531	-0.079718628	-0.05932825	-0.028513001	-0.02472923	0.01013408		887068 0.026183044	0.042576193
FLAG_DOCUMENT_4	ACIV/Or	ADIVIOS ADIVIOS ADIVIOS	#DIV/0: 0.000534489	ACIVIOS ACIVIOS ACIVIOS		DIV/O #DIV/O	ACIVO:	ADIV/01 ADIV/01 ADIV/01	ACIV/O	ACKV/OX	ADIV/O	ADIV/0:	ADIV/0	#DIV/0:	ADIV/OI	ACIV/0:	#DIV/0:		/Oz #CHV/Oz	ADIVIOR 4
FLAG_DOCUMENT_5 FLAG_DOCUMENT_6	-0.030388084 -0.019318844	-0.004620618 -0.00880516 -0.013724504 -0.004471022 0.031691958 0.021665664	0.029847093	-0.005401576 0.00047853 0.081050354 0.001455327 0.078050202 -0.017522591			0.080915807	0.00387983 0.089959001 -0.03157303 0.002388594 0.03271753 0.009584082	-0.017251158 -0.014438343	-0.000881079 0.008185871	3.40244E-16 -0.002482158	0.038779103	0.01381371	0.038898253	0.031517148 0.000922479	0.00721609	0.005122352	0.005679952 -0.0215		-0.020311298 -0.004824475
FLAG DOCUMENT 7	ADIV/O	#DIV/0: #DIV/0: #DIV/0:	40xV/0t			DIV/0: 4DIV/0:	40IV/0	ADIVOS ADIVOS ADIVOS	40xV/0t	40rv/0t	#DIV/0:	40rv/0	40rv/tr	#DIV/O	4DIV/0	4OIV/0	4OVV/01		/Oz #DRV/Oz	#DIV/0: 4
FLAG DOCUMENT 8	0.002331848	0.181930815 0.08530543 0.138131828		0.053766639 0.003792701 -0.034308408			-0.021317956	0.008718384 0.014163868 0.035088152	0.002794077	-0.068800221	-0.096814665	0.039590709	0.043837877	0.035089157	0.032003755	0.008080912	-0.004719824	-0.011680802 0.0503		-0.024355858
FLAG_DOCUMENT_9	0.01433683	0.050204085 0.001783416 0.003298304	-0.000347815	0.007585437 -0.03024404 -0.013939083		DIV/0: 4DIV/0:	-0.01893895	0.001845578 -0.012205432 0.003308411	-0.003049708	-0.021162512	-0.018578993	-0.010444179	0.022477108	0.023753195	0.009813807	0.003125449	-0.007793957	-0.018025845 0.0258		0.010785237
FLAG_DOCUMENT_10	#DIV/0:	#DIV/0: #DIV/0: #DIV/0:	ACIV/O	#DEV/0: #DEV/0: #DEV/0:		DIV/0: 4DIV/0:	#DIV/0:	HORV/OR HORV/OR HORV/OR	4OIV/0:	#CIVIO:	4DIV/0:	ADIV/OI	#DIV/0:	4DIV/0	ADIV/0	#CIVIO:	4DIV/02		/OE #CHV/OE	4DEV/OR 6
FLAG_DOCUMENT_11	0.005353954	0.003036084 0.074850772 0.021683308		0.015579105 -0.03108149 -0.025852338			0.110218383	0.001910628 -0.003659358 -0.01639412	0.004778832	-0.030851897	-0.036964837	0.017882375	0.174100818	0.09760107	0.008385168	0.053854914	0.016845103	-0.018023401 0.0055		-0.014579235
FLAG_DOCUMENT_12 FLAG_DOCUMENT_13	401V/0: -0.016204127	#DIV/0: #DIV/0: #DIV/0: 0.018808017 0.001705875 0.001444571	408V/08 0.008089209	#DIV/0: #DIV/0: #DIV/0: #DIV/0: 0.017245778 0.011325701 -0.013572544		CIV/0: 4CIV/0: CIV/0: 4CIV/0:	40FV/0E -0.014151897	#DIV/0: #DIV/0: #DIV/0: 0.000696372 -0.012784363 -0.00597522	40FV/0E -0.008357028	401V/01 -0.031885777	40KV/08 -0.031107819	401V/0: 0.041290395	401V/0: -0.003469827	401V/01 -0.00582103	4DIV/0: -0.00494213	408V/08 0.062877207	#DIV/0: 0.032902982	4DIV/01 4DIV/ -0.013880677 -0.0235	/01 #CEV/01 222991 -0.019219934	401V/01 -0.015418742
