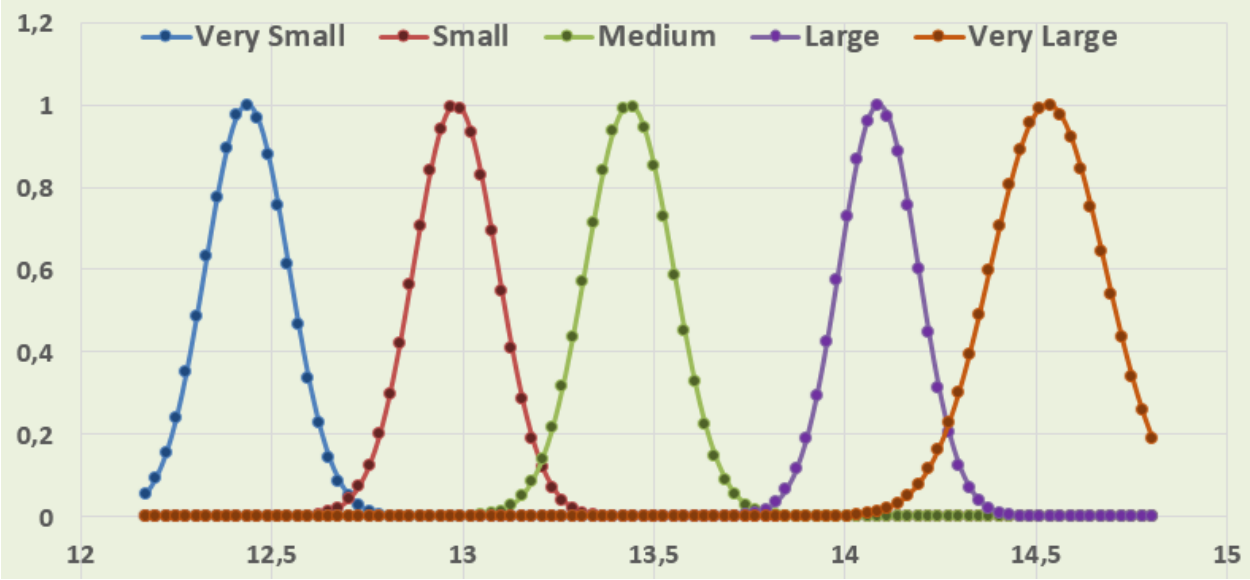
CCOD
Lab 9 27.10.2016
Akira Imada
Student – Aleksey Trotsiuk (AS - 36)

