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K-C MODEL OR K-COSINE MODEL - A MODEL FOR TRADING IN FINANCIAL INSTRUMENTS

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Abstract:
The K-Cosine Model, or K-C Model, is a unique approach to understanding movements in the prices of actively traded financial instruments, such as currencies, equities, and bonds. The model works best with instruments with deep liquidity and developed underlying capital/currency markets. The model is based on a basic mathematical truth- when the average is rising (falling), the marginal data point must be above (below) the average. A trader/user can take best trading decisions with the "Summary Page" view, showcasing **four live indicators**, i.e. (1) Price, (2) Charts, (3) Heat map and (4) Cosine values, all on one screen. A consolidated view of the **four indicators** equips users to make better trading decisions. The K-Cosine model is a new way of looking at the price of the trading scrips, and takes trading positions at the right combination of buoyancy or gravity. Obviously, the awards reaped by a trader will depend upon two things. **One**, the number of times he/she understands and interprets the indications given as the net of the Buoyancy and Gravity on the summary page. **Two**, the number of positions taken by the trader based on each of the leads generated.

JEL: G17, G11, G12, G31, C53

Keywords: trading, prices, equity, currencies, bonds, charts, buoyancy, Marginal Cosine Value (MCV), Marginal Time Stamp (MTS)

Table 1: Abbreviations and Vocabulary

K-C Model	K-Cosine Model
CV	Cosine Values
Cosine	Trigonometrical Value
Scrip	Financial Instruments line Currency Pairs (e.g. GBPUSD, EURUSD, etc.), Equity shares, Fixed Income instruments, etc.)
CMP	Current Market Price of a Scrip
MCV	Marginal Cosine Value
MTS	Marginal Time-Stamp
SRM	Simultaneous Relative-Movement

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KDP	Key Driving Point
Zero Line/Base Line	The X-Axis which divides the area between positive and negative marginal cosine values of the CMP of a scrip against its MTS value
Surface	MCVs of CMP of scrips against most recent prices.
Depth	MCVs of CMP of scrips against older prices.

1. Technical Analysis - A Brief Overview

Technical analysis helps analyse the price patterns of underlying financial instruments using numbers, charts, and trends. An effective technical analysis helps a trader take positions that suits her/his pocket and risk-appetite.

1.1 Existing Tools of Technical Analysis

Currently, traders around the world use candlestick patterns, bar charts, line charts and related tools for technical analysis to understand the past movements of an underlying and make predictions about the future price movements.

There are a host of related tools like fibonacci retracements, trendlines, channels, etc., and various patterns and indicators like doji, morning star, evening star, etc. that traders use and rely upon as a basis of forming opinions and taking trading positions.

2. K-Cosine Model or K-C Model

2.1 What is the K-Cosine Model?

- K-Cosine or K-C model is a type of technical analysis that is based on a set of four parameters, all fitting on one screen.
- The four parameters are- price, cosine value, heatmap and charts.
- A consolidated live view of all the four parameters on one-screen gives traders a better understanding of price-trends.
- Important terms and references used under the model are: marginal cosine value (MCV) representing cosine value of current market price (CMP) with the opening price of a time-interval, marginal time-stamp (MTS) implying the Time Interval considered, such as 10m, 30m, etc.

2.2 Need for the Model

The question is:

- Why, at all, do we need 'K-Cosine Model' when we already have a hugely popular and widely followed Technical Analysis in place?

2.3 Answer

The question has it in it. We need a new concept, which is different from the existing, and yet powerful and equally effective, if not more, and is surprisingly all too simple**.**

Unlikely, it might seem as a first thought. But it might be worth visiting the concept, which is relatively easy to understand and use.

It is a new way to analyze movement of scrips, and predict the direction, strength and longevity of its next move. Whether it's the buoyancy (up move) or the gravity (down move) that will prevail? It's an exciting trip for sure. Hope the readers will enjoy the journey.

While the existing charts and patterns, and related tools are very helpful for the traders, the K Cosine Model captures the surface, depth, momentum, buoyancy vs. weight and the behavioral forces of the scrip, in a more wholesome, granular and analytical way than any existing form of technical analysis.

The Model works better as the liquidity of the scrip improves. Direction and momentum are displayed in the summary page, which depicts values, charts and heat-map of the time-stamped movement in market price of the instruments.

2.4 Model Pre-Requisites

MS Office Suite and Excel-Worksheet connected with live content providers such as Reuters/Refinitiv/Bloomberg for capturing live feeds of the instrument, such as EUR/USD, GBP/USD, AUD/USD, and EUR/GBP exchange rates.