FLAG DOCUMENT 14	-0.02808234	0.047573833 0.109807991 0.080488354	0.10929898	0.091484052 -0.03187318 -0.012374014			0.008855799	0.001208839 0.080529028 0.018851894	-0.025052319	-0.069066168	-0.067831656	0.050773247	-0.008013337	0.019802482	0.028088482	-0.015719263	-0.029943898	-0.024055717 0.0380		-0.023802516
FLAG_DOCUMENT_15	40IV/0:	ADIANOS ADIANOS ADIANOS	ADIV/0:	HORNOS HORNOS HORNOS		Orv/or #Orv/or	#DIV/0:	HORN/OR HORN/OR HORN/OR	#DIW/0:	#DIW/0:	#DIV/0	40IV/0	40rv/0r	#DIV/0:	#DIV/0	40xV/0x	#DIV/0:		/0: #DEV/0:	HORV/OI 4
FLAG_DOCUMENT_16	-0.028890782	0.007484628 0.0362101 -0.025569171	0.027118753	-0.016444821 0.014821212 0.005085543			-0.007669713	0.002567775 0.023230413 -0.02203277	-0.030076838	0.003197333	0.000478888	0.0141787	-0.012794502	-0.021484233	-0.018223412	-0.03344568	-0.050004887	-0.038204027 0.025		0.02318723
FLAG_DOCUMENT_17	-0.01145642	-0.001438883 0.018871722 0.003554974	0.024416951	-0.008230251 -0.00480795 0.00357183			-0.010005481	0.00040234 0.031439897 -0.00422452	-0.004494459	-0.005645462	-0.004956265	-0.003876348	-0.00245319	-0.004115505	-0.003494117	-0.006412802	-0.012215852	-0.009813728 0.0108		-0.003756847
FLAG_DOCUMENT_18	0.027031221	-0.032713973 0.01622785 -0.039783478	0.013892172	0.058584801 -0.04838231 -0.048008481			0.022005902	-0.109019501 -0.000226573 -0.02203277	0.016376498	-0.009859083	-0.012885244	0.025971484	0.010055141	-0.021484233	-0.001838833	0.005748259	0.025380137	0.016218497 -0.0092		0.003996825
FLAG_DOCUMENT_19 FLAG_DOCUMENT_20	-0.019848742 -0.01145842	-0.004897111 0.034876835 0.008426606 -0.001436883 0.020245217 -0.001972438	0.03489822 0.028158233	0.009681429 0.023071217 -0.009052982 0.024202417 0.002107068 0.00459731			0.027028355	0.000853 0.007717005 -0.00731916 0.00049234 -0.009038625 -0.00422452	-0.017707108 -0.004494459	-0.009781008 -0.005645462	-0.008588943 -0.004056285	0.016789015-	-0.004250257 -0.00245319	-0.007130291 -0.004115505	-0.008053709 -0.003494117	-0.011110456 -0.008412802	-0.021184492 -0.012215852	-0.017002704 0.0180 -0.009813728 0.0098		0.014120784
FLAG DOCUMENT 21	ADIV/O	#DIV/0: #DIV/0: #DIV/0:	40xV/0t	#DIV/0: #DIV/0: #DIV/0:		DIV/0: 4DIV/0:	401V/0:	#DIV/0: #DIV/0: #DIV/0:	4DIV/0	#CIV/O	40IV/0	4DIV/0	#DIV/0	#Orv/0	4CIV/0	40IV/0	401V/0		/Oz #CNV/Oz	ADIVO: 4
AMT REQ CREDIT BUREAU HO		0.007649785 0.0230932 0.041099166		0.011519191 -0.02738487 -0.020173039			-0.001905918	0.002324335 0.005103188 0.022245152	0.005813347	-0.013356327	-0.016695817	-0.03131009	-0.011581505	0.023748914	0.033980262	-0.000340167	0.019098784	0.014680885 -0.0228		-0.014925381