Initial data

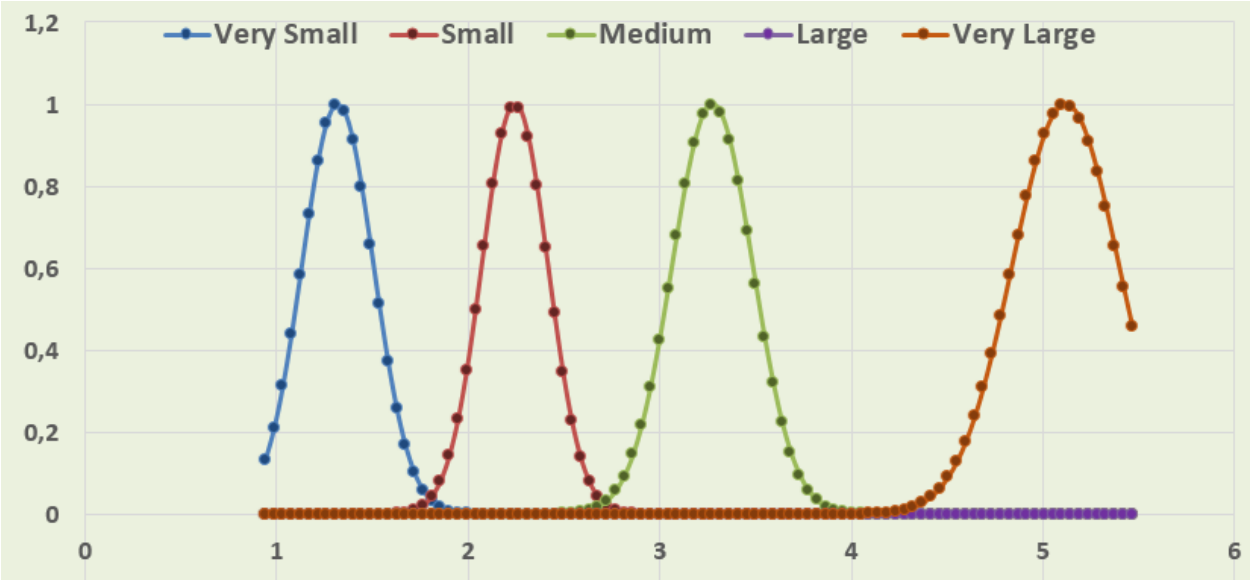
class	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13
1	14,23	1,71	2,43	15,6	127	2,8	3,06	0,28	2,29	5,64	1,04	3,92	1065
1	13,2	1,78	2,14	11,2	100	2,65	2,76	0,26	1,28	4,38	1,05	3,4	1050
1	13,16	2,36	2,67	18,6	101	2,8	3,24	0,3	2,81	5,68	1,03	3,17	1185
1	14,37	1,95	2,5	16,8	113	3,85	3,49	0,24	2,18	7,8	0,86	3,45	1480
1	13,24	2,59	2,87	21	118	2,8	2,69	0,39	1,82	4,32	1,04	2,93	735
1	14,2	1,76	2,45	15,2	112	3,27	3,39	0,34	1,97	6,75	1,05	2,85	1450
1	14,39	1,87	2,45	14,6	96	2,5	2,52	0,3	1,98	5,25	1,02	3,58	1290
1	14,06	2,15	2,61	17,6	121	2,6	2,51	0,31	1,25	5,05	1,06	3,58	1295
1	14,83	1,64	2,17	14	97	2,8	2,98	0,29	1,98	5,2	1,08	2,85	1045
1	13,86	1,35	2,27	16	98	2,98	3,15	0,22	1,85	7,22	1,01	3,55	1045
2	12,37	0,94	1,36	10,6	88	1,98	0,57	0,28	0,42	1,95	1,05	1,82	520
2	12,33	1,1	2,28	16	101	2,05	1,09	0,63	0,41	3,27	1,25	1,67	680
2	12,64	1,36	2,02	16,8	100	2,02	1,41	0,53	0,62	5,75	0,98	1,59	450
2	13,67	1,25	1,92	18	94	2,1	1,79	0,32	0,73	3,8	1,23	2,46	630
2	12,37	1,13	2,16	19	87	3,5	3,1	0,19	1,87	4,45	1,22	2,87	420
2	12,17	1,45	2,53	19	104	1,89	1,75	0,45	1,03	2,95	1,45	2,23	355
2	12,37	1,21	2,56	18,1	98	2,42	2,65	0,37	2,08	4,6	1,19	2,3	678
2	13,11	1,01	1,7	15	78	2,98	3,18	0,26	2,28	5,3	1,12	3,18	502
2	12,37	1,17	1,92	19,6	78	2,11	2	0,27	1,04	4,68	1,12	3,48	510
2	13,34	0,94	2,36	17	110	2,53	1,3	0,55	0,42	3,17	1,02	1,93	750
3	12,86	1,35	2,32	18	122	1,51	1,25	0,21	0,94	4,1	0,76	1,29	630
3	12,88	2,99	2,4	20	104	1,3	1,22	0,24	0,83	5,4	0,74	1,42	530
3	12,81	2,31	2,4	24	98	1,15	1,09	0,27	0,83	5,7	0,66	1,36	560
3	12,7	3,55	2,36	21,5	106	1,7	1,2	0,17	0,84	5	0,78	1,29	600
3	12,51	1,24	2,25	17,5	85	2	0,58	0,6	1,25	5,45	0,75	1,51	650
3	12,6	2,46	2,2	18,5	94	1,62	0,66	0,63	0,94	7,1	0,73	1,58	695
3	12,25	4,72	2,54	21	89	1,38	0,47	0,53	0,8	3,85	0,75	1,27	720
3	12,53	5,51	2,64	25	96	1,79	0,6	0,63	1,1	5	0,82	1,69	515
3	13,49	3,59	2,19	19,5	88	1,62	0,48	0,58	0,88	5,7	0,81	1,82	580
3	12,84	2,96	2,61	24	101	2,32	0,6	0,53	0,81	4,92	0,89	2,15	590

1. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Alcohol” attribute:



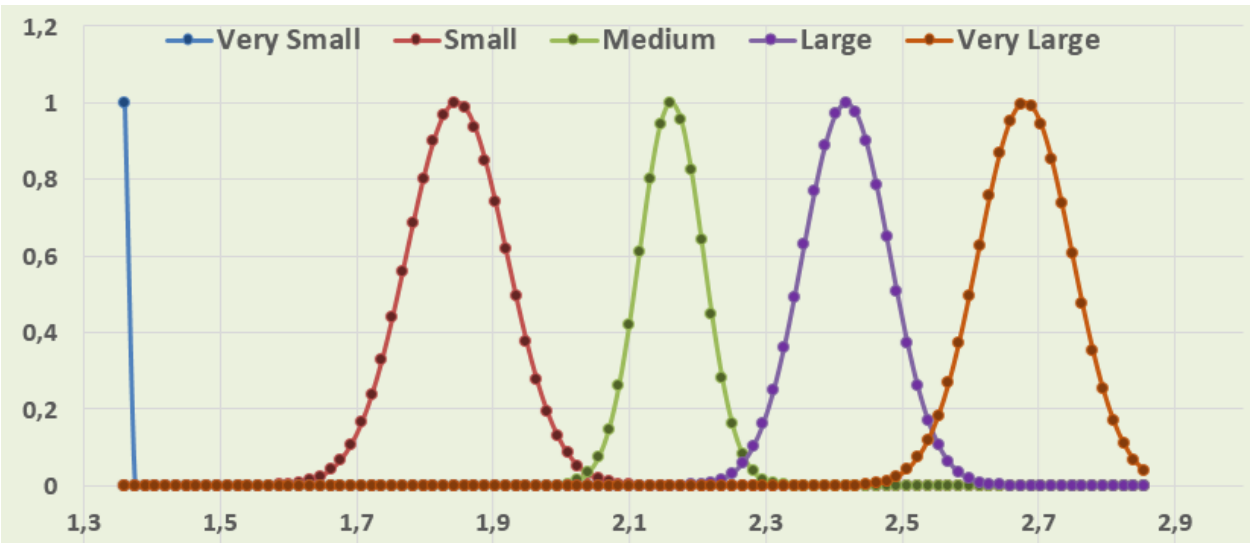
	Very Small	Small	Medium	Large	Very Large
AVG	12,4342	12,9800	13,4350	14,0875	14,5300
STD	0,0239	0,0244	0,0263	0,0214	0,0451

2. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Malic acid” attribute:



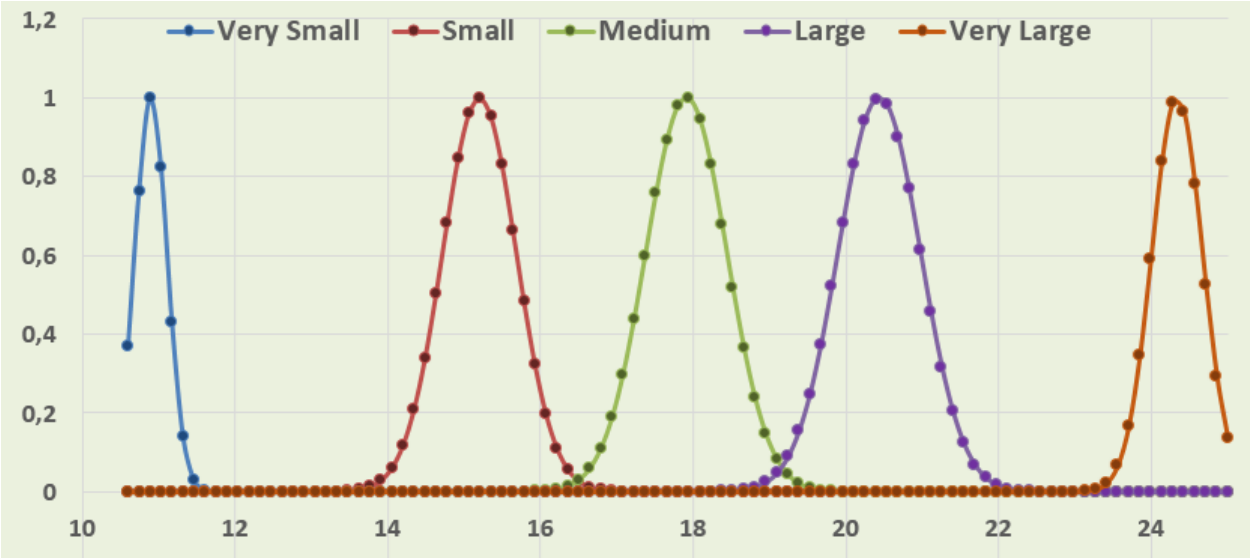
	Very Small	Small	Medium	Large	Very Large
AVG	1,3171	2,2414	3,2725	0,0000	5,1150
STD	0,0703	0,0599	0,0889	0,0000	0,1560

3. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Ash” attribute:



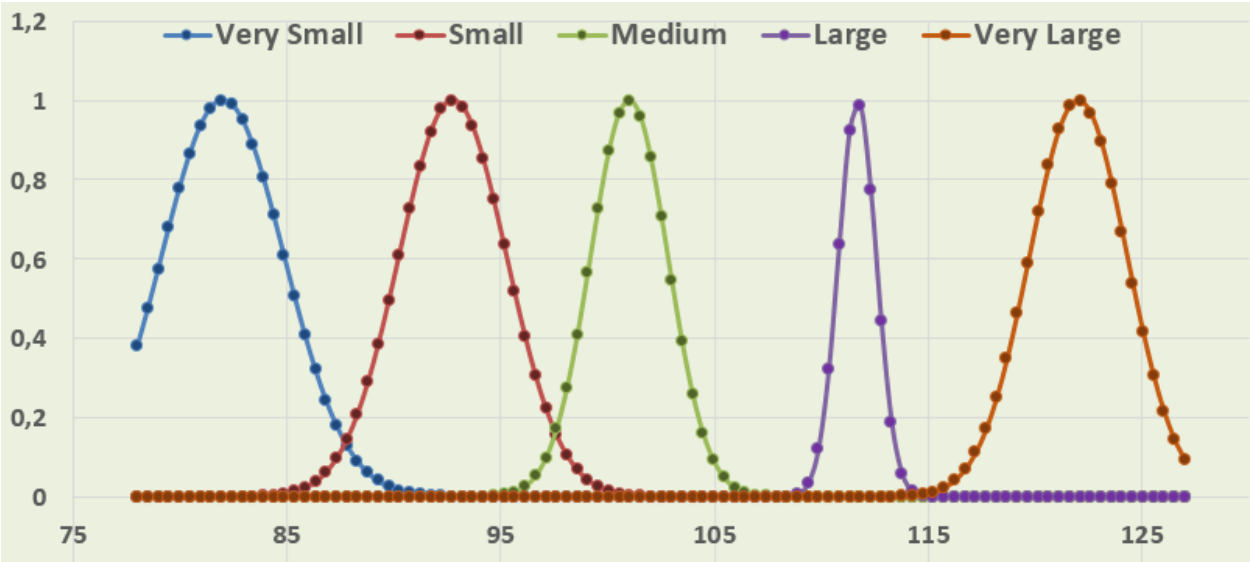
	Very Small	Small	Medium	Large	Very Large
AVG	1,3600	1,8467	2,1614	2,4179	2,6800
STD	0,0000	0,0108	0,0044	0,0082	0,0095

4. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Alkalinity of Ash” attribute:



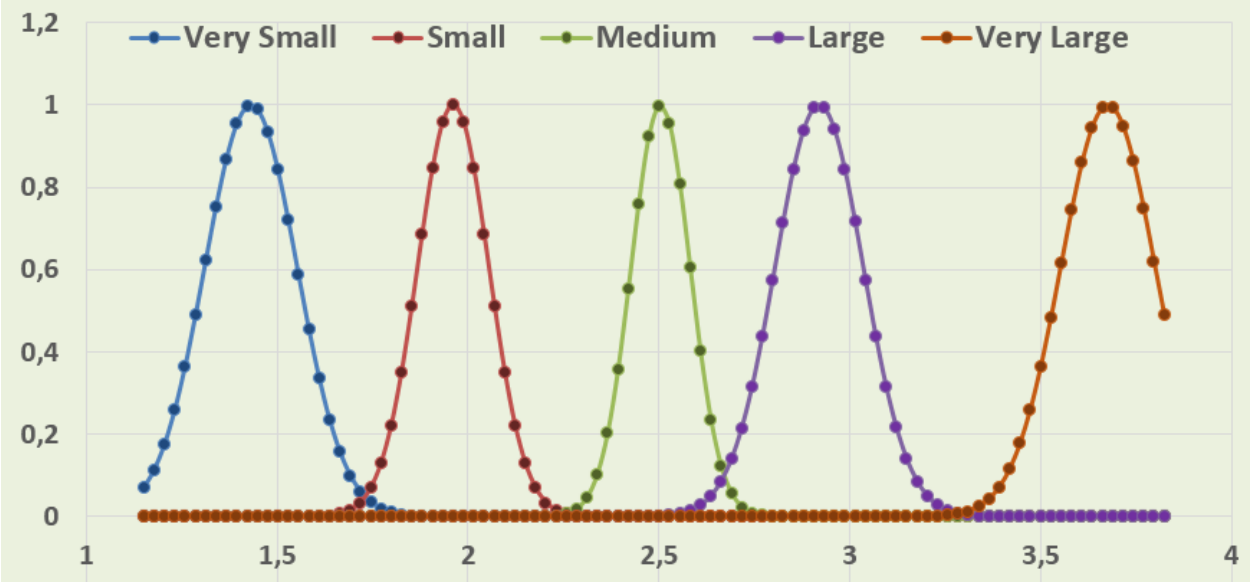
	Very Small	Small	Medium	Large	Very Large
AVG	10,8999	15,2000	17,9083	20,4333	24,3333
STD	0,0900	0,4686	0,5674	0,5888	0,2222

5. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Magnesium” attribute:



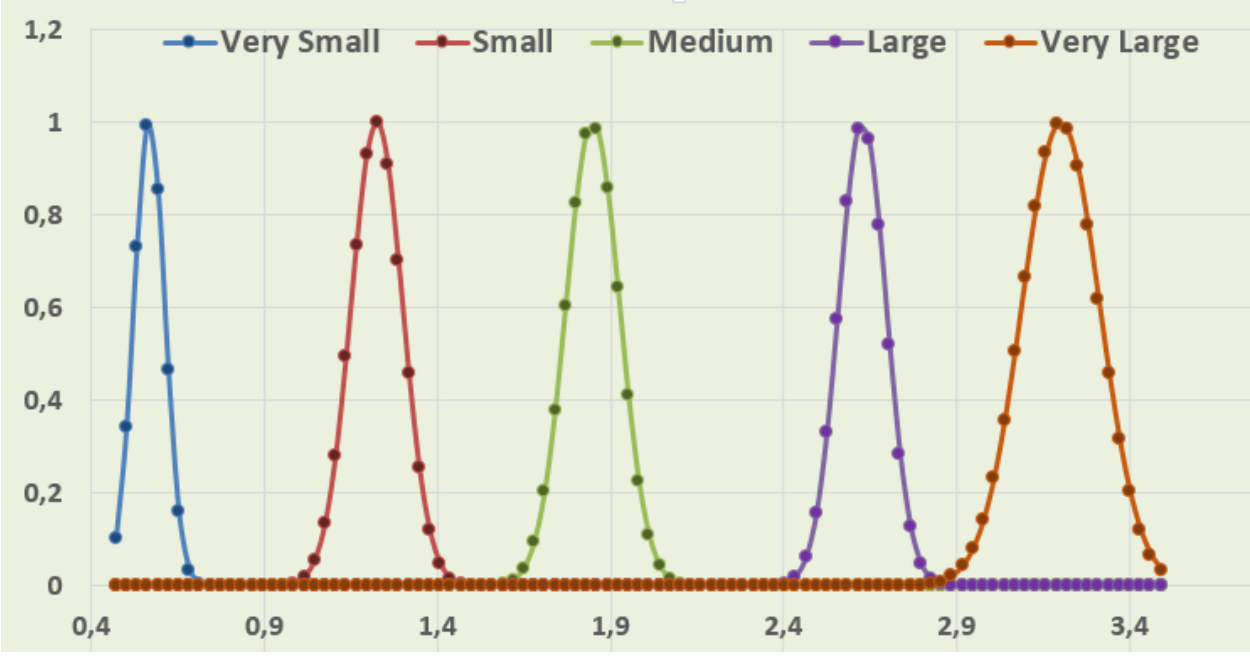
	Very Small	Small	Medium	Large	Very Large
AVG	82,0000	92,7500	101,0000	111,6667	122,0000
STD	16,5000	12,6875	6,5454	1,5555	10,5000

6. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Total phenols” attribute:



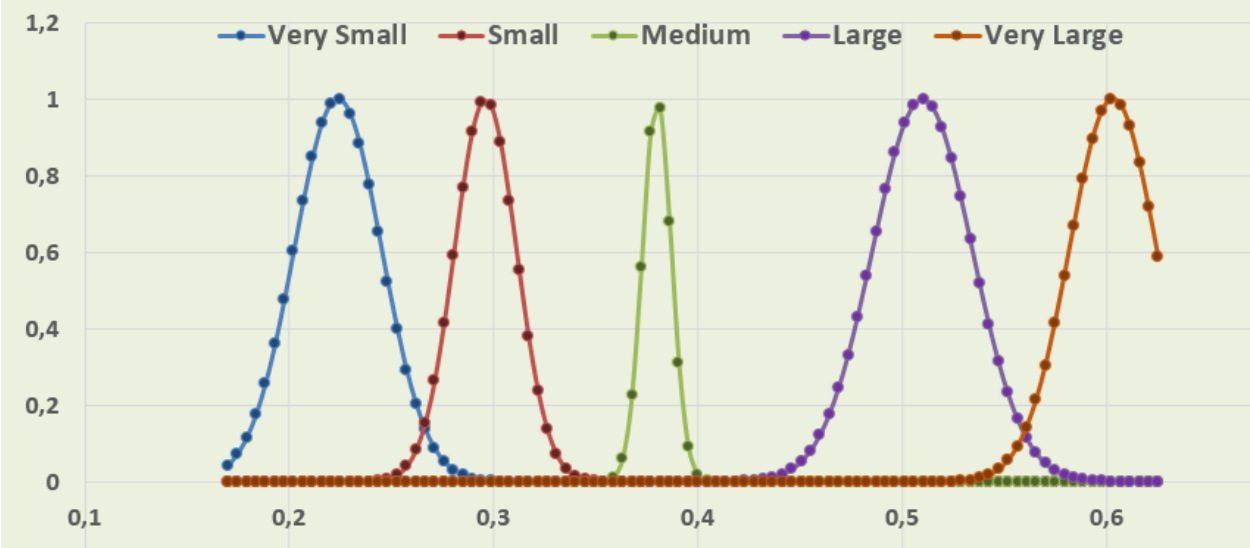
	Very Small	Small	Medium	Large	Very Large
AVG	1,4300	1,9600	2,5033	2,9186	3,6750
STD	0,0294	0,0175	0,0120	0,0268	0,0306

7. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Flavonoids” attribute:



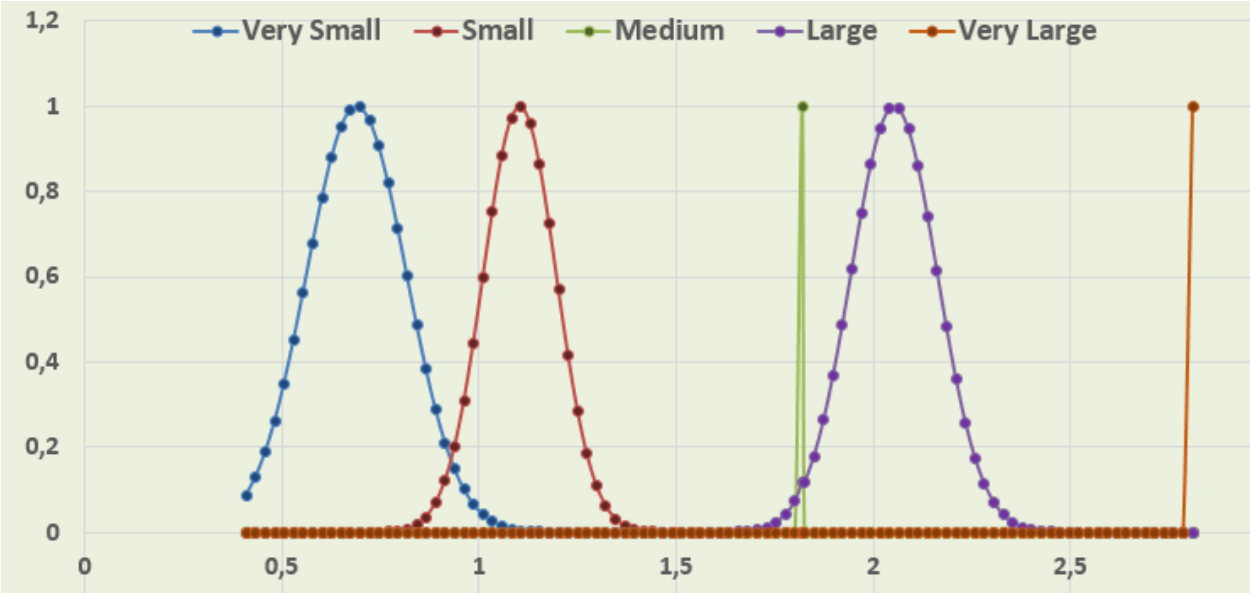
	Very Small	Small	Medium	Large	Very Large
AVG	0,5657	1,2229	1,8467	2,6260	3,1987
STD	0,0039	0,0111	0,0120	0,0095	0,0253

8. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Nonflavonoid phenol” attribute:



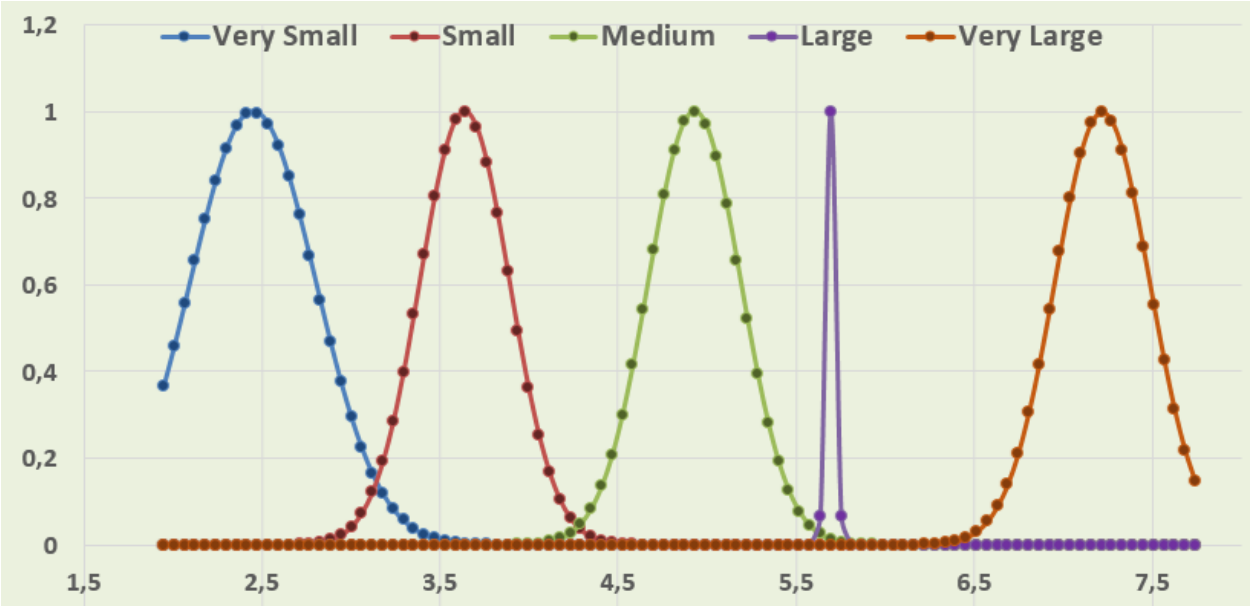
	Very Small	Small	Medium	Large	Very Large
AVG	0,2237	0,2960	0,3800	0,5100	0,6033
STD	0,0009	0,0004	0,0001	0,0012	0,0009

9. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Proanthocyanins” attribute:



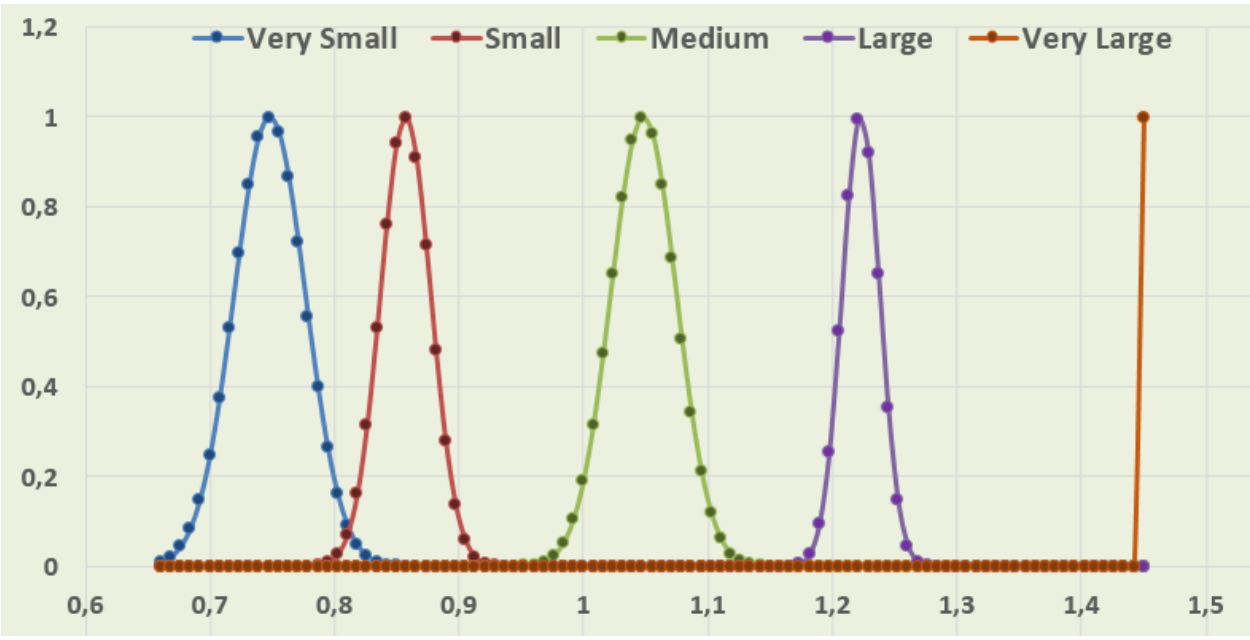
	Very Small	Small	Medium	Large	Very Large
AVG	0,6900	1,1038	1,8200	2,0533	2,8100
STD	0,0322	0,0171	0,0000	0,0241	0,0000

