1. What is the concept of cyclical

momentum?

I’ve been enjoying several good weeks. Some of that is to be expected at this time of year. I’m a big fan of summer, complete with long hours of daylight, soaring temps, and abundant flora and fauna everywhere I look. By contrast, I can get a little grim and enervated for a few weeks on either side of the winter solstice.

This is far from unique to me. Most people are familiar with the notion of circadian rhythms, cycles based on a day, but circannual rhythms are also a known phenomenon. Circa-monthly, too (I don’t know a tidier term for that one).

Such cycling goes well beyond the biological. Put humans together in a society, and they start playing off of one another to create other cycles. Bull-and-bear stock markets. Larger-scale economic upturns and downturns. Political sentiment. An individual immersed in all of these cycles might be hard-pressed to identify which of them is having what effect on his subjective reality. One might even subscribe to – or invent – unverifiable cyclic events in a search for explanation, if not predictability (astrology, anyone?).

So, as I imagine most people do, I perceive cycles in my life. Mood, energy-level, motivation. Spates of good/bad news, even “luck,” as unscientific as such a thing seems to be for a physician to talk about. As a human, being a pattern-recognition machine, I probably selectively notice and overestimate things that mesh with whatever cyclic phase I’m in. If I’m in a good mood and a dozen random events come my way, I might perceive more of them to be positive than I otherwise would…and/or I might be less inclined to notice unhappier stuff.

(Lest it need saying: I’m not talking about pathological, unstable stuff like cyclothymia here. Any readers experiencing ego-dystonic cycling should probably be seeking individualized treatment from a mental health professional rather than hoping for direction from online blogs.)

I’ve come to find it worth my while to recognize my cycles, however subjective they may be, and when possible to adjust my behavior to take advantage of them. Or, to minimize whatever negative impact they might otherwise have.

An analogy: You’re pushing a kid on a swing-set. The swing is cycling between forward and backward arcs. If you want to make it go higher, you give it a push when the momentum of the cycle is in your favor—that is, the kid is moving forward, away from you. Pushing against the momentum, when he’s coming back towards you, will be disruptive, taking away from his overall arc (and being pretty jarring to the kid).

Similarly, if I can tell I’m on an upswing—good mood, high energy, things seeming to be going my way—I’ve got a better chance of good results when taking on tasks: getting chores done, solving problems, even writing columns like this one. If I’m “not feeling it,” I’m much better off leaving things for later on than forcing myself to plow ahead.

Sometimes that’s not an option, for instance if I’m on a schedule—a meeting or a deadline later today that can’t be pushed back without consequence. Having to “power through” when I’m in a downturn, even if absolutely necessary, can be unpleasant, feeling an awful lot more effort-intensive. Further, when looking back on things later on, it can be painfully obvious to me that things didn’t go as well as they might have. My performance in the meeting, or the quality of whatever I turned in for the deadline, was a middling B- instead of an A+.

There are some ways to prevent this from happening. Regarding deadlines, for instance, I like to get things done comfortably before they are due. In addition to keeping the pressure off, it gives me more chances to work on projects when I am cycling favorably. If my due-date is Friday and that turns out to be a lousy day, but I only got working on the task that morning, I’ve got no options. But, if I start looking to get it done at the outset of the week, and recognize that Tuesday or Thursday are turning out to be good days for me, I can declare either of them to be “soft” deadlines on the fly.

Of course, we don’t always have such a luxury of prep-time to “choose our window” for performance. That meeting scheduled for this afternoon, for instance, or the dozens of cases on your worklist, are stationary, pressing concerns. Sometimes there’s nothing for it but to grab an extra cup of coffee in the hope of goosing yourself into a brief, artificial upswing (and, truth be told, sometimes such “fake it till you make it” maneuvers actually work, reversing a downward cycle-phase).

A little over two years ago in this column, I described how I participated in a business-venture that almost succeeded. One of the ways I knew it had a good chance was that, initially, it felt like everything about it was flowing along easily, practically running itself without a hint of friction or resistance. My partners and I, our allies, even the market-sector we were pursuing, were all in a good place. We had momentum, and it was carrying us forward almost with a sense of guaranteed success, like it was meant to happen.