AMT_REQ_CREDIT_BUREAU_DA	-0.027417098	-0.006760721 -0.01772912 -0.016613201	-0.015772788	-0.000884434 0.000300324 -0.005034102			0.012003424	0.002525915 0.020379427 0.004525254	-0.023058511	0.014383313	0.012032788	0.014803537	0.009088484	0.019103429	0.013157749	-0.014311427	0.008835033	0.013586143 -0.0136		-0.012729004
AMT_REQ_CREDIT_BUREAU_WE		0.013890977 -0.00145428 0.037832954		0.014899814 -0.00770514 -0.008735599			-0.023311783	0.004781979 -0.013829822 0.034594145	-0.028788579	-0.012582758	-0.008817545	-0.009762977	0.010299397	-0.018985112	-0.033937536	0.00112945	0.010999221	0.018533042 -0.0125		-0.002824471
AMT REQ CREDIT BUREAU MC		0.08902427 0.090950841 0.089088433		0.078013903 0.038298978 0.035533859			-0.037248789	0.008397718 0.005831445 0.023852767	-0.00094388	-0.075243161	-0.073928055	0.085875278	0.051671559	-0.01936776	0.039970817	-0.040115335	-0.058228384	-0.028072539 0.0495		0.020639491
AMT REQ CREDIT BUREAU OF AMT REQ CREDIT BUREAU YE		0.03841144 -0.01753259 0.004512183 0.041154265 -0.0075445 0.011589057		0.024829147 0.002030725 -0.010787687 0.027090402 0.108442833 0.015354508			-0.067684586 -0.090740241	-0.008124748 -0.015401987 0.0240233333 0.029872443 -0.040132989 0.052039488	0.004148083	-0.001255221 0.018732811	-0.010088571 0.016125629	-0.008974095 -0.038177831	-0.008327312 -0.033992815	-0.010281848 -0.030443212	-0.013880808 -0.014028142	-8.35118E-05 -0.032983997	-0.049521511 -0.024087988	-0.037436728 0.0075 -0.002565198 -0.0014		0.048735504 0.043987042
ANT_NEG_ENEUT_BUREAU_TE	-constant	4.001346 (U113685)	4401/333941	U. GET GENERAL G. 1009425151 G. U. 13194306	G. GEORGE E. G. GEORGE E. G.	Service Mornice	42.000140241	COLUMN TOWN THE COLUMN COLUMNS	74 WAR 1345	G. Gridf 32011	0.016128629	-a.u30171031	-2.033868013	-1.030#A3212	~1.0 I#025 I#2	-c.u.a903001	~a.ua/43513655	*4.00a200100 *4.001*	111124 121200000	U.O.LIEJIONZ

#### **Insights:**

- Defaulting decreases with the age and experience, therefore bank give more priority to the older and experienced applicants.
- Educated clients tend to default less frequently.
- Also, clients with more than two children default more frequently.
- Male clients tend to default more than female clients.

#### Here is the link to Excel Sheet

#### Result:

In this project I applied the EDA(Exploratory data analysis) Using Excel to analyze patterns in the dataset. Before starting this project, I conducted a brief research on risk analytics in banking and finance services.

Through this project, I learned to identify and handle missing data, detect outliers, data imbalance. The result of this analysis highlighted key factors influencing loan defaults, such as income level, loan amount, and credit history. We discovered patterns indicating higher default rates among certain customer segments, leading to data-driven decision rules for approving or modifying loans.