2.5 Key Driving Point (KDP) of the Model

Basic mathematical truth that when the average is rising (falling), the marginal data point must be above (below) the average.

2.6 About the Model

2.6.1 Why the Name K-C Model

- K-C Model, or K- Cosine Model, is a mathematical model, showing real-time relative movement in financial instruments like currencies, stocks, etc., by way of angles, numbers, charts, and heat-map together in a single-frame.
- The K of the Model-name stems from the shape assumed by the up-move (bullish) and down-move (bearish) of the instrument within a time-span. Time is captured on X-axis and price-movements depicted on the Y-axis.

2.6.2 How Does the Model Work?

K Cosine model captures "*simultaneous relative-movement*" of an instrument as cosine values against a sequence of opening prices in MTS, say, 10min, 30-Min, Hourly, Daily etc., along the time-series.

The marginal cosine value (MCV) is *cos theta* or cos θ (ratio of the *adjacent side* to the *hypotenuse)*, θ being the angle. *Adjacent* Side or *Base* represents "Time Series", *Height* represents the Cosine formula, which is as follows:

Cos theta (θ) = Angle {Adjacent} / {Hypotenuse}.

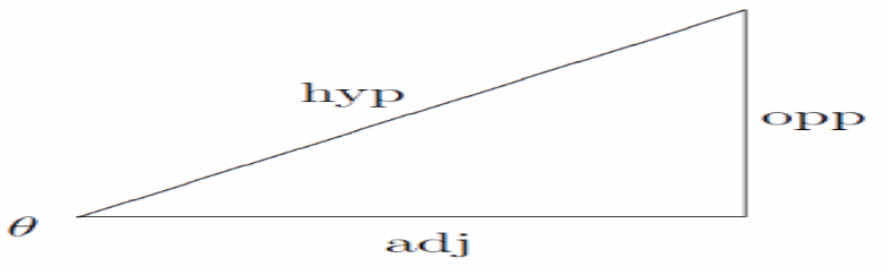


Figure-1 (representation of cos theta angle)

The cosine value (*CVs)* of the price movements range between 0.00 (Min) to 90.00 (Max). Positive sign and green colour for Bullish Outlook, while negative sign and red colour for Bearish outlook, *Zero*, shown in Yellow Color, typically shows likelihood of trend-cessation or reversal. Higher absolute CV, means higher strength of bullish/bearish trend.

So, for example, if the GBP/USD *CV* has moved from say 0.00 to 5.45, it signals a probable start of an early bullish phase, and the propensity of the base currency (GBP) to move higher.

If the value further moves up to say 11.23 to 15.68, 24.97 to 45.64, 68.95 to 75.32 to 85.67 to 89.61, to 90.00, it shows that bullish signals have been strengthening and the GBP has been moving up, and the movement has now peaked up to 90.00.

Table 2: Cosine value of live GBPUSD prices

Live Time	**Live Price**	**Base**	**Perpendicular**	**Hypotenuse**	**Cosine Value**	
10:02	**1.3105**				**(C/E)**	**Angle**
A	**B**	**C**	**D**	**E**	**F**	**G**
Time-Gap Beginning	**GBP Price**	**Time Differential**	**Price Differential**	**Derived Hypotenuse**	**Adj/ Hyp**	**Theta (θ)**
10:00	1.31	0.001	**0.00050**	0.0015	0.94174	19.65
9:50	1.3095	0.008	**0.00100**	0.0084	0.99282	6.87
9:40	1.309	0.015	**0.00150**	0.0154	0.99523	5.60
9:30	1.3085	0.022	**0.00200**	0.0221	0.99589	5.19
9:20	13080	0.029	**0.00250**	0.0293	0.99635	4.89

The chart in Figure 1 above depicts how the MCV is derived based on the MSV of the underlying scrip.

The MCV (column-G) can be checked for change as the live price in B2 changes.

Figure 3: Four-in-one-screen view of GBPUSD Cosine values, charts, table and heat-map

