Hypothesis Testing

Dataset: Amazon Inc

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Time Periods: 2000-2010, 2005-2015, 2010-2020

● Model 1

- ❏ **Difference Pattern:** Difference between successive Close Price
- ❏ **Difference Range:** +/- $ 1.5

1. **Time Range:** 2010-2020

Today / Tomorrow	Down	Stagnant	Up
Down	0.428704	0.187037	0.384259
Stagnant	0.410749	0.270633	0.318618
Up	0.441530	0.193443	0.365027

Tomorrow / Today	Down	Stagnant	Up
Down	463	214	404
Stagnant	202	141	177
Up	415	166	334

2. **Time Range:** 2005-2015

Today / Tomorrow	Down	Stagnant	Up
Down	0.277863	0.39084	0.331298
Stagnant	0.208861	0.616297	0.174842
Up	0.350671	0.384228	0.265101

Today / Tomorrow	Down	Stagnant	Up
Down	0.277863	0.39084	0.331298
Stagnant	0.208861	0.616297	0.174842
Up	0.350671	0.384228	0.265101

3. **Time Range:** 2000-2010

Tomorrow / Today	Down	Stagnant	Up
Down	182	264	209
Stagnant	256	779	229
Up	217	221	158

Today / Tomorrow	Down	Stagnant	Up
Down	0.156364	0.647273	0.196364
Stagnant	0.09128	0.824579	0.084141
Up	0.195652	0.597826	0.206522

● Model 2

❏ **Difference Pattern:** Difference between Close and Open Price
❏ **Difference Range:** +/- $ 1.5

4. Time Range: 2010-2020

Tomorrow Today	Down	Stagnant	Up
Down	372	181	396
Stagnant	193	171	201
Up	383	213	406

Today Tomorrow	Down	Stagnant	Up
Down	0.392405	0.203586	0.404008
Stagnant	0.320354	0.302655	0.376991
Up	0.394816	0.200399	0.404786

5. Time Range: 2005-2015

Tomorrow Today	Down	Stagnant	Up
Down	163	208	191
Stagnant	221	858	247
Up	178	259	190

Today Tomorrow	Down	Stagnant	Up
Down	0.290036	0.393238	0.316726
Stagnant	0.156981	0.647547	0.195472
Up	0.304140	0.393312	0.302548

6. Time Range: 2000-2010

Tomorrow Today	Down	Stagnant	Up
Down	43	138	54
Stagnant	148	1727	156
Up	44	166	36

Today Tomorrow	Down	Stagnant	Up
Down	0.182979	0.629787	0.187234
Stagnant	0.067947	0.850320	0.081733
Up	0.219512	0.634146	0.146341

● Model 3

❏ **Difference Pattern:** Diff between successive column Close Price
❏ **Difference Range:** Diff of |Change %| / 2 * Open
where Change% = (Diff b/w the difference parameter/ Open).

7. Time Range: 2010-2020

Tomorrow Today	Down	Stagnant	Up
Down	339	397	157
Stagnant	406	177	329
Up	147	339	225

Today Tomorrow	Down	Stagnant	Up
Down	0.380045	0.455157	0.164798
Stagnant	0.434830	0.193866	0.371303
Up	0.220816	0.462729	0.316456

8. Time Range: 2005-2015

Tomorrow Today	Down	Stagnant	Up
Down	285	352	177
Stagnant	385	199	342
Up	144	375	256

Today Tomorrow	Down	Stagnant	Up
Down	0.350123	0.472973	0.176904
Stagnant	0.380130	0.214903	0.404968
Up	0.228387	0.441290	0.330323

9. Time Range: 2000-2010

Tomorrow Today	Down	Stagnant	Up
Down	270	363	164
Stagnant	377	179	349
Up	149	364	297

Today Tomorrow	Down	Stagnant	Up
Down	0.339196	0.473618	0.187186
Stagnant	0.400662	0.197572	0.401766
Up	0.202469	0.430864	0.366667

● Model 4

❏ **Difference Pattern:** Difference between Close and Open Price
❏ **Difference Range:** Diff of |Change %| / 2 * Open
 where Change% = (Diff b/w the difference parameter/ Open).

10. **Time Range:** 2010-2020

Tomorrow Today	Down	Stagnant	Up
Down	274	350	154
Stagnant	331	182	377
Up	173	358	317

Today Tomorrow	Down	Stagnant	Up
Down	0.352185	0.425450	0.222365
Stagnant	0.393258	0.204494	0.402247
Up	0.181604	0.444575	0.373821

11. **Time Range:** 2005-2015

Tomorrow Today	Down	Stagnant	Up
Down	274	350	154
Stagnant	331	182	377
Up	173	358	317

Today Tomorrow	Down	Stagnant	Up
Down	0.347258	0.412533	0.240209
Stagnant	0.396667	0.194444	0.408889
Up	0.168433	0.480565	0.351001

12. **Time Range:** 2000-2010

Tomorrow Today	Down	Stagnant	Up
Down	281	349	148
Stagnant	342	161	397
Up	155	390	289