As months went by, however, that momentum faded. For whatever reason, the cycle had turned. Our every action now felt like it was facing resistance. Or without any effect whatsoever, like trying to push on a rope. We still gave it our best, but as it became increasingly clear that things no longer “wanted” to move forward, we saw that it made no sense to keep on throwing good resources (including time and effort) after bad.

In contrast, I’ll reiterate that these past few weeks have been good ones for me. I’ve taken multiple opportunities to let my cyclic momentum propel me forward—and it feels like this has resulted in something of a positive-feedback loop. That is, optimistically taking on more stuff (and at least perceiving that I’m doing well with it) might just have prolonged my usual summer-solstice upswing, which usually doesn’t last this long

2. What callback keeps track of hyperparameter values (along with other data) during training?

Machine learning algorithms are tunable by multiple gauges called hyperparameters. Recent deep learning models are tunable by tens of hyperparameters, that together with data augmentation parameters and training procedure parameters create quite complex space. In the reinforcement learning domain, you should also count environment params.

Data scientists should control hyperparameter space well in order to make progress.

Here, we will show you recent practices, tips & tricks, examples, and tools to manage, track, and visualize hyperparameters efficiently and with minimal overhead. You will find yourself in control of the most complex deep learning experiments

3. In the color dim plot, what does one column of pixels represent?

To create a two-dimensional image, each point in the image is assigned a color. A point in 2D can be identified by a pair of numerical coordinates. Colors can also be specified numerically. However, the assignment of numbers to points or colors is somewhat arbitrary. So we need to spend some time studying coordinate systems, which associate numbers to points, and color models, which associate numbers to colors.

2.1.1 Pixel Coordinates

A digital image is made up of rows and columns of pixels. A pixel in such an image can be specified by saying which column and which row contains it. In terms of coordinates, a pixel can be identified by a pair of integers giving the column number and the row number. For example, the pixel with coordinates (3,5) would lie in column number 3 and row number 5. Conventionally, columns are numbered from left to right, starting with zero. Most graphics systems, including the ones we will study in this chapter, number rows from top to bottom, starting from zero. Some, including OpenGL, number the rows from bottom to top instead.

Note in particular that the pixel that is identified by a pair of coordinates (x,y) depends on the choice of coordinate system. You always need to know what coordinate system is in use before you know what point you are talking about.

Row and column numbers identify a pixel, not a point. A pixel contains many points; mathematically, it contains an infinite number of points. The goal of computer graphics is not really to color pixels—it is to create and manipulate images. In some ideal sense, an image should be defined by specifying a color for each point, not just for each pixel. Pixels are an approximation. If we imagine that there is a true, ideal image that we want to display, then any image that we display by coloring pixels is an approximation. This has many implications.

Suppose, for example, that we want to draw a line segment. A mathematical line has no thickness and would be invisible. So we really want to draw a thick line segment, with some specified width. Let's say that the line should be one pixel wide. The problem is that, unless the line is horizontal or vertical, we can't actually draw the line by coloring pixels. A diagonal geometric line will cover some pixels only partially. It is not possible to make part of a pixel black and part of it white. When you try to draw a line with black and white pixels only, the result is a jagged staircase effect. This effect is an example of something called "aliasing." Aliasing can also be seen in the outlines of characters drawn on the screen and in diagonal or curved boundaries between any two regions of different color. (The term aliasing likely comes from the fact that ideal images are naturally described in real-number coordinates. When you try to represent the image using pixels, many real-number coordinates will map to the same integer pixel coordinates; they can all be considered as different names or "aliases" for the same pixel.)

Antialiasing is a term for techniques that are designed to mitigate the effects of aliasing. The idea is that when a pixel is only partially covered by a shape, the color of the pixel should be a mixture of the color of the shape and the color of the background. When drawing a black line on a white background, the color of a partially covered pixel would be gray, with the shade of gray depending on the fraction of the pixel that is covered by the line. (In practice, calculating this area exactly for each pixel would be too difficult, so some approximate method is used.) Here, for example, is a geometric line, shown on the left, along with two approximations of that line made by coloring pixels. The lines are greatly magnified so that you can see the individual pixels. The line on the right is drawn using antialiasing, while the one in the middle is not:

Note that antialiasing does not give a perfect image, but it can reduce the "jaggies" that are caused by aliasing (at least when it is viewed on a normal scale).