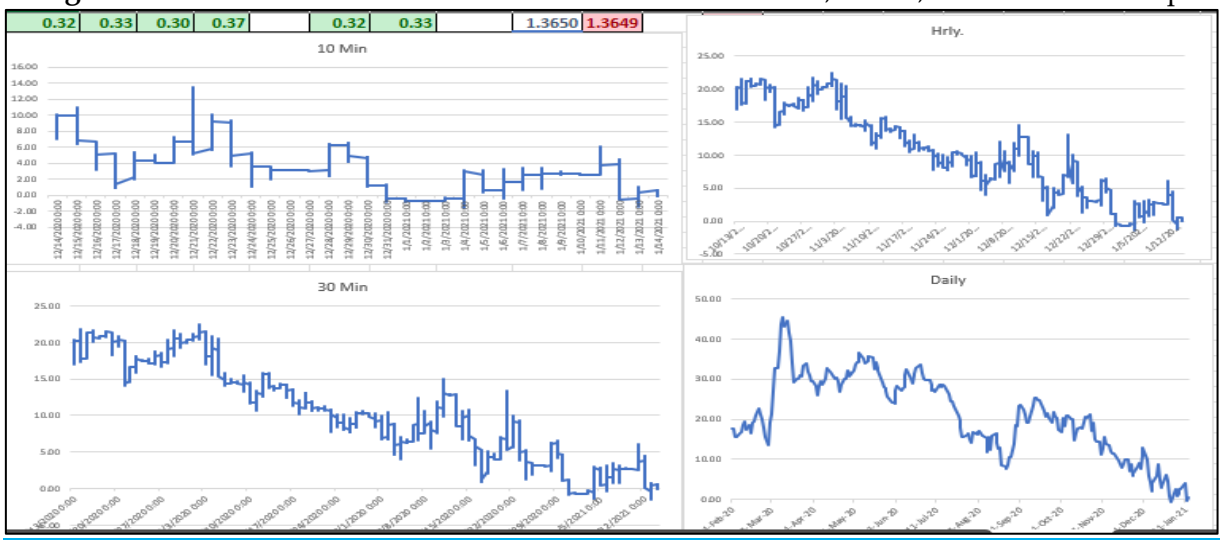
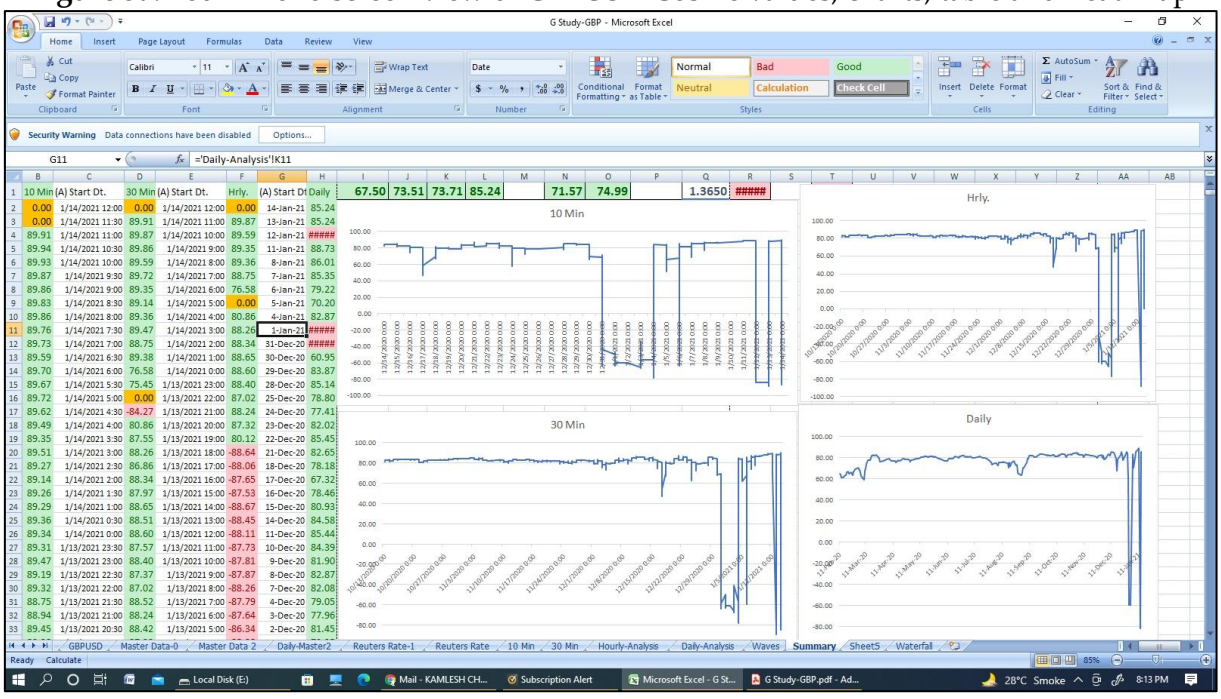


Figure 3a: Four-in-one-screen view of GBPUSD Cosine values, charts, table and heat-map



The **4 MTS** taken for understanding purposes are 10m, 30m, 1 hr and daily in the cells B2, D2, F2 and H2, respectively. (ref. Fig. 3a, Table 2a & Annexure).