Today Tomorrow	Down	Stagnant	Up
Down	0.361183	0.439589	0.199229
Stagnant	0.387778	0.178889	0.433333
Up	0.177458	0.476019	0.346523

HMM Results
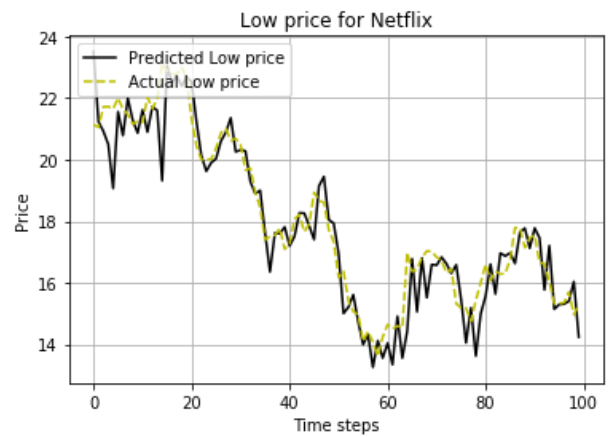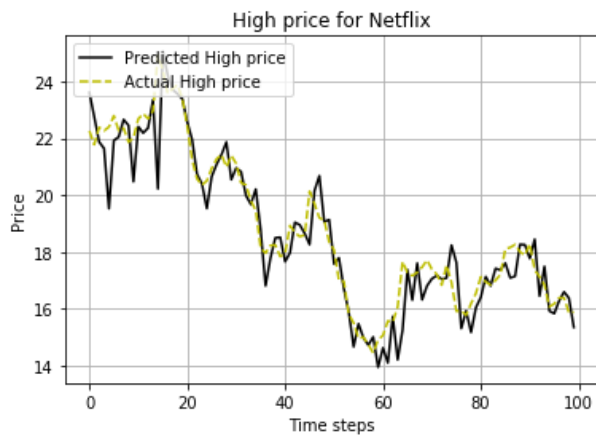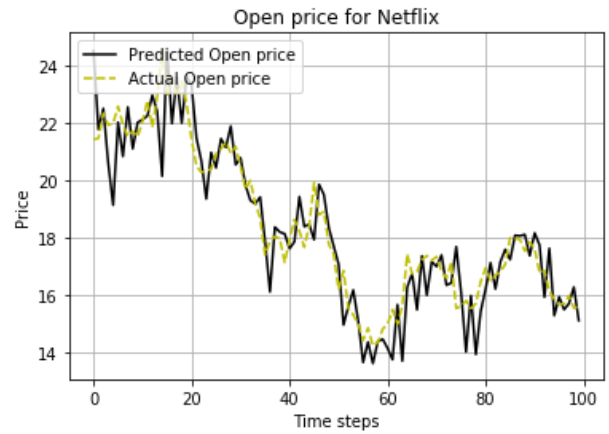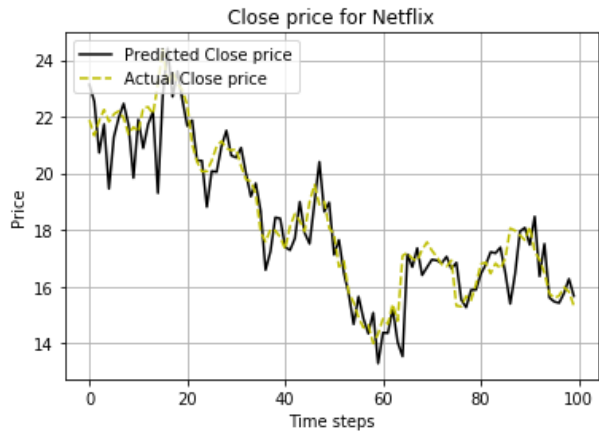
1. Amazon

Optimum number of states are 13
MAPE for the stock Amazon is [0.02309835 0.02548907 0.01664381 0.02521461]
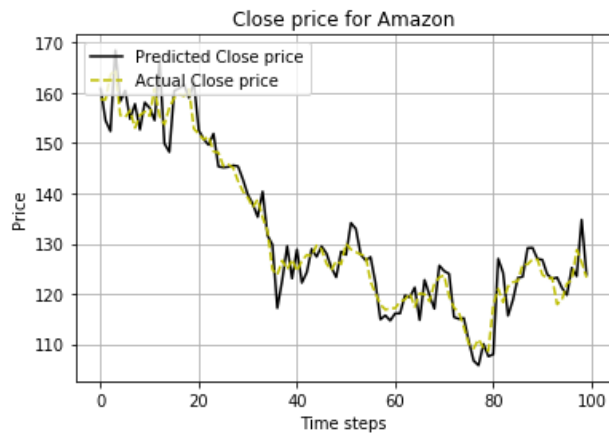
2. Netflix

Optimum number of states are 13
MAPE for the stock Netflix is [0.03775599 0.04385977 0.03398027 0.03566543]

3. Tesla

Optimum number of states are 14
MAPE for the stock Tesla is [0.04583013 0.04494318 0.04953916 0.03743635]

Close price for Tesla / Open price for Tesla / High price for Tesla / Low price for Tesla