

Candidate No:
809732

Project A

2nd Hand Car Market

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1. Introduction

1.1. Problem Statement

Car4all is seeking to understand the dynamics of the second-hand Volkswagen Golf market in the B771AS area. The primary goal is to determine the key factors that influence the pricing of these vehicles and to evaluate how the local market compares with broader trends. This analysis will focus on critical variables such as mileage, engine size, gear type, and fuel type.

1.2. Objectives

- **Determine Key Pricing Variables:** Identify the vehicle characteristics that most significantly affect the price of a used Volkswagen Golf.
- **Market Comparison:** Assess how the local market trends in B771AS compare to the wider market.
- **Data-Driven Insights:** Provide actionable insights for Car4all to support pricing strategies using statistical analysis.

1.3. Data Source and Collection

The dataset was sourced from [Autotrader](#) and comprises 300 records of Volkswagen Golf listings registered between 2020 and 2025.

Car	Price	Mileage	Engine (L)	Registration	Regulation	Gears	Fuel Type	Body Type	Color	Top Speed (MPH)	Age	Owner
1	\$34,290	6711	2.0	2024	24	Automatic	Petrol	Hatchback	Grey	155	1	1
2	\$24,399	1999	2.0	2024	74	Manual	Diesel	Estate	White	126	1	1
3	\$21,995	1692	1.5	2024	74	Manual	Petrol	Hatchback	White	126	1	1
4	\$9,499	122200	1.5	2021	21	Manual	Petrol	Hatchback	Blue	139	4	1
5	\$20,299	12084	1.5	2024	24	Manual	Petrol	Hatchback	Blue	139	1	1
6	\$22,599	10139	1.5	2024	24	Manual	Petrol	Hatchback	Black	126	1	1
7	\$28,750	1826	2.0	2024	24	Automatic	Diesel	Hatchback	Black	139	1	1
8	\$21,898	3335	1.5	2024	74	Manual	Petrol	Estate	Blue	126	1	1
9	\$37,400	9500	2.0	2023	23	Automatic	Petrol	Hatchback	Black	155	2	1
10	\$15,600	58383	1.5	2020	70	Automatic	Petrol Hybrid	Hatchback	Black	139	5	2
11	\$21,999	2764	1.5	2024	74	Manual	Petrol	Estate	Black	126	1	1
12	\$21,993	16971	1.5	2022	22	Automatic	Petrol Hybrid	Hatchback	Grey	139	3	1
13	\$20,232	17995	1.5	2021	21	Automatic	Petrol Hybrid	Hatchback	Grey	139	4	1
14	\$46,299	644	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
15	\$21,799	1432	1.5	2024	74	Manual	Petrol	Hatchback	Black	126	1	1
16	\$22,495	12700	1.5	2023	72	Manual	Petrol	Hatchback	Grey	133	2	2
17	\$24,977	774	1.5	2024	74	Manual	Petrol	Hatchback	Black	139	1	1
18	\$28,999	46000	2.0	2021	21	Automatic	Petrol	Hatchback	White	155	4	1
19	\$22,299	15730	1.5	2024	24	Manual	Petrol	Hatchback	Blue	126	1	1
20	\$46,995	200	2.0	2024	74	Automatic	Petrol	Hatchback	Blue	168	1	1
21	\$17,199	40295	1.5	2020	69	Manual	Petrol	Hatchback	Grey	134	5	3
22	\$32,799	13237	2.0	2023	23	Automatic	Petrol	Hatchback	Black	155	2	1
23	\$26,999	3684	2.0	2024	24	Automatic	Diesel	Estate	Blue	139	1	1
24	\$24,700	3070	1.5	2024	24	Manual	Petrol	Hatchback	Black	139	1	1
25	\$21,999	3166	1.5	2024	74	Manual	Petrol	Estate	Blue	126	1	1
26	\$33,999	5724	2.0	2024	24	Automatic	Petrol	Hatchback	White	155	1	1
27	\$27,462	268	1.5	2025	74	Automatic	Petrol Hybrid	Hatchback	Blue	139	0	1
28	\$20,929	26309	1.5	2022	22	Manual	Petrol	Hatchback	Moonstone Grey	133	3	1
29	\$41,999	2786	2.0	2024	24	Automatic	Petrol	Hatchback	Black	155	1	1
30	\$15,897	39985	1.5	2022	72	Manual	Petrol	Hatchback	White	133	3	1
31	\$19,600	41660	1.5	2022	71	Automatic	Petrol Hybrid	Hatchback	Yellow	139	3	1
32	\$29,995	15131	2.0	2023	73	Automatic	Diesel	Hatchback	Grey	152	2	1
33	\$22,450	19114	1.5	2023	73	Manual	Petrol Hybrid	Hatchback	Silver	139	2	1
34	\$41,950	14000	2.0	2023	23	Automatic	Petrol	Hatchback	Blue	155	2	2
35	\$23,495	35000	2.0	2021	21	Automatic	Petrol	Hatchback	Black	155	4	2
36	\$38,599	7751	2.0	2024	24	Automatic	Petrol	Hatchback	Black	155	1	1
37	\$16,400	23279	1.5	2022	22	Manual	Petrol	Hatchback	Silver	139	3	2
38	\$29,495	18000	2.0	2024	73	Automatic	Diesel	Hatchback	Grey	152	1	1
39	\$21,199	27333	1.5	2023	73	Automatic	Petrol Hybrid	Hatchback	Black	139	2	1
40	\$25,499	28855	2.0	2020	20	Automatic	Petrol	Hatchback	Blue	155	5	1
41	\$19,400	9732	1.5	2021	21	Automatic	Petrol Hybrid	Hatchback	Grey	139	4	1
42	\$16,498	31747	1.5	2022	72	Manual	Petrol	Hatchback	White	133	3	1
43	\$39,599	33	2.0	2024	74	Automatic	Petrol	Hatchback	White	155	1	1
44	\$19,999	14757	1.5	2024	24	Manual	Petrol	Hatchback	Silver	139	1	1
45	\$33,300	6535	2.0	2023	23	Automatic	Petrol	Hatchback	Black	155	2	1
46	\$22,683	5435	1.5	2023	23	Manual	Petrol	Hatchback	White	133	2	1
47	\$24,995	10000	1.4	2023	73	Automatic	Petrol Plug-in Hybrid	Hatchback	Grey	137	2	1
48	\$14,700	62556	2.0	2020	70	Manual	Diesel	Hatchback	Grey	134	5	1
49	\$36,999	7718	2.0	2024	24	Automatic	Petrol	Hatchback	Blue	155	1	1
50	\$44,999	2024	2.0	2024	74	Automatic	Petrol	Hatchback	Black	168	1	1

