Using Libre 1 minute data in autoISF

As a **background** AAPS is configured in general to work with 5 minute data. However, as long as all calculation results like deltas are normalised to 5 minute intervalls there is no numerical conflict. Still, there are some things to be aware of.

Every time a new Libre reading arrives AAPS rebuilds an array of BG values 5 minutes apart. So it contains the Libre data from now, now-5m, now-10m, etc. This array is then treated just like coming from any other CGM. It can be smoothed, deltas can be calculated, etc. A minute later, i.e. at time now+1, this whole process starts over again and the new BG array then holds readings from now+1, now-4, now-9, etc. The readings in this new array are all different from the ones a minute earlier and only after 5 minutes the bulk of that array has the previous values in its history. One implication of this is an **optical illusion** on the home screen. Like a serpent ([animate](#)) the 5 minute subset (bright green dots) seems to creep along the white circles representing the Libre data. Similarly in AndroidCar the deltas displayed do not correlate with the BG displayed now and at now-1m.

How to handle **smoothing**? The readings from Libre genrate a much more "rounded" curve than some other raw CGM data. A special effort of 2nd order exponential smoothing the 