There are other issues involved in mapping real-number coordinates to pixels. For example, which point in a pixel should correspond to integer-valued coordinates such as (3,5)? The center of the pixel? One of the corners of the pixel? In general, we think of the numbers as referring to the top-left corner of the pixel. Another way of thinking about this is to say that integer coordinates refer to the lines between pixels, rather than to the pixels themselves. But that still doesn't determine exactly which pixels are affected when a geometric shape is drawn. For example, here are two lines drawn using HTML canvas graphics, shown greatly magnified. The lines were specified to be colored black with a one-pixel line width:

The top line was drawn from the point (100,100) to the point (120,100). In canvas graphics, integer coordinates corresponding to the lines between pixels, but when a one-pixel line is drawn, it extends one-half pixel on either side of the infinitely thin geometric line. So for the top line, the line as it is drawn lies half in one row of pixels and half in another row. The graphics system, which uses antialiasing, rendered the line by coloring both rows of pixels gray. The bottom line was drawn from the point (100.5,100.5) to (120.5,120.5). In this case, the line lies exactly along one line of pixels, which gets colored black. The gray pixels at the ends of the bottom line have to do with the fact that the line only extends halfway into the pixels at its endpoints. Other graphics systems might render the same lines differently

4. In color dim, what does "poor teaching" look like? What is the reason for this?

We are aware there are plenty of shortages at the moment including teachers, bus drivers, cafeteria cooks, support staff. And add in a tremendous need for counselors, nurses, social workers, psychologists. Do you see that happening? I hope so! What better use of funding than supporting our traumatized children and staff. Let’s also remember there are probably no classroom volunteers, and likely shortage of paras. That puts a huge burden on teachers.

And let’s consider administrators, the tough decisions being made by principals and superintendents. I thought I had a challenging situation, where I was, while Principal, but nothing like this. It’s also time to take a look at School Boards and their significant role in what happens. Hopefully administrators and teachers are actively seeking out Board Members to share needs and requests. Better yet, I’d love to see educators running to be on School Boards, then we’ll really see changes in favor of what teachers know to be true. Their everyday action research is meaningful and powerful. Power and politics right now are run amok, in my opinion and I hope to see that change in the short term.

School Principals, Assistant principals. This is leadership where it really counts. How admirable watching these Captains right their ships with laser like focus. It matters. Leadership right now, in this defining moment puts us on the cusp of a brave new educational world, future is now, really. It’s imperative that school leadership is shared, with teachers’ opinions counting. If there was ever time for autonomy, it’s right now. I recognize teachers can’t take on one more thing, but having a voice in what happens at school is worth that effort.

And Tik Tok Trends, Unlawful and Dangerous, to Deal With.

After I finished my draft of this article, I caught a really sickening article in my newsfeed. Written by Alia Wong, in USA Today: Her headline is ‘Devious licks’ asks students to’ smack a staff member.’ The nation’s teachers are feeling burnt out.”

“Educators across the country are already overwhelmed with the chaos that is teaching during a pandemic. As if that weren’t enough, now they’re contending with a different kind of chaos: a TikTok trend that encourages students to cause havoc on campus.

This month, that havoc could reach a new level, resulting in physical violence against teachers and other school employees. And the prospect has already-demoralized educators increasingly worried about the sustainability of their profession as it stands.” In September, its inaugural month, the so-called “devious licks” trend challenged students to steal and vandalize school property…. This month’s challenge is to “smack a staff member.” Challenges for subsequent months range from “mess up school signs” and “flip off the front office” to kiss your friend’s girlfriend at school and more, I prefer not to repeat here. Take a look at the article. I’m really overwhelmed with the idea that having been out of school for so long, rather than being elated to be back, in some instances, school culture and sense of belonging have really taken a beating. This is just unreal to me. Worth a school conversation.