- Mean of 10m, 30m, 1 hr and daily in cells I1, J1, K1 and L1, respectively. (ref. Table 2.a.ii).
- Mean of I1, J1, K1 in N1, and I1, J1, K1 and L1 in O1. (ref. Table 2.a.iii)

In the table above, we can see the live prices (linked to say, Reuters/Refinitiv) in B2. 10-min. MTS CVs in cell A5 and downward, average of today's total 10-min MTS in C2.

Referring to the model KDP, an ideal **buy** or **sell** proposition should be arranged like a pyramid structure, i.e. the '**Absolute value'** of MCV of the smaller MTS (say, 10min) or combination of smaller MTS should be the **greater** than the next higher MTS (30m),

Table 2a: Cosine value of live GBPUSD in 10min, 30min, hourly and daily

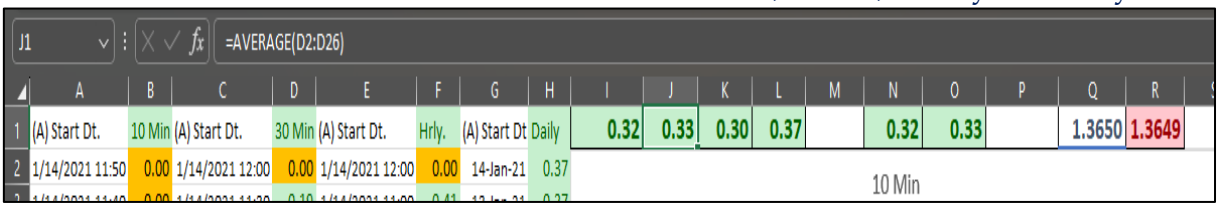


Table 2a(i) : Magnified view of cosine values

	A	B	C	D	E	F	G	H
1	(A) Start Dt.	10 Min	(A) Start Dt.	30 Min	(A) Start Dt.	Hrly.	(A) Start Dt	Daily
2	1/14/2021 11:50	0.00	1/14/2021 12:00	0.00	1/14/2021 12:00	0.00	14-Jan-21	0.37
3	1/14/2021 11:40	0.00	1/14/2021 11:30	0.19	1/14/2021 11:00	0.41	13-Jan-21	0.37
4	1/14/2021 11:30	0.19	1/14/2021 11:00	0.41	1/14/2021 10:00	0.31	12-Jan-21	-0.44
9778	10/14/2020 16:20	18.60	4/15/2020 3:30	25.81	1/0/1900 0:00	0.00	0-Jan-00	0.00

Table 2a(ii): Magnified view of mean of the cosine values

I1	J1	K1	L1	Live price
0.32	0.33	0.30	0.37	1.3649
Mean of 10min. MCV from the sample	Mean of 30min. MCV from the sample	Mean of 1 hr MCV from the sample	Mean of Daily MCV from the sample	Live price
Sample period: 14-Jan 2020 to 14-Jan 2021				

Table 2a(iii): Magnified view of mean of the cosine values

	A	I	J	K	L	N	O	Q	R
1	(A) Start Dt.	0.32	0.33	0.30	0.37	0.32	0.32984	1.3650	1.3649
2	1/14/2021 11:50								
9780	10/14/2020 16:00								
9781		mean of 10min. MCV from the sample	mean of 30min. MCV from the sample	mean of 1 hr MCV from the sample	mean of Daily MCV from the sample	mean of (I1, J1, K1)	mean of (I1, J1, K1 & L1))		Live price
9782	Sample period: 14-Jan 2020 to 14-Jan 2021								

2.6.2.1 MCV hierarchy

There can be multiple combination relative relationships in these MCVs

1) B2>D2>F2>H2 (i.e. MCVs of 10min > 30 min. > hourly > daily),
2) B2>I1, D2>J1, F2>K1, H2>L1 (i.e. MCVs of 10min > mean 10 min and so on),
3) I1>J1>K1>L1>N1>O1 (i.e. MCVs of mean of 10min > mean 30 min and so on),
4) N1>O1 (i.e. Mean of MCVs of smaller MTSs > Mean of MCVs of smaller MTSs),
5) R1>Q1 (R1 is the Live Price, while Q1 is the Derived Price from Avg. of the CVs).

2.6.2.2 What does it mean?

In the example provided above, I have taken 4 Marginal Time-Stamps (MTS) which can be expanded or contracted as per any dealer's preferences, i.e. if a dealer is more comfortable following 30m charts, he/she can refer only 30m, etc.

2.6.2.3 Model KDP

1) The marginal cosine value (MCV) for all MTS should be greater than their respective averages
2) The MCV for the smallest MTS should always lead the move and be at the top of the pyramid, while the largest MTS should be at the base, with the lowest MCV.
3) The front-end (latest) MCV for all time-stamps should be greater than their respective averages.