51	\$22,998	4997	1.5	2022	71	Manual	Petrol	Hatchback	Blue	139	3	1
52	\$18,600	35019	2.0	2020	20	Automatic	Diesel	Hatchback	White	133	5	1
53	\$17,499	34518	1.5	2020	69	Automatic	Petrol	Hatchback	Grey	134	5	2
54	\$34,976	6361	2.0	2024	73	Automatic	Petrol	Hatchback	Blue	155	1	1
55	\$17,900	39000	1.5	2020	70	Automatic	Petrol Hybrid	Hatchback	Silver	139	5	1
56	\$23,698	455	1.5	2024	74	Manual	Petrol	Hatchback	Black	126	1	1
57	\$26,799	6607	1.5	2024	74	Automatic	Petrol Hybrid	Hatchback	Black	139	1	1
58	\$26,498	2535	1.5	2024	74	Manual	Petrol	Hatchback	Grey	139	1	1
59	\$17,100	46317	1.5	2021	21	Manual	Petrol	Hatchback	Grey	133	4	2
60	\$17,240	63834	1.5	2020	70	Automatic	Petrol	Hatchback	Blue	132	5	1
61	\$31,599	4626	2.0	2024	24	Automatic	Petrol	Hatchback	Black	145	1	1
62	\$20,995	10737	1.5	2021	21	Manual	Petrol	Hatchback	White	139	4	1
63	\$23,899	12178	1.5	2023	23	Manual	Petrol Hybrid	Hatchback	Red	139	2	2
64	\$19,197	6922	1.5	2023	73	Manual	Petrol	Hatchback	Grey	133	2	1
65	\$37,999	2439	2.0	2023	23	Automatic	Petrol	Hatchback	Black	155	2	1
66	\$17,260	33460	1.5	2023	72	Manual	Petrol	Hatchback	Black	133	2	1
67	\$18,549	26964	2.0	2023	23	Automatic	Diesel	Hatchback	Blue	126	2	1
68	\$18,499	32572	1.5	2022	71	Automatic	Petrol Hybrid	Hatchback	Blue	139	3	1
69	\$36,452	1365	2.0	2024	74	Automatic	Petrol	Hatchback	Black	155	1	1
70	\$17,846	15327	1.5	2021	21	Manual	Petrol	Hatchback	Grey	133	4	1
71	\$28,990	5000	2.0	2024	74	Automatic	Diesel	Estate	Black	139	1	1
72	\$13,900	45563	1.5	2020	20	Manual	Petrol	Hatchback	Grey	133	5	2
73	\$25,699	12457	2.0	2024	73	Automatic	Diesel	Hatchback	Black	139	1	1
74	\$26,761	10652	2.0	2024	73	Automatic	Diesel	Hatchback	Grey	139	1	1
75	\$18,399	6541	1.0	2023	23	Manual	Petrol	Hatchback	Grey	126	2	1
76	\$17,449	24104	2.0	2020	70	Manual	Diesel	Hatchback	Black	126	5	1
77	\$22,244	5224	1.5	2024	74	Manual	Petrol	Hatchback	Grenadilla Black	126	1	1
78	\$39,799	123	2.0	2024	74	Automatic	Petrol	Hatchback	White	155	1	1
79	\$16,398	33900	1.5	2021	71	Manual	Petrol	Hatchback	Black	133	4	1
80	\$11,199	84778	1.0	2021	21	Manual	Petrol	Hatchback	Grey	126	4	1
81	\$19,549	18523	2.0	2023	23	Automatic	Diesel	Hatchback	Blue	126	2	1
82	\$18,990	5988	1.0	2022	22	Manual	Petrol	Estate	White	126	3	1
83	\$26,498	3567	1.5	2024	74	Manual	Petrol	Hatchback	Silver	139	1	1
84	\$26,490	6250	1.4	2024	24	Automatic	Petrol Plug-in Hybrid	Hatchback	Lime Yellow	140	1	1
85	\$15,600	38949	1.5	2022	72	Manual	Petrol	Hatchback	Blue	139	3	2
86	\$20,599	34783	1.5	2022	22	Automatic	Petrol Hybrid	Hatchback	Black	139	3	1
87	\$16,749	33875	1.5	2022	72	Manual	Petrol	Hatchback	Grey	139	3	1
88	\$22,999	2000	1.5	2024	74	Manual	Petrol	Estate	Grey	126	1	1
89	\$33,949	17886	2.0	2023	23	Automatic	Petrol	Hatchback	White	155	2	1
90	\$22,500	1718	1.0	2024	73	Automatic	Petrol Hybrid	Estate	Blue	126	1	1
91	\$17,949	34712	2.0	2023	72	Automatic	Diesel	Hatchback	Silver	126	2	1
92	\$35,999	4842	2.0	2024	74	Automatic	Petrol	Hatchback	Grey	155	1	1
93	\$21,800	7853	1.5	2023	23	Automatic	Petrol Hybrid	Hatchback	Grey	139	2	1
94	\$17,999	36551	1.5	2021	21	Manual	Petrol	Hatchback	Grey	139	4	4
95	\$36,499	6314	2.0	2023	73	Automatic	Petrol	Hatchback	Grey	155	2	1
96	\$24,990	11748	1.5	2024	73	Automatic	Petrol Hybrid	Hatchback	Grey	139	1	1
97	\$18,288	43547	1.5	2021	21	Automatic	Petrol Hybrid	Estate	Grey	139	4	1
98	\$19,750	19306	1.5	2022	72	Manual	Petrol	Hatchback	Urano Grey	139	3	1
99	\$14,449	75203	2.0	2020	70	Manual	Diesel	Hatchback	Grey	138	5	1
100	\$15,300	34000	1.5	2020	70	Manual	Petrol	Hatchback	Silver	133	5	2
101	\$36,999	587	2.0	2024	74	Automatic	Petrol	Hatchback	Black	155	1	1
102	\$26,582	3625	1.5	2024	74	Manual	Petrol	Hatchback	Grey	139	1	1
103	\$21,899	16541	1.5	2024	24	Manual	Petrol	Hatchback	Blue	139	1	1
104	\$18,197	35726	1.5	2020	70	Automatic	Petrol Hybrid	Hatchback	Grey	139	5	1
105	\$39,999	6011	2.0	2023	23	Automatic	Petrol	Hatchback	Blue	155	2	1
106	\$30,799	8512	2.0	2024	24	Automatic	Petrol	Hatchback	Black	155	1	1
107	\$15,200	43118	1.5	2022	72	Manual	Petrol	Hatchback	Blue	133	3	1
108	\$37,999	6804	2.0	2023	73	Automatic	Petrol	Hatchback	Black	155	2	1
109	\$38,499	5668	2.0	2024	24	Automatic	Petrol	Hatchback	Blue	155	1	1
110	\$23,699	5679	1.5	2024	74	Manual	Petrol	Hatchback	Grey	126	1	1
111	\$26,449	3608	2.0	2024	24	Automatic	Diesel	Hatchback	Silver	139	1	1
112	\$21,999	15266	1.5	2024	24	Manual	Petrol	Hatchback	Grey	139	1	1
113	\$15,999	25091	1.5	2024	24	Automatic	Petrol Hybrid	Estate	Grey	132	1	1
114	\$22,167	11924	1.5	2021	21	Automatic	Petrol Hybrid	Hatchback	Silver	139	4	1
115	\$23,197	11061	1.5	2023	73	Manual	Petrol Hybrid	Hatchback	Blue	139	2	1
116	\$26,498	3084	1.5	2024	74	Manual	Petrol	Hatchback	Silver	139	1	1
117	\$29,190	6895	1.4	2024	24	Automatic	Petrol	Hatchback	White	137	1	1
118	\$38,999	9902	2.0	2023	23	Automatic	Petrol	Hatchback	Blue	155	2	1
119	\$24,814	8608	1.5	2024	24	Manual	Petrol	Hatchback	Grey	139	1	1
120	\$26,799	5090	1.5	2024	74	Automatic	Petrol Hybrid	Hatchback	Black	139	1	1
121	\$17,697	39374	1.5	2022	72	Manual	Petrol	Hatchback	Grey	139	3	2
122	\$36,999	8383	2.0	2024	24	Automatic	Petrol	Hatchback	White	155	1	1
123	\$14,500	17500	1.4	2020	69	Automatic	Petrol Plug-in Hybrid	Hatchback	Blue	138	5	1
124	\$18,099	16914	2.0	2020	70	Manual	Diesel	Hatchback	Blue	126	5	1
125	\$29,499	10162	1.5	2024	74	Automatic	Petrol Hybrid	Hatchback	Black	139	1	1
126	\$36,999	284	2.0	2025	74	Automatic	Petrol	Hatchback	Red	155	0	1
127	\$46,999	11	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
128	\$30,650	3052	1.5	2025	74	Automatic	Petrol	Hatchback	White	139	0	1
129	\$15,687	34574	1.5	2020	70	Manual	Petrol	Hatchback	Silver	133	5	3
130	\$27,599	4597	2.0	2024	24	Automatic	Diesel	Estate	Black	139	1	1
131	\$34,899	16172	2.0	2024	24	Automatic	Petrol	Hatchback	Black	155	1	1
132	\$26,349	5351	2.0	2024	24	Automatic	Diesel	Hatchback	White	139	1	1
133	\$23,070	35415	2.0	2022	71	Automatic	Diesel	Hatchback	White	152	3	1
134	\$19,997	18725	1.5	2022	71	Manual	Petrol	Hatchback	Blue	133	3	1
135	\$44,350	972	2.0	2024	74	Automatic	Petrol	Hatchback	Black	168	1	1
136	\$19,000	23719	1.0	2023	23	Automatic	Petrol Hybrid	Hatchback	Grey	126	2	2
137	\$20,348	21459	2.0	2021	21	Automatic	Diesel	Hatchback	Black	139	4	1
138	\$18,429	14097	1.5	2021	71	Manual	Petrol	Hatchback	White	139	4	1
139	\$15,997	37876	1.5	2022	72	Manual	Petrol	Hatchback	Blue	133	3	1
140	\$21,750	50000	2.0	2020	69	Automatic	Petrol	Hatchback	Silver	154	5	4
141	\$33,599	15171	2.0	2023	23	Automatic	Petrol	Hatchback	Grey	155	2	1
142	\$28,895	4086	1.5	2024	74	Manual	Petrol	Hatchback	Black	139	1	1
143	\$16,497	30820	1.5	2022	72	Manual	Petrol	Hatchback	Black	139	3	2
144	\$21,097	25939	1.4	2023	23	Automatic	Petrol Plug-in Hybrid	Hatchback	Black	137	2	1
145	\$25,895	25895	2.0	2024	24	Automatic	Diesel	Hatchback	Black	139	1	1
146	\$26,099	7066	2.0	2024	24	Automatic	Diesel	Estate	Black	139	1	1
147	\$17,799	25512	1.0	2022	22	Automatic	Petrol Hybrid	Hatchback	Grey	126	3	1
148	\$18,290	16727	1.5	2022	22	Manual	Petrol	Hatchback	White	139	3	1
149	\$12,499	119842	1.5	2021	71	Manual	Petrol	Hatchback	Grey	133	4	1
150	\$21,799	5448	1.5	2024	74	Manual	Petrol	Hatchback	Grey	126	1	1
151	\$14,780	51730	1.5	2020	70	Automatic	Petrol	Estate	Silver	135	5	1
152	\$15,697	41449	1.5	2022	72	Manual	Petrol	Hatchback	Blue	133	3	1
153	\$13,924	64812	2.0	2020	70	Manual	Diesel	Hatchback	Blue	126	5	1
154	\$46,990	336	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
155	\$26,749	30359	2.0	2023	23	Automatic	Diesel	Hatchback	Black	152	2	1
156	\$9,775	109862	2.0	2021	71	Manual	Diesel	Estate	Grey	126	4	1
157	\$25,790	3706	1.5	2024	74	Manual	Petrol	Hatchback	Oyster Silver	139	1	1
158	\$23,999	9515	2.0	2024	24	Automatic	Diesel	Estate	Silver	139	1	1
159	\$20,197	31640	1.5	2022	72	Manual	Petrol	Hatchback	Blue	139	3	1
160	\$22,649	9495	1.5	2024	73	Manual	Petrol	Hatchback	Silver	139	1	1