Challenging Times, Extraordinary Opportunities

I’ve been saying since March ’20, “Challenging Times, Extraordinary Opportunities”. But at this time, I’m just not sure how many teachers even had opportunity to be heard as collective voices what they think needs to happen to reach and teach all children. Who were the deciders to leave schools and teachers so unprepared to feel safe, physically, mentally and emotionally? I’m not blaming here, just flummoxed how we all got to this state of unknowns, treading water, wading in, then wham caught in an undertow sucking life out, while still watching for that lighthouse beam to cast a light of ok now.

Besides obvious concerns about all children, beyond basic Maslow needs of shelter, clothing and food, do students finally have internet access and an actual iPad or Chromebook? Are kids still sitting in parking lots to get a signal? Or are most of those kids back in schoolhouse, face to face, with its own challenges? My first and most basic question is simply where are all the kids? And for those back in schoolhouse, whether hybrid, remote, in person or variation on a theme, there are some definite commonalities. All is not well and teachers are not ok. Teaching today is much different than pre-pandemic. We certainly know that. So many teachers are making it all look easy because that’s what teachers always do. Take things in stride, until snap! There’s a breaking point and we are just scotch taping broken rubber bands and reusing old bandaids

5. Does a batch normalization layer have any trainable parameters?

Just like the parameters (eg. weights, bias) of any network layer, a Batch Norm layer also has parameters of its own: Two learnable parameters called beta and gamma.

6. In batch normalization during preparation, what statistics are used to normalize? What about during the validation process?

Batch-Normalization (BN) is an algorithmic method which makes the training of Deep Neural Networks (DNN) faster and more stable. It consists of normalizing activation vectors from hidden layers using the first and the second statistical moments (mean and variance) of the current batch.

7. Why do batch normalization layers help models generalize better?

Batch normalization solves a major problem called internal covariate shift. It helps by making the data flowing between intermediate layers of the neural network look, this means you can use a higher learning rate. It has a regularizing effect which means you can often remove dropout.

8.Explain between MAX POOLING and AVERAGE POOLING is number eight.

There are two types of Pooling: Max Pooling and Average Pooling . Max Pooling returns the maximum value from the portion of the image covered by the Kernel. On the other hand, Average Pooling returns the average of all the values from the portion of the image covered by the Kernel.

9. What is the purpose of the POOLING LAYER?

Pooling layers are used to reduce the dimensions of the feature maps. Thus, it reduces the number of parameters to learn and the amount of computation performed in the network. The pooling layer summarises the features present in a region of the feature map generated by a convolution layer.

10. Why do we end up with Completely CONNECTED LAYERS?

Fully connected layers are global (they can introduce any kind of dependence). This is also why convolutions work so well in domains like image analysis - due to their local nature they are much easier to train, even though mathematically they are just a subset of what fully connected layers can represent.

11. What do you mean by PARAMETERS?

A parameter (from Ancient Greek παρά (pará) 'beside, subsidiary', and μέτρον (métron) 'measure'), generally, is any characteristic that can help in defining or classifying a particular system (meaning an event, project, object, situation, etc.).

12. What formulas are used to measure these PARAMETERS?

Measurement Formulas

Measurement formulas are the estimation of ratios of quantity it compares a quantity with a standard unit. The basic measurements are mass, distance, area, and volume. The measurement formulas help us find these basic measurements with the given parameters. They also include some conversion formulas like conversion of an inch to feet, meter to miles, etc. A few of the measurement formulas are given below along with a few solved examples.

What Are Measurement Formulas?

Measurement formulas for the different objects are different. Measurement formulas are very necessary for our calculations of the parameters that we want to know. With measurement in math, we mean calculating, the perimeter, area, volume. Measurement formulas vary according to the dimensions of an object. The dimensions of an object can be classified as 2-dimensional shapes or 3-dimensional shapes. Let us learn about few measurement formulas based on the shapes.

Examples Using Measurement Formulas

Example 1: Noah measured the sides of the square to 12 inches, what would be the area of this square? Solve it by using measurement formulas.

Solution:

To find: The area of a square.

The sides of the square = 12 inches (given)

Using measurement formulas,

Area of a Square = (side)2

Area of a Square = (12)2

= 144 m2

Answer: The area of a square is 144 m2.