All opening past values at the start of a range of MTS are linked to the current live price, thus it shows the angular measure of the instrument's current market price (CMP) with the past prices at the opening price along the timeline MTS at a time-series taken. i.e. CMP (current market price) versus a range of past values.

2.6.3 How Long Will the Currency Keep Moving Up?

If the currency still keeps moving higher, the CV in other cells below will also keeping moving towards **90.00**.

The up-move/down-move will continue as long as the cells are turning green/red, and CVs are moving up towards **90.00**.

2.7 Does the model show that the up-move / down-move has ended, and the trend is likely to reverse? How?

Figure 1 and Figure 2, shown above, should be used in sync with the explanations given below for a complete understanding of key concepts.

Yes, it does. The first signs of a Resistance (Support) in an up-move (down-move) will appear in the cells representing the smallest marginal CVs (MCVs), i.e. in cells B2, D2, F2 & H2. Typically, if currently, the mkt. is bullish and the cells are all green in nearly +90.00, we will see the first signs of resistance in the cells B2, D2, F2, and H2.

The MCV in these cells should first get lower at say, 75,80,72,71 in the fields B2, D2, F2, and H2 respectively, and should fall gradually to zero, and then turn negative to say -15, -10, -8, -5, and then should increase to larger negative numbers until the values reach at/close to -90.00

The resistance will show in the order of the lowest MTSs. MCVs receding from the peak 90.00 to lower absolute numbers say, 88.00, 85.00, 75.00, 50.00, etc., followed by similar patterns in higher MTSs. The average of the MTSs will show a similar pattern, i.e. the lowest average MTS will start showing lower MCVs first, followed by the higher ones. The KDP of the model will again be crucial to conclude a valid/false reversal/resistance.

The support will show in the order of the lowest MTS MCVs receding from the peak -90.00 to lower negative numbers say, -88.00, -85.00, -75.00, -50.00, etc., followed by similar patterns in higher MCVs. The average of the MCVs will show a similar pattern,

i.e. the lowest average MCV will start showing lower CVs first, followed by the higher ones. Slowly, the MCVs in the cells will turn from red to green and then should proceed towards +90.00, if the bullish trend will likely continue. The KDP of the model will again be crucial to conclude a valid/false reversal/resistance.

It may be worthwhile to reiterate that if proper KDP of MCV hierarchy is not sighted, then it is not a valid reversal sign.

The model captures the marginal thrust (up/down), the average thrust and the CMP, and also shows where the CMP stands relative to the marginal, and average thrust implied levels.

It brings multiple time-frame movements, i.e. for example 10-min, 30-min, hourly, daily etc. on a single frame at a time by way of numbers, heat-map and charts, all 3 on a single page at a time.

The relative power of the marginal and incremental up or down move can be adjusted to various support or resistance levels as determined by trend lines, fibonacci levels or any other levels being watched/tracked by the trader.

2.8 Model Drawbacks/Limitations

The Model is most effective in normal market situations. In extraordinary times, when surprise events/news impact the volatility on a higher side, the actual movements might be contrary.

The K-C Model is not a traditional way of visualizing the movement of instruments.

The model does not show the starting, low, high, and closing value of the security/instruments in a time frame, e.g. 10-min, 30-min, etc.

It needs frequent adjustment of the time-span manually. However, with proper IT Help, this shortcoming can be automating the time-adjustment.

Currently, it does not have additional features like analyzing with trend-lines, fibonacci series, ichimoku clouds, etc.

Currently, the users are accustomed to charts and forms like candlesticks, line charts, etc., as shown in Bloomberg and Reuters, which have added features like analyzing the levels by various add-ins like trendlines, bollinger bands, RSI, etc. to understand the support/resistance levels and expected levels, etc.

3. Conceptual Questions

3.1 Q1: How does ‘K’ find its place in the nomenclature of this model?

A1: ‘K’ comes from the shape assumed as the prices of a scrip move up and down the Base-line/Zero-line.

When the prices move up, the charts trace rising lines, slanted to vertical, depending upon the MCVs. And when the prices move down, the charts trace downward falling lines, slanted to vertical, depending upon the MCVs.

The lines thus trace up or down like 'K'. In a Bullish scenario, for instance, most of the MCVs stay above the Baseline, and in a Bearish scenario, most of the MCVs stay below the Baseline, thus making a shape like 'K.'

3.2 Q2: Do scrips move in a K-shape always?
A2: No. The scrips MCVs trace either up or down movement. At any time, the entire chart moves like a wave- up and down. Like a sea-wave, the current is on the surface, as well as in the depths. If the buoyancy force is predominant, the MCVs of CMP against the most recent prices will trace lines above the base-line/zero-line.