161	\$17,495	43290	1.5	2020	70	Manual	Petrol	Hatchback	Grey	139	5	1
162	\$28,499	2597	1.5	2024	24	Automatic	Petrol Hybrid	Hatchback	White	139	1	1
163	\$15,940	42213	1.5	2021	71	Manual	Petrol	Hatchback	Grey	133	4	1
164	\$21,599	12746	1.5	2023	23	Automatic	Petrol Hybrid	Hatchback	Silver	139	2	1
165	\$26,469	11933	2.0	2024	73	Automatic	Diesel	Hatchback	White	139	1	1
166	\$46,999	25	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
167	\$16,004	22772	1.5	2020	70	Manual	Petrol	Hatchback	Blue	130	5	1
168	\$26,498	3381	1.5	2024	74	Manual	Petrol	Hatchback	Grey	139	1	1
169	\$31,995	25023	2.0	2024	73	Automatic	Petrol	Hatchback	White	155	1	1
170	\$38,499	13000	2.0	2023	23	Automatic	Petrol	Hatchback	Blue	155	2	1
171	\$22,490	16126	1.5	2022	72	Manual	Petrol	Hatchback	Red	139	3	1
172	\$38,599	7210	2.0	2024	24	Automatic	Petrol	Hatchback	Black	155	1	1
173	\$31,950	10000	2.0	2023	23	Automatic	Petrol	Hatchback	White	155	2	1
174	\$30,495	15000	2.0	2024	73	Automatic	Diesel	Hatchback	Silver	152	1	1
175	\$16,700	51411	1.5	2021	21	Manual	Petrol	Hatchback	Grey	133	4	2
176	\$16,595	42420	1.4	2020	70	Automatic	Petrol Plug-in Hybrid	Hatchback	Blue	138	5	2
177	\$29,995	7000	2.0	2023	72	Automatic	Diesel	Hatchback	White	152	2	1
178	\$16,197	32494	1.5	2022	72	Manual	Petrol	Hatchback	Black	139	3	2
179	\$17,699	7860	1.5	2020	70	Manual	Petrol	Hatchback	Grey	130	5	1
180	\$25,249	12477	2.0	2024	73	Automatic	Diesel	Hatchback	Black	139	1	1
181	\$30,559	13580	2.0	2024	24	Automatic	Diesel	Hatchback	Grey	152	1	1
182	\$29,150	845	1.5	2024	74	Automatic	Petrol Hybrid	Hatchback	Black	139	1	1
183	\$23,749	2298	1.4	2024	24	Automatic	Petrol Plug-in Hybrid	Hatchback	Silver	140	1	1
184	\$22,649	7816	1.5	2024	73	Manual	Petrol	Hatchback	Silver	139	1	1
185	\$30,995	1364	1.5	2024	74	Automatic	Petrol Plug-in Hybrid	Hatchback	Grey	137	1	1
186	\$16,792	30411	1.5	2022	22	Manual	Petrol	Hatchback	Black	133	3	1
187	\$22,254	1299	1.5	2024	74	Manual	Petrol	Hatchback	Grenadilla Black	126	1	1
188	\$37,999	7520	2.0	2024	24	Automatic	Petrol	Hatchback	Blue	155	1	1
189	\$13,300	52944	1.5	2020	20	Manual	Petrol	Hatchback	White	133	5	2
190	\$15,300	45278	1.5	2022	72	Manual	Petrol	Hatchback	Blue	139	3	2
191	\$42,999	2594	2.0	2023	73	Automatic	Petrol	Hatchback	White	168	2	1
192	\$45,999	11	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
193	\$17,497	19069	1.0	2022	22	Automatic	Petrol Hybrid	Hatchback	Silver	126	3	1
194	\$41,500	9900	2.0	2024	24	Automatic	Petrol	Hatchback	Black	168	1	1
195	\$38,300	2600	2.0	2024	24	Automatic	Diesel	Hatchback	Grey	152	1	1
196	\$21,349	39878	1.5	2022	22	Automatic	Petrol Hybrid	Hatchback	White	139	3	1
197	\$20,750	51800	2.0	2020	20	Automatic	Petrol	Hatchback	Grey	155	5	6
198	\$23,631	6912	1.5	2024	73	Manual	Petrol	Hatchback	Grey	139	1	1
199	\$32,990	18600	2.0	2023	23	Automatic	Petrol	Hatchback	White	155	2	1
200	\$30,499	10793	2.0	2024	24	Automatic	Petrol	Hatchback	White	155	1	1
201	\$26,498	5741	1.5	2024	74	Manual	Petrol	Hatchback	Grey	139	1	1
202	\$13,300	59979	1.0	2021	71	Manual	Petrol	Hatchback	Grey	126	4	1
203	\$26,498	4284	1.5	2024	74	Manual	Petrol	Hatchback	Silver	139	1	1
204	\$23,149	5367	1.4	2024	24	Automatic	Petrol Plug-in Hybrid	Hatchback	Blue	140	1	1
205	\$49,999	25	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
206	\$35,470	4042	2.0	2024	73	Automatic	Petrol	Hatchback	Black	155	1	1
207	\$17,298	14506	1.5	2020	70	Manual	Petrol	Hatchback	Silver	133	5	1
208	\$26,499	12134	2.0	2024	24	Automatic	Diesel	Hatchback	Black	139	1	1
209	\$23,631	6913	1.5	2024	73	Manual	Petrol	Hatchback	Grey	139	1	1
210	\$15,500	36356	1.5	2021	70	Manual	Petrol	Hatchback	Urano Grey	133	4	1
211	\$20,449	30751	1.5	2020	70	Automatic	Petrol Hybrid	Hatchback	Yellow	139	5	1
212	\$28,480	1985	1.5	2024	74	Manual	Petrol	Hatchback	White	139	1	1
213	\$17,997	35078	1.5	2022	72	Manual	Petrol	Hatchback	Grey	139	3	2
214	\$15,500	41059	1.5	2022	72	Manual	Petrol	Hatchback	White	133	3	1
215	\$16,499	54271	2.0	2020	70	Automatic	Diesel	Hatchback	Yellow	139	5	2
216	\$16,899	8900	1.5	2024	74	Manual	Petrol	Hatchback	Blue	139	1	4
217	\$17,695	37413	1.5	2021	21	Manual	Petrol	Estate	Deep Black Pearles	139	4	2
218	\$18,000	45497	1.4	2021	21	Automatic	Petrol Plug-in Hybrid	Hatchback	Grey	140	4	1
219	\$27,599	7201	1.5	2024	24	Automatic	Petrol Hybrid	Hatchback	Black	139	1	1
220	\$11,499	71661	2.0	2020	69	Manual	Diesel	Hatchback	Black	134	5	1
221	\$17,241	27042	1.5	2023	23	Manual	Petrol	Hatchback	Black	133	2	1
222	\$26,498	2686	1.5	2024	74	Manual	Petrol	Hatchback	Grey	139	1	1
223	\$34,950	11650	2.0	2023	23	Automatic	Diesel	Hatchback	Grey	152	2	2
224	\$25,999	18317	1.5	2023	23	Automatic	Petrol Hybrid	Hatchback	Grey	139	2	1
225	\$17,449	25304	1.5	2024	73	Manual	Petrol	Hatchback	Blue	139	1	1
226	\$17,699	35622	1.5	2020	70	Manual	Petrol	Hatchback	White	139	5	1
227	\$16,797	31617	1.5	2023	23	Manual	Petrol	Hatchback	Black	133	2	2
228	\$22,284	18000	1.5	2023	72	Manual	Petrol	Hatchback	Grey	139	2	1
229	\$47,999	67	2.0	2025	74	Automatic	Petrol	Hatchback	Blue	168	0	1
230	\$13,900	47786	1.5	2020	70	Manual	Petrol	Hatchback	Blue	133	5	2
231	\$35,795	3548	2.0	2024	74	Automatic	Petrol	Hatchback	Black	155	1	1
232	\$37,999	11316	2.0	2024	24	Automatic	Petrol	Hatchback	Blue	155	1	1
233	\$21,480	19181	1.4	2022	71	Automatic	Petrol Plug-in Hybrid	Hatchback	Black	140	3	1
234	\$24,499	9390	1.5	2023	73	Manual	Petrol	Hatchback	Silver	133	2	1
235	\$24,777	12406	1.5	2024	73	Automatic	Petrol Hybrid	Hatchback	Black	139	1	1
236	\$21,999	26839	1.5	2022	22	Automatic	Petrol Hybrid	Hatchback	Blue	139	3	1
237	\$18,800	40000	1.5	2022	22	Manual	Petrol	Hatchback	Grey	139	3	1
238	\$44,849	827	2.0	2024	74	Automatic	Petrol	Hatchback	Blue	168	1	1
239	\$18,399	28386	2.0	2023	72	Automatic	Diesel	Hatchback	White	126	2	2
240	\$23,242	17682	1.5	2022	22	Automatic	Petrol Hybrid	Hatchback	Blue	139	3	1
241	\$16,995	31118	1.0	2021	21	Automatic	Petrol Hybrid	Hatchback	Black	126	4	1
242	\$13,295	71000	1.5	2020	20	Automatic	Petrol	Hatchback	Rear Diffuser Black	134	5	2
243	\$14,241	60497	1.5	2020	70	Automatic	Petrol	Hatchback	Black	132	5	2
244	\$30,021	20410	2.0	2022	72	Automatic	Petrol	Hatchback	White	155	3	1
245	\$17,500	24500	1.5	2020	70	Manual	Petrol	Hatchback	White	139	5	3
246	\$26,998	2791	1.5	2024	74	Manual	Petrol	Hatchback	Grey	139	1	1
247	\$49,999	15	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
248	\$18,861	10426	1.0	2023	72	Automatic	Petrol	Hatchback	Grey	116	2	1
249	\$18,750	24812	1.5	2022	22	Manual	Petrol	Hatchback	Silver	139	3	1
250	\$39,599	2231	2.0	2024	74	Automatic	Petrol	Hatchback	Black	155	1	1
251	\$17,579	32467	1.5	2022	22	Manual	Petrol	Hatchback	Black	139	3	1
252	\$26,498	2853	1.5	2024	74	Manual	Petrol	Hatchback	Grey	139	1	1
253	\$49,599	25	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
254	\$37,999	13088	2.0	2024	24	Automatic	Petrol	Hatchback	Black	155	1	1
255	\$24,299	3225	1.5	2024	74	Manual	Petrol	Hatchback	Grey	139	1	1
256	\$33,436	11235	2.0	2023	23	Automatic	Petrol	Hatchback	Grey	155	2	1
257	\$17,449	25302	1.5	2024	73	Manual	Petrol	Hatchback	Blue	139	1	1
258	\$25,799	10334	1.5	2023	73	Automatic	Petrol Hybrid	Hatchback	Grey	139	2	1
259	\$19,499	18555	1.5	2020	70	Manual	Petrol	Hatchback	Black	139	5	1
260	\$15,200	50046	1.0	2021	21	Automatic	Petrol Hybrid	Hatchback	Grey	126	4	1
261	\$48,999	25	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
262	\$22,975	12631	1.4	2022	72	Automatic	Petrol Plug-in Hybrid	Hatchback	Blue	140	3	1
263	\$19,999	7708	1.0	2024	24	Automatic	Petrol Hybrid	Estate	Red	126	1	1
264	\$26,599	4727	1.5	2024	24	Automatic	Petrol Hybrid	Hatchback	Grey	139	1	1
265	\$14,400	33319	1.0	2021	21	Manual	Petrol	Hatchback	White	126	4	2
266	\$25,795	9219	1.5	2024	24	Manual	Petrol	Hatchback	Black	139	1	1
267	\$31,995	25000	2.0	2024	73	Automatic	Petrol	Hatchback	White	155	1	1
268	\$21,900	6151	1.5	2022	72	Manual	Petrol	Hatchback	White	139	3	1
269	\$28,499	1988	1.5	2024	24	Automatic	Petrol Hybrid	Hatchback	White	139	1	1
270	\$18,497	35822	1.5	2022	71	Manual	Petrol	Hatchback	Black	139	3	1