10. Below you can see 3 Gaussian Membership Function of small, medium and large x-y coordinate for “Color intensity” attribute:



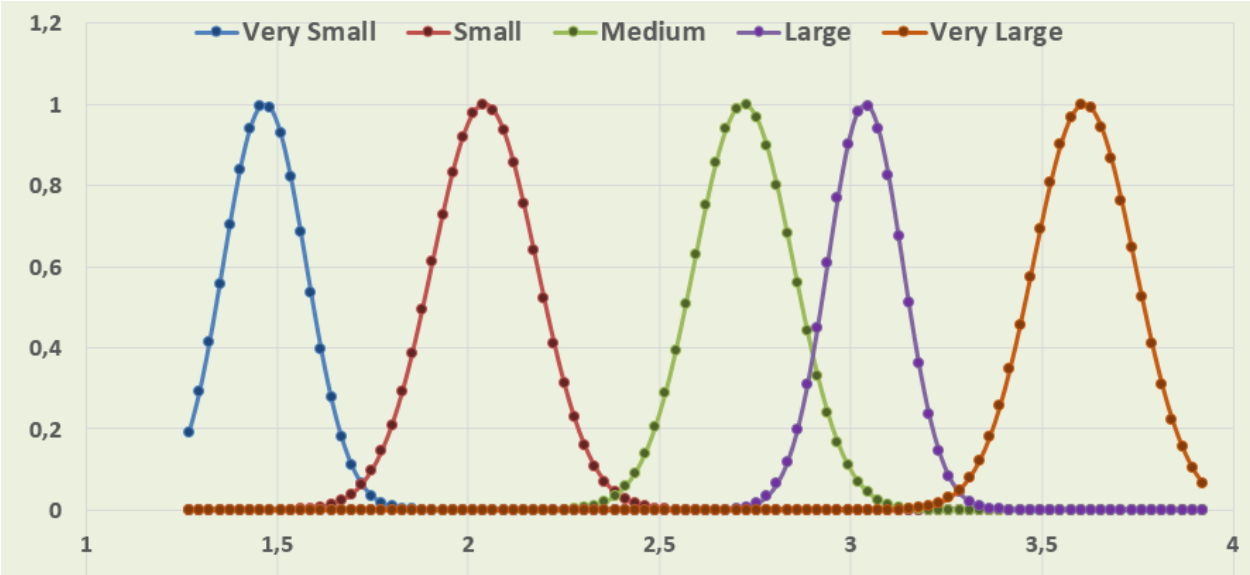
	Very Small	Small	Medium	Large	Very Large
AVG	2,4500	3,6380	4,9285	5,6940	7,2175
STD	0,2500	0,1278	0,1360	0,0013	0,1429

11. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Hue” attribute:



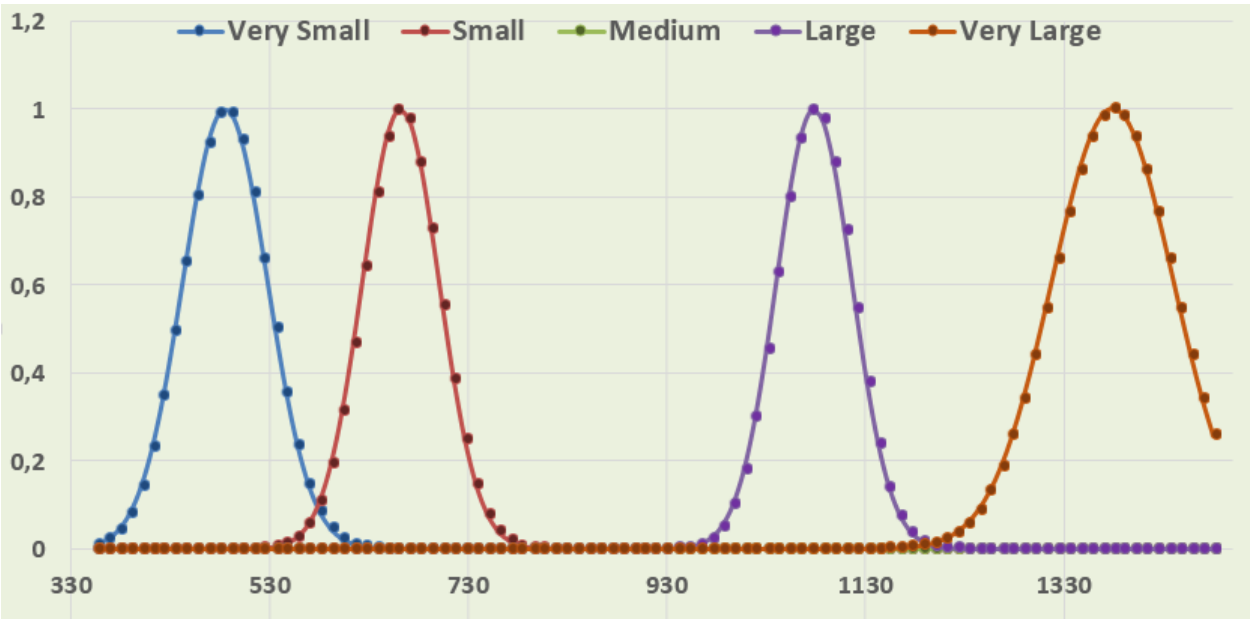
	Very Small	Small	Medium	Large	Very Large
AVG	0,7475	0,8567	1,0479	1,2225	1,4500
STD	0,0016	0,0008	0,0014	0,0004	0,0000

12. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “OD280/OD315 of diluted wines” attribute:



	Very Small	Small	Medium	Large	Very Large
AVG	1,4669	2,0417	2,7200	3,0375	3,6100
STD	0,0235	0,0374	0,0338	0,0194	0,0356

13. Below you can see 5 Gaussian Membership Function of small, medium and large x-y coordinate for “Proline” attribute:



	Very Small	Small	Medium	Large	Very Large
AVG	484,6660	661,5000	0,0000	1078,0000	1378,7500
STD	3670,8880	3003,9166	0,0000	2916,0000	7554,6875

I’ve created 7 rules for each wine A, B, C, Other:

Rule 1: **If x1=medium; x2=very small; x3=medium; x4= very small, x5=medium, x6=medium, x7=large, x8=small, x9=medium, x10=medium, x11=small, x12=medium, x13=large, then Family A**.

Rule 2: **If x1=large; x2=small; x3=very large; x4=large, x5=large, x6=very large, x7=very large, x8=medium, x9=large, x10=large, x11=medium, x12=very large, x13=very large, then Family A**.

Rule 3: **If x1=very small; x2= very small; x3=small; x4=medium, x5=very small, x6=small, x7=very small, x8=very small, x9=small, x10= very large, x11= large, x12=small, x13=very small, then Family B**

Rule 4: **If x1= very small; x2= small; x3= small; x4= small, x5= medium, x6= small, x7=large, x8=very small, x9= small, x10= small, x11= small, x12= medium, x13= very small, then Family B**

Rule 5: **If x1=very small; x2=very small; x3=medium; x4=medium, x5=very small, x6=very small, x7=very small, x8=very small, x9=very small, x10=medium, x11=very small, x12=very small, x13=very small, then Family C**

Rule 6: **If x1=medium; x2=very large; x3=large; x4=very large, x5=very large, x6=medium, x7=small, x8=very large, x9=small, x10=very large, x11=small, x12=small, x13=small, then Family C**

Rule 7: **If x1=very large; x2= medium; x3= large; x4= very small, x5=small, x6= large, x7= medium, x8=large, x9=very large, x10=small, x11=very large, x12=large, x13=medium, then Other**

Initial data

class	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13
1	14,1	2,16	2,3	18	105	2,95	3,32	0,22	2,38	5,75	1,25	3,17	1510
1	14,12	1,48	2,32	16,8	95	2,2	2,43	0,26	1,57	5	1,17	2,82	1280
1	13,75	1,73	2,41	16	89	2,6	2,76	0,29	1,81	5,6	1,15	2,9	1320
1	14,75	1,73	2,39	11,4	91	3,1	3,69	0,43	2,81	5,4	1,25	2,73	1150
1	14,38	1,87	2,38	12	102	3,3	3,64	0,29	2,96	7,5	1,2	3	1547
2	12,21	1,19	1,75	16,8	151	1,85	1,28	0,14	2,5	2,85	1,28	3,07	718
2	12,29	1,61	2,21	20,4	103	1,1	1,02	0,37	1,46	3,05	0,906	1,82	870
2	13,86	1,51	2,67	25	86	2,95	2,86	0,21	1,87	3,38	1,36	3,16	410
2	13,49	1,66	2,24	24	87	1,88	1,84	0,27	1,03	3,74	0,98	2,78	472
2	12,99	1,67	2,6	30	139	3,3	2,89	0,21	1,96	3,35	1,31	3,5	985
3	12,93	2,81	2,7	21	96	1,54	0,5	0,53	0,75	4,6	0,77	2,31	600
3	13,36	2,56	2,35	20	89	1,4	0,5	0,37	0,64	5,6	0,7	2,47	780
3	13,52	3,17	2,72	23,5	97	1,55	0,52	0,5	0,55	4,35	0,89	2,06	520
3	13,62	4,95	2,35	20	92	2	0,8	0,47	1,02	4,4	0,91	2,05	550
3	12,25	3,88	2,2	18,5	112	1,38	0,78	0,29	1,14	8,21	0,65	2	855

Below you can see evaluated rules

Data №:	Famile A	Famile B	Famile C	Result
№1	A	B	C	Good
№2	B	C	C	Not good
№3	A	B	C	Good
№4	A	B	C	Good
№5	A	Other	C	Not good
Success Rate:	80%	60%	100%	60%