More Bullish market sentiments are shown by higher MCVs. The highest MCV is 90.00, which shows very bullish scenario when the price rise vs. time is very steep, which suggests strong upside movement of the scrip. It also shows higher propensity, higher momentum and stronger buoyancy for an up-move. The heatmap also turns green, as a supportive signal. When these conditions meet, the upper part of 'K" is traced on the charts.

More Bearish market sentiments are shown by higher MCVs. The highest MCV is 90.00, which shows a very bearish scenario when the price rise vs. time is very steep, which suggest strong downside movement of the scrip. It also shows higher propensity, higher momentum and stronger gravity for down-move. The heatmap also turns Red, as a supportive signal. When these conditions meet, the lower part of 'K" is traced on the charts.

While the MCVs of CMP against prior values may or may not show above the baseline. A stronger bullish market will be shown by surface as well as depths staying above the baseline, and a bearish market will be shown by surface as well as depths staying below the baseline.

3.3 Q3: Are there any indicators in the K-C Model that signal an impending directional movement, either upside (buoyancy) or downside (gravity)?
A3: Yes. There are.

3.4 Q4: Details
A4: Currently, we have found a 'self-generating' indicator called 'Bow & Arrow.' This 'Bow & Arrow' signal appears automatically on the charts. A more well-formed 'Bow & Arrow' indicates a stronger likelihood of an impending 'Bullish' or 'Bearish' movement of the scrip.

3.5 Q5: How does this Bow & Arrow work?
A5: If a Bow & Arrow sign appears, in either direction, i.e. arrow pointing upwards or pointing downwards, it indicates an increased likelihood of a bullish or a bearish market condition.

When CMP of scrips are moving up, the most recent MCVs must trace upward movement. The 'Bow & Arrow' travels upward/downward if the bullishness/bearishness continues.

The Bow & Arrow, should get more pronounced in shape, and should keep moving upwards along the 'Y-Axis' in a Bullish Market. In a Bearish Market Scenario, the Bow & Arrow, should get more pronounced in shape, and should keep moving downwards along the 'Y-Axis' in a Bullish Market.

The 'Bow & Arrow' signal is a self-appearing and disappearing signal that shows up on the charts. One has to spot it. When pointing upwards, and traveling upwards in the direction of the positive y-axis vector, the signal for the trader is bullish.

Moreover, the more pronounced the 'Bow & Arrow' shape is, and the higher its upside speed, the stronger the Bullish signal.

Similarly, the more pronounced the 'Bow & Arrow' shape is, and the higher its downside speed, the stronger the Bearish signal.

4. Conclusion

The K-C Model or K- Cosine Model is a new way of looking into the movements of Financial Instruments like currencies, stocks, etc., by capturing the marginal movements (MCVS) in time-spans (MTS) across various Time-ranges. The model captures and shows the MCVs, Heat-Maps (Colour of the Cells), Charts, and Values/Prices, all in a single-frame in the 'Summary' page.

It can be used independently, or along with existing chart patterns like Candle-Sticks/line/bar charts provided by Reuters/Bloomberg, etc., for a better perspective.

The Model has the potential to include other analytical features available in Candlesticks/line/bar charts provided by Reuters/Bloomberg, etc., which will further improve the analytics power for traders.

It is an Enabling-Model for traders across a range of financial instruments.

The next version of the book will deal with the topic in greater detail. Wishing the readers and Traders Great Luck & Fortune, as they get ready to trade their favorite scrip, having gotten better equipped by learning the 'K-C Model.'

Acknowledgements
This book is affectionately dedicated to my parents, Shri P. N. Choudhary and Smt. Buchhi Devi & my grandfather (Late) Shri. Maharudra Choudhary Model Concept,

Design & Literature
Design & Literature by Kamlesh Choudhary, Banker, Dealer (Financial Instruments).

Conflict of Interest Statement

The author declares no conflicts of interest.

About the Author

Kamlesh Choudhary is a Banker with over 20 years of banking experience, including 9 years of experience as a trader in varied financial instruments, namely Forex, Equity, Mutual Funds, Fixed Income Instruments, Derivatives, Money-Market instruments, etc. The author has developed this model and tested it in a live environment, and found it to be a useful tool that gives a definite edge in two main ways. One- It helps spot a false signal, thereby helping avoid taking a wrong 'long' or 'short' call. Two- it helps differentiate between a short-lived call and a long-lived call. Kamlesh has already authored a fiction with a wide readership horizon. His book is titled "Vertical and the Organic". While cosine similarity and angle-based measures have been widely used in information retrieval and pattern recognition (Singhal, 2001), their application to financial price–time trajectories remain limited. This paper proposes a novel K-Cosine Model that maps price movement into angular space for technical analysis.