271	\$20,680	20606	1.5	2023	72	Manual	Petrol	Hatchback	Grey	133	2	1
272	\$13,750	57140	1.5	2020	70	Automatic	Petrol Hybrid	Hatchback	Black	139	5	2
273	\$21,995	1690	1.5	2024	74	Manual	Petrol	Hatchback	White	126	1	1
274	\$15,595	39000	1.5	2021	21	Manual	Petrol	Hatchback	Grey	133	4	1
275	\$18,069	16018	1.5	2023	72	Manual	Petrol	Hatchback	Grey	139	2	1
276	\$15,887	38886	1.5	2022	72	Manual	Petrol	Hatchback	White	139	3	1
277	\$33,999	22238	2.0	2022	72	Automatic	Petrol	Hatchback	Red	155	3	1
278	\$19,450	14930	1.5	2022	72	Manual	Petrol	Hatchback	Moonstone Grey	133	3	1
279	\$49,999	25	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
280	\$18,430	34511	1.5	2021	21	Automatic	Petrol Hybrid	Hatchback	Grey	139	4	1
281	\$11,995	11995	1.0	2023	23	Manual	Petrol	Hatchback	Silver	126	2	1
282	\$47,990	293	2.0	2025	74	Automatic	Petrol	Hatchback	Black	168	0	1
283	\$26,799	14896	2.0	2024	73	Automatic	Diesel	Hatchback	Grey	139	1	1
284	\$13,499	60100	1.5	2021	21	Manual	Petrol	Hatchback	White	133	4	2
285	\$17,799	41093	1.5	2020	70	Automatic	Petrol Hybrid	Hatchback	White	139	5	1
286	\$19,491	23000	1.5	2022	72	Manual	Petrol	Hatchback	Grey	139	3	1
287	\$33,999	5723	2.0	2024	24	Automatic	Petrol	Hatchback	White	155	1	1
288	\$15,995	29000	2.0	2020	70	Automatic	Diesel	Hatchback	Grey	139	5	2
289	\$13,799	59532	1.5	2020	69	Manual	Petrol	Hatchback	Grey	134	5	1
290	\$38,799	18040	2.0	2023	23	Automatic	Petrol	Hatchback	White	155	2	1
291	\$16,999	14300	1.5	2020	70	Automatic	Petrol	Hatchback	Silver	139	5	1
292	\$25,659	2636	1.5	2024	24	Manual	Petrol	Hatchback	White	139	1	1
293	\$18,395	21800	1.4	2020	70	Automatic	Petrol Plug-in Hybrid	Hatchback	Brake Calipers Blue	138	5	1
294	\$35,995	7000	2.0	2023	23	Automatic	Petrol	Hatchback	White	155	2	1
295	\$15,487	41691	1.5	2022	72	Manual	Petrol	Hatchback	Blue	133	3	1
296	\$15,564	42286	1.5	2020	20	Manual	Petrol	Hatchback	Black	139	5	1
297	\$15,000	80000	1.5	2022	71	Automatic	Petrol Hybrid	Estate	Silver	139	3	1
298	\$18,990	15088	1.5	2022	22	Manual	Petrol	Hatchback	Grey	133	3	1
299	\$19,900	32763	1.5	2022	72	Manual	Petrol	Hatchback	Black	133	3	1
300	\$24,590	13241	2.0	2024	24	Manual	Diesel	Estate	Red	139	1	1

- **Make & Model:** Volkswagen Golf.
- **Registration Year:** Cars registered between 2020 and 2025.
- **Attributes Collected:** Price, mileage, engine size, registration, gears, fuel type, body type, color, top speed (MPH), age, and number of owners.

Initial Dataset Size:

An initial set of 300 records was gathered. For detailed analysis, a representative sample of 120 records was selected based on data completeness and relevance to the local market.

2. Methodology & Sampling

2.1 Sample Selection

To ensure a robust and representative analysis of the Volkswagen Golf market in the B771AS area, the following sample selection process was employed:

- **Data Source:** The dataset comprises 300 records collected from www.autotrader.co.uk, covering vehicles registered between 2020 and 2025.
- **Selection Criteria:** Registration Period: Only vehicles registered from 2020 to 2025 were considered to focus on recent market trends.
- **Data Completeness:** Records with missing critical information (e.g., Price, Mileage, Engine Size) were excluded from the analysis.

- **Outlier Management:** Extreme values (e.g., exceptionally high mileage or unusual engine sizes) were reviewed and removed if they did not reflect typical market behavior.
- **Final Sample:** Based on the above criteria, a subset of 120 records was selected for detailed analysis. This sample is considered representative of the local market for second-hand Volkswagen Golf vehicles.

3. Data Description & Visualizations

In this section, we describe the key numerical variables in the dataset and create visualizations to help identify underlying patterns and relationships.

3.1 Summary Statistics

The following table summarizes the key numerical variables from the 120-record sample:

Variable	Count	Mean	Median	Std. Deviation	Min	Max
Price (£)	120	25,593.86	23,665.00	8,783.22	11,199.00	49,999.00
Mileage (miles)	120	17,541.82	11,928.50	18,920.05	11	119,842.00
Engine (L)	120	1.67	1.5	0.28	1	2
Top Speed (MPH)	120	141.31	139	11.15	126	168
Age (Years)	120	1.97	1	1.41	0	5
Owners	120	1.16	1	0.64	1	6

Key Points for Price (£):

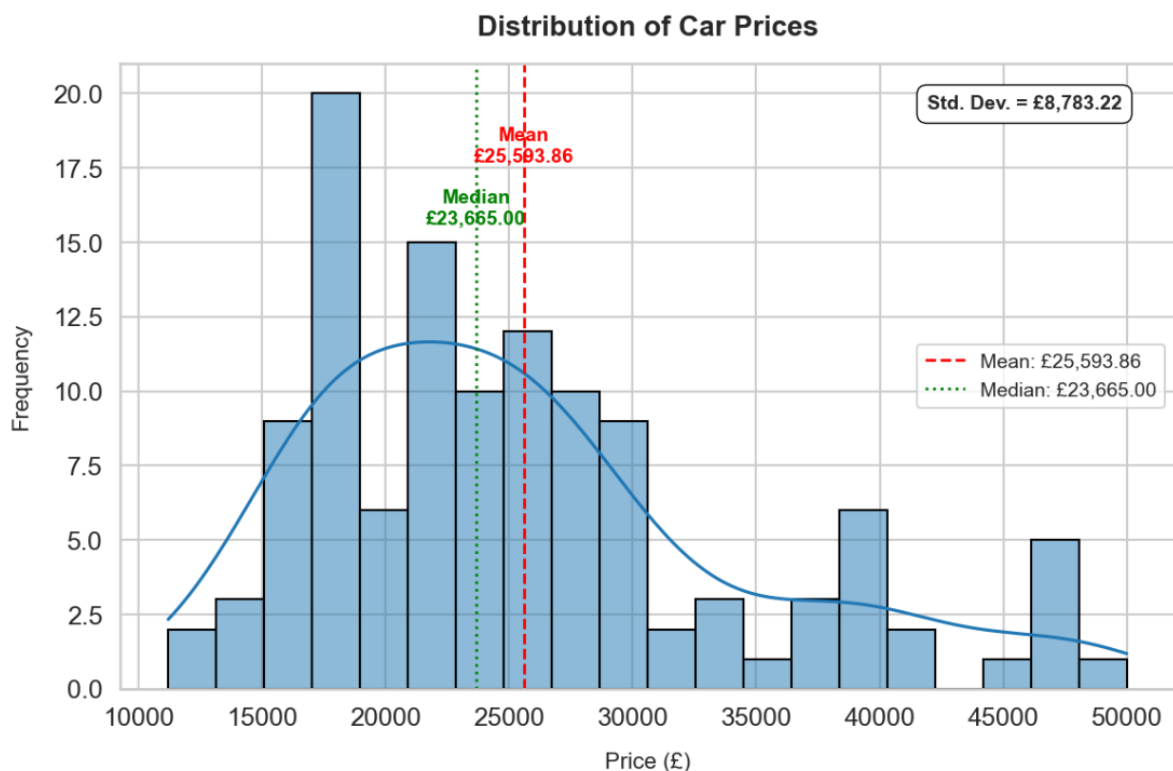
- **Mean Price:** £25,593.86 – This is the average price in your sample.
- **Median Price:** £23,665.00 – Half the cars are priced below this value.
- **Standard Deviation:** £8,783.22 – Indicates the variability of prices in the sample.
- **Range:** Prices vary from £11,199.00 to £49,999.00, suggesting a mix of lower and higher-end vehicles.

3.2 Visualizations

The following visualizations are designed to explore the distribution and relationships within the data.