References

Kamich, D. (1999). *Chart patterns: After the breakout — The Bloomberg way to trade stocks and commodities*. Bloomberg Press. ISBN 978-1576603009. Retrieved from https://www.wiley.com/en-us/Chart+Patterns-p-9780470885277

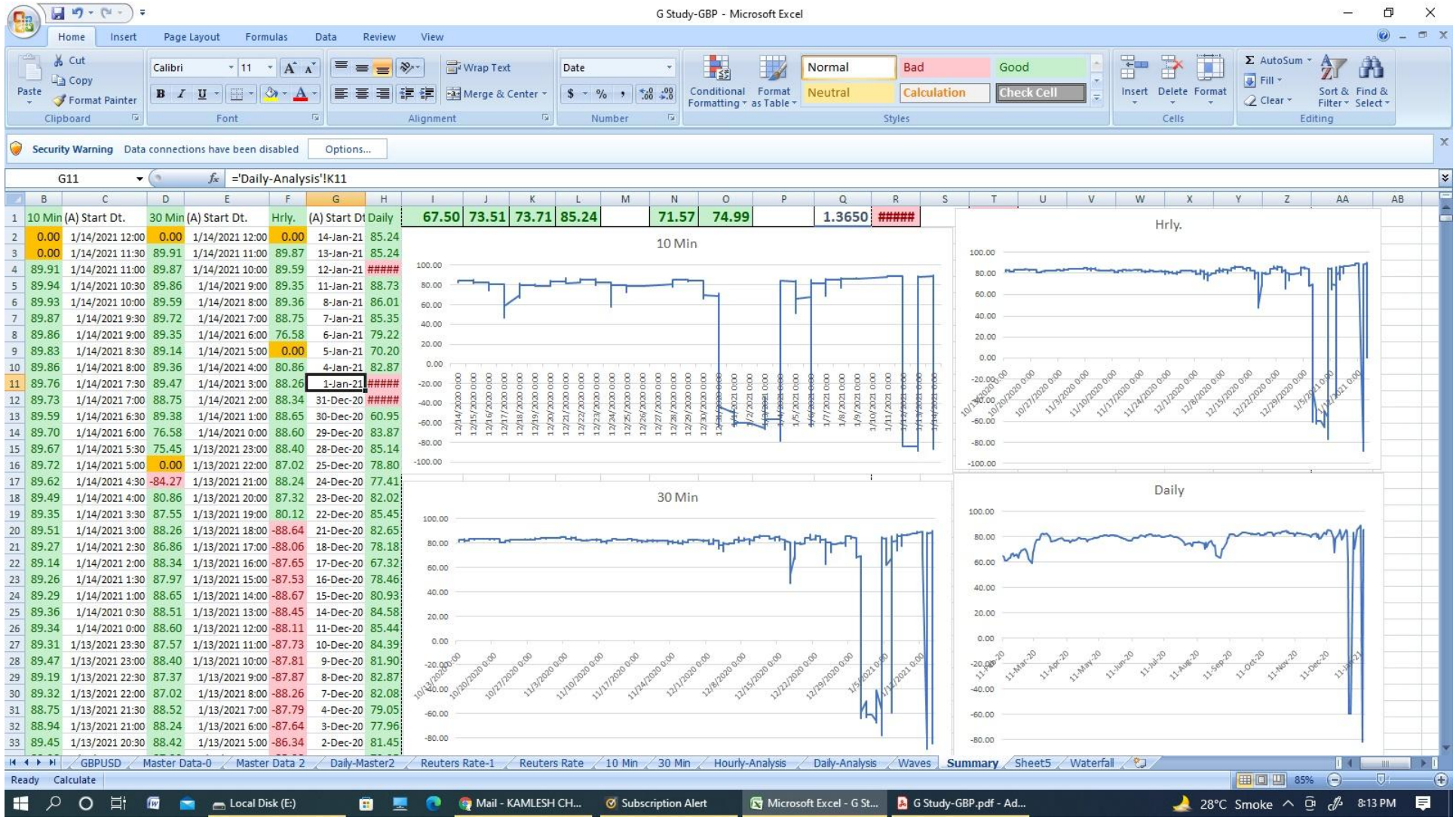
Live Reuters/Refinitiv and Bloomberg trading platform and content platform provided by State Bank of India.