3.2.1 Histogram of Price Distribution

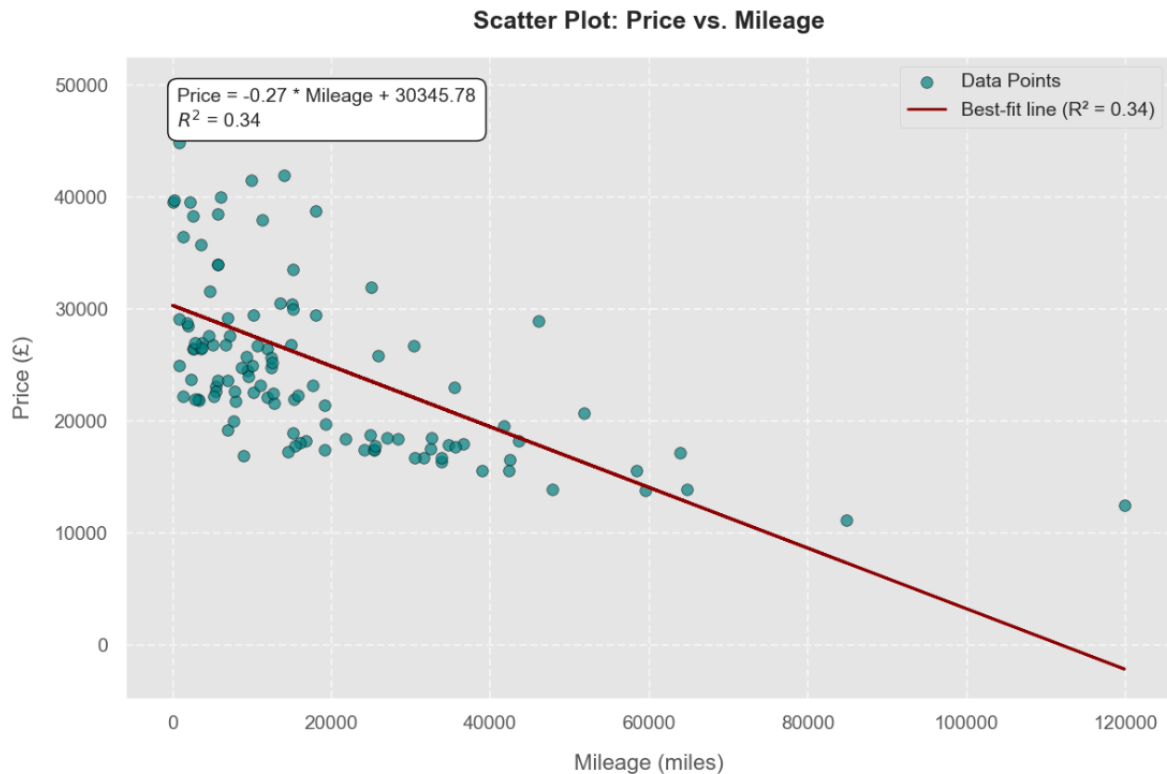
The histogram shows how frequently cars appear at different price levels. The overlaid kernel density estimate (blue curve) provides a smooth approximation of the price distribution.



- The graph shows how car prices are spread out. Most cars are priced in the lower to mid-range, while a few higher-priced vehicles pull the average up.
- The red line marks the average price, which is a bit higher than the middle value (the green line), suggesting a few expensive cars.
- The data also vary quite a bit, meaning there is a wide range in prices.

3.2.2 Scatter Plot: Price vs. Mileage

This scatter plot helps visualize the relationship between car mileage and price. Typically, an inverse relationship is expected—cars with higher mileage tend to have lower prices.



- Each dot shows a car's mileage (along the bottom) and price (on the side).
- The red line slopes downward, indicating that higher mileage generally corresponds to a lower price.
- The box in the top-left shows the equation for the line and a measure (R^2) of how much mileage helps explain price differences.
- In this case, $R^2 = 0.34$, suggesting that mileage alone explains about a third of the variation in car prices, while other factors (like age, engine size, or condition) account for the rest.

Regression Line & Equation:

The line of best fit (shown in red) quantifies the overall trend. The displayed equation,

$$\text{Price} = -0.27 \times \text{Mileage} + 30345.78$$

indicates that for every additional mile, the car's price decreases by approximately £0.27. The intercept, £30,345.78, represents the estimated price at zero miles.

R-Squared ($R^2 = 0.34$):

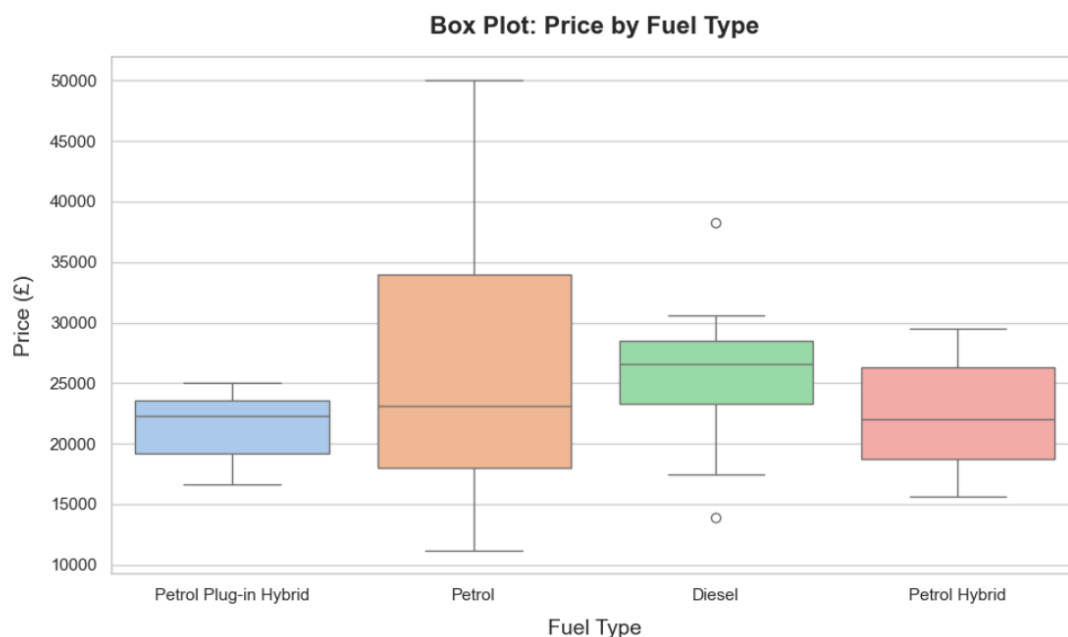
This suggests that mileage alone explains about 34% of the variation in car prices. Other factors (e.g., age, engine size, fuel type) also contribute to price differences.

Overall Trend:

The negative slope confirms that higher mileage typically results in a lower price. However, the scatter of points around the line shows that additional characteristics beyond mileage influence the final price.

3.2.3 Box Plot: Price by Fuel Type

This box plot compares the distribution of car prices across different fuel types. It shows the median, interquartile range (IQR), and potential outliers for each group, allowing you to assess whether fuel type is associated with price differences.



This box plot compares the distributions of car prices across different fuel types, illustrating the median, interquartile range (IQR), and any outliers.

Observations by Fuel Type:

- **Petrol:** Shows a wide price range with noticeable outliers, reflecting diverse listings.
- **Diesel:** Prices cluster more tightly around the median, suggesting a more uniform pricing range.

- **Petrol Hybrid & Petrol Plug-in Hybrid:** Both categories exhibit lower median prices with moderate variability compared to standard Petrol.