Lo, A. W., Mamaysky, H., & Wang, J. (2000). Foundations of technical analysis: Computational algorithms, statistical inference, and empirical implementation. *Journal of Finance, 55*(4), 1705–1765. https://doi.org/10.1111/0022-1082.00265

Nison, S. (2001). *Japanese candlestick charting techniques: A contemporary guide to the ancient investment techniques of the Far East* (2nd ed.). Prentice Hall. ISBN 978-0735201811. Retrieved from https://pakyahussin.com/wp-content/uploads/2019/07/Steve-Nison-Japanese-Candlestick-Charting-Techniques-Prentice-Hall-Press-2001.pdf

Park, C.-H., & Irwin, S. H. (2009). Price trends and patterns in technical analysis: A theoretical and empirical examination. *Journal of Banking & Finance, 33*(6), 1089–1100. https://doi.org/10.1016/j.jbankfin.2008.12.010

Annexure



	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	10 Min	(A) Start Dt.	30 Min	(A) Start Dt.	Hrly.	(A) Start Dt	Daily	67.50	73.51	73.71	85.24		71.57	74.99		1.3650	#####
2	0.00	1/14/2021 12:00	0.00	1/14/2021 12:00	0.00	14-Jan-21	85.24										
3	0.00	1/14/2021 11:30	89.91	1/14/2021 11:00	89.87	13-Jan-21	85.24										
4	89.91	1/14/2021 11:00	89.87	1/14/2021 10:00	89.59	12-Jan-21	#####										
5	89.94	1/14/2021 10:30	89.86	1/14/2021 9:00	89.35	11-Jan-21	88.73										
6	89.93	1/14/2021 10:00	89.59	1/14/2021 8:00	89.36	8-Jan-21	86.01										
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8	89.86	1/14/2021 9:00	89.35	1/14/2021 6:00	76.58	6-Jan-21	79.22										
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10	89.86	1/14/2021 8:00	89.36	1/14/2021 4:00	80.86	4-Jan-21	82.87										
11	89.76	1/14/2021 7:30	89.47	1/14/2021 3:00	88.26	1-Jan-21	#####										
12	89.73	1/14/2021 7:00	88.75	1/14/2021 2:00	88.34	31-Dec-20	#####										
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14	89.70	1/14/2021 6:00	76.58	1/14/2021 0:00	88.60	29-Dec-20	83.87										
15	89.67	1/14/2021 5:30	75.45	1/13/2021 23:00	88.40	28-Dec-20	85.14										
16	89.72	1/14/2021 5:00	0.00	1/13/2021 22:00	87.02	25-Dec-20	78.80										
17	89.62	1/14/2021 4:30	-84.27	1/13/2021 21:00	88.24	24-Dec-20	77.41										
18	89.49	1/14/2021 4:00	80.86	1/13/2021 20:00	87.32	23-Dec-20	82.02										
19	89.35	1/14/2021 3:30	87.55	1/13/2021 19:00	80.12	22-Dec-20	85.45										
20	89.51	1/14/2021 3:00	88.26	1/13/2021 18:00	-88.64	21-Dec-20	82.65										
21	89.27	1/14/2021 2:30	86.86	1/13/2021 17:00	-88.06	18-Dec-20	78.18										
22	89.14	1/14/2021 2:00	88.34	1/13/2021 16:00	-87.65	17-Dec-20	67.32										
23	89.26	1/14/2021 1:30	87.97	1/13/2021 15:00	-87.53	16-Dec-20	78.46										
24	89.29	1/14/2021 1:00	88.65	1/13/2021 14:00	-88.67	15-Dec-20	80.93										
25	89.36	1/14/2021 0:30	88.51	1/13/2021 13:00	-88.45	14-Dec-20	84.58										
26	89.34	1/14/2021 0:00	88.60	1/13/2021 12:00	-88.11	11-Dec-20	85.44										
27	89.31	1/13/2021 23:30	87.57	1/13/2021 11:00	-87.73	10-Dec-20	84.39										
28	89.47	1/13/2021 23:00	88.40	1/13/2021 10:00	-87.81	9-Dec-20	81.90										
29	89.19	1/13/2021 22:30	87.37	1/13/2021 9:00	-87.87	8-Dec-20	82.87										
30	89.32	1/13/2021 22:00	87.02	1/13/2021 8:00	-88.26	7-Dec-20	82.08										
31	88.75	1/13/2021 21:30	88.52	1/13/2021 7:00	-87.79	4-Dec-20	79.05										
32	88.94	1/13/2021 21:00	88.24	1/13/2021 6:00	-87.64	3-Dec-20	77.96										
33	89.45	1/13/2021 20:30	88.42	1/13/2021 5:00	-86.34	2-Dec-20	81.45										