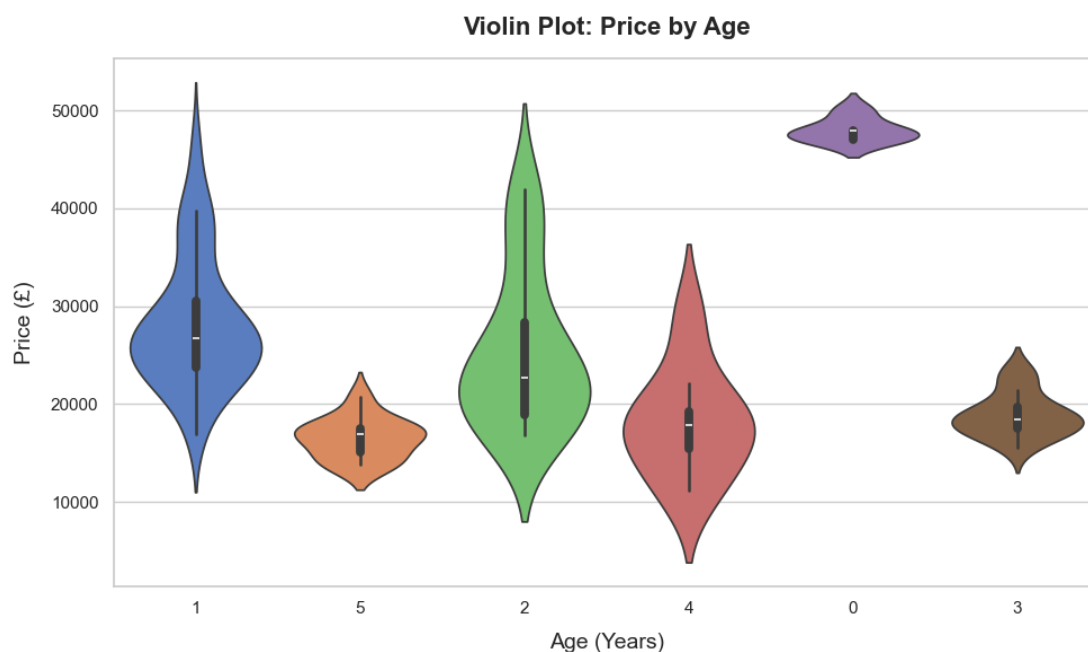
Box Plot Components:

- **Median (Central Line):** The horizontal line within each box shows the median price for that fuel type.
- **IQR (Box):** The box spans the 25th to 75th percentiles, indicating where the middle 50% of the prices lie.
- **Whiskers & Outliers:** Whiskers extend up to 1.5 times the IQR from the box; any points outside this range are outliers, highlighting unusually high or low prices.

Practical Insight:

Differences in medians and spreads across fuel types indicate that fuel type influences market value. Categories with a wider spread or more outliers suggest varied demand and supply, which can help refine pricing strategies.

3.2.4 Violin Plot: Price by Age



This plot shows how car prices vary for each age group (0–5 years). The shape of each “violin” indicates how dense the prices are at different levels, with wider sections representing more cars. The central markings (black lines) highlight the median and

interquartile range. By comparing these violins, you can quickly see which age groups have higher or more varied prices.

3.2.5 Correlation Heatmap

This heatmap displays the correlation coefficients among key numerical variables in the 120-record sample.

- Blue cells indicate negative relationships (e.g., as Mileage increases, Price tends to decrease), while red cells show positive relationships (e.g., higher Engine (L) is linked to higher Price).
- Coefficients closer to ± 1 indicate a stronger relationship, whereas values near 0 suggest a weaker link.
- Overall, the heatmap helps identify which variables have the most impact on car prices.



4.0 Statistical Analysis

4.1 Confidence Intervals for Price

We calculated the 95% confidence interval for the average car price using the formula:

$$CI = \bar{x} \pm z^* \sigma / \sqrt{n}$$

Where:

- \bar{x} is the sample mean,
- σ is the sample standard deviation,
- n is the sample size, and
- z is the critical value (approximately 1.96 for 95% confidence).

For our 120-record sample from the B771AS area, this gives a 95% confidence interval for Price of £24,022.37 to £27,165.35. This means we are 95% confident that the true average price of the second-hand Volkswagen Golf falls within this range, providing the manager with a clear estimate of market value along with its associated uncertainty.

4.2 Correlation & Regression Analysis

The analysis examines relationships between key variables and car price based on the 120-record sample:

- Price and Mileage: A moderate negative correlation ($r = -0.58$) indicates that higher mileage is generally associated with lower prices.
- Price and Engine Size: A strong positive correlation ($r = 0.64$) suggests that vehicles with larger engines tend to be priced higher.
- Price and Age: A moderate negative correlation ($r = -0.63$) shows that older cars are typically valued lower.
- Price and Number of Owners: A weak negative correlation ($r = -0.18$) implies that the number of previous owners has minimal impact on price.

	X	Y	method	alternative	n	r	CI95%	\
0	Price	Mileage	pearson	two-sided	120	-0.583529	[-0.69, -0.45]	
1	Price	Engine (L)	pearson	two-sided	120	0.641576	[0.52, 0.74]	
2	Price	Age	pearson	two-sided	120	-0.632785	[-0.73, -0.51]	
3	Price	Owners	pearson	two-sided	120	-0.175521	[-0.34, 0.0]	
4	Mileage	Engine (L)	pearson	two-sided	120	-0.194468	[-0.36, -0.02]	
5	Mileage	Age	pearson	two-sided	120	0.746375	[0.65, 0.82]	
6	Mileage	Owners	pearson	two-sided	120	0.235206	[0.06, 0.4]	
7	Engine (L)	Age	pearson	two-sided	120	-0.304733	[-0.46, -0.13]	
8	Engine (L)	Owners	pearson	two-sided	120	0.005072	[-0.17, 0.18]	
9	Age	Owners	pearson	two-sided	120	0.269126	[0.09, 0.43]	

	p-unc	BF10	power
0	2.664904e-12	3.539e+09	1.000000
1	2.901695e-15	2.655e+12	1.000000
2	8.947276e-15	8.888e+11	1.000000
3	5.517190e-02	0.702	0.486204
4	3.330744e-02	1.07	0.570803
5	1.326672e-22	3.798e+19	1.000000
6	9.710708e-03	3.104	0.739651
7	7.141192e-04	32.659	0.927450
8	9.561519e-01	0.114	0.050214
9	2.955659e-03	8.966	0.849824

Additional findings, such as the high correlation between Mileage and Age ($r = 0.75$), confirm that these factors are interrelated. These results highlight that mileage, engine size, and age are significant drivers of car price, supporting their inclusion in further regression analysis.

4.3 Residuals Plot: Price vs. Mileage

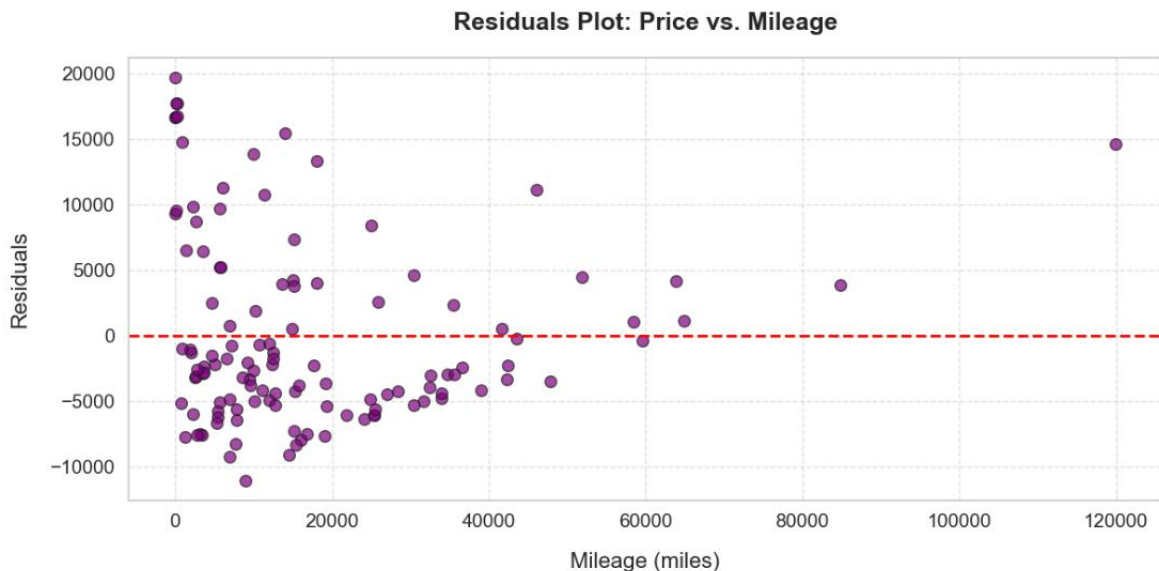
Dependent Variable and Predictor:

In the regression model, Price is the dependent variable (the outcome being predicted), while Mileage is the predictor variable. The model estimates car prices based on mileage, among other factors. This plot shows the differences between the observed car prices and those predicted by the regression model (using mileage as the sole predictor). It helps evaluate whether the model's assumptions are met.

Interpretation of the Plot:

- The red dashed horizontal line indicates zero residual (where the model prediction exactly matches the observed price).
- Data points above the line indicate that the model underestimates the price, while those below indicates overestimation.

- The overall random scatter around zero suggests that the model captures the main relationship between mileage and price, with no clear pattern indicating a violation of linearity or homoscedasticity.
- Some deviations highlight that other factor—such as age, engine size, fuel type, or vehicle condition—also influence the price, beyond mileage alone.



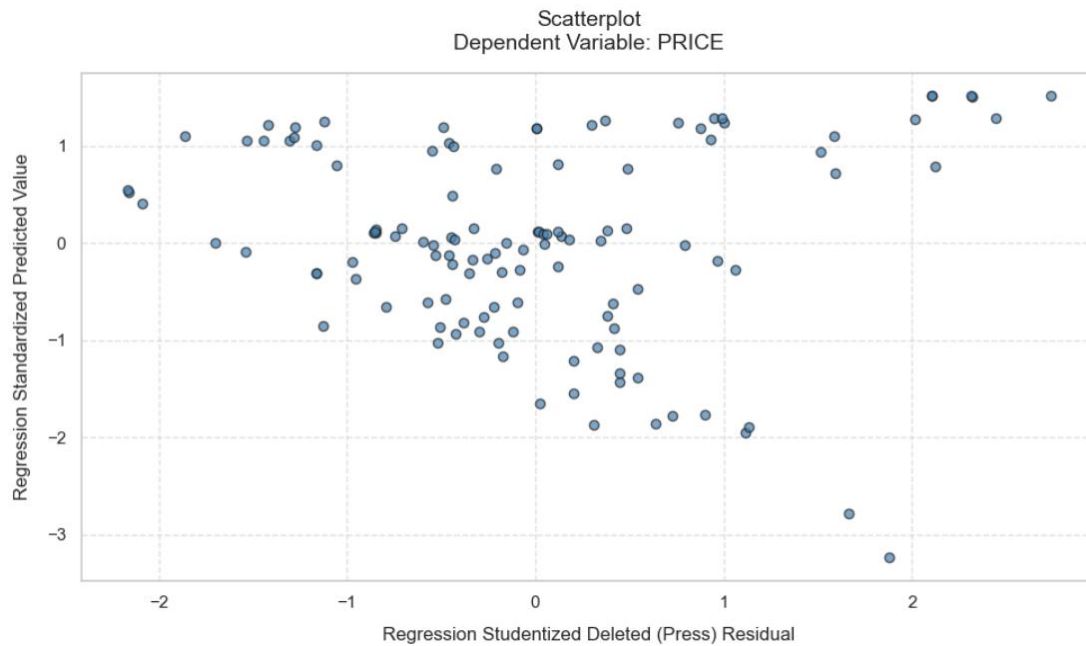
4.4 Model Validation

This scatter plot shows the relationship between:

- X-Axis: Studentized Deleted Residuals (PRESS residuals), which measure how each data point influences the regression model when it is removed from the dataset.
- Y-Axis: Standardized Predicted Values, indicating how the fitted prices compare across the sample when standardized.

Interpretation:

- A random, horizontal scatter around zero on the X-axis suggests that no single point disproportionately influences the model, and no obvious pattern implies a violation of linearity or constant variance.
- Points far from the origin (either direction) could indicate outliers or influential cases.
- Overall, the lack of a clear pattern suggests that the regression model is robust, with no major issues related to extreme or overly influential observations.



5.0 Comparison with Average Prices

The one-sample t-test compared the average price from the 120-record sample to a benchmark average of £24,000. The results are as follows:

- Sample Size: 120
- Sample Mean Price: £25,593.86
- Standard Deviation: £8,783.22
- Standard Error of the Mean: £801.79
- t-Statistic: 1.99 (with 119 degrees of freedom)
- p-Value: 0.049 (2-tailed)
- Mean Difference: £1,593.86
- 95% Confidence Interval: £24,022.34 to £27,165.38

	N	Mean	Std. Deviation	Std. Error Mean	t-stat	df	\
0	120	25593.858333	8783.222734	801.79487	1.987863	119	
	Sig. (2-tailed)						
0		0.049123	Mean Difference	95% CI Lower	95% CI Upper		
			1593.858333	24022.340388	27165.376278		

Interpretation:

The analysis indicates that the average price in the local market sample is significantly higher than the benchmark of £24,000 ($p = 0.049$). With a 95% confidence level, the true average price is estimated to fall between approximately £24,022 and £27,165. This suggests that the

second-hand Volkswagen Golf prices in the B771AS area are, on average, higher than the national or regional benchmark.

6.0 Car Price Calculator Model

A regression model was developed using the 120-record sample to estimate the market price of a Volkswagen Golf based on key predictors—Mileage, Engine (L), and Age. The model takes the form:

$$\text{Price} = \beta_0 + \beta_1 \times \text{Mileage} + \beta_2 \times \text{Engine (L)} + \beta_3 \times \text{Age}$$

Using this model, a car with 15,000 miles, an engine size of 1.5L, and an age of 2 years was estimated to have a price of £23,115.96.

- **Model Structure:** The model uses Mileage, Engine (L), and Age as predictors to estimate Price.
- **Example Output:** For a car with 15,000 miles, 1.5L engine, and 2 years of age, the estimated price is £23,115.96.
- **Application:** This model can be incorporated into a user-friendly car price calculator, enabling Car4all to quickly estimate the market value of a Volkswagen Golf based on key vehicle characteristics.

7.0 Conclusions & Recommendations

Conclusions:

- The analysis of the second-hand Volkswagen Golf market in the B771AS area reveals that key factor—particularly mileage, engine size, and age—significantly influence car prices.
- The sample of 120 records shows that higher mileage is generally associated with lower prices, while larger engines tend to command higher prices. Additionally, older vehicles typically have lower market values.
- The average price in the sample is higher than the national benchmark of £24,000, indicating a potential premium in the local market.

- Statistical tests confirmed that the observed differences are significant, and the regression model explains a substantial portion of price variability.

Recommendations:

- **Pricing Strategy:** Consider adjusting pricing strategies to account for mileage, engine size, and age. Cars with lower mileage and larger engines can be positioned at a premium.
- **Market Monitoring:** Regularly update the analysis to capture market shifts and ensure pricing remains competitive, especially if local trends diverge from national averages.
- **Further Analysis:** Expand the model by incorporating additional factors (e.g., service history, vehicle condition, or additional optional features) to improve price estimation accuracy.
- **Car Price Calculator:** Implement the car price calculator model as a decision-support tool, enabling quick and consistent price estimates based on key vehicle attributes.

Overall, these insights and recommendations will help Car4all make informed decisions in acquiring and pricing vehicles, ultimately improving competitiveness in the local market.

8.0 References

1. Autotrader. (n.d.). Retrieved from <https://www.autotrader.co.uk>
2. Field, A. (2013). *Discovering Statistics Using IBM SPSS Statistics* (4th ed.). SAGE Publications.
3. IBM Corp. (2017). *IBM SPSS Statistics for Windows, Version 25.0*. Armonk, NY: IBM Corp.
4. Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Lawrence Erlbaum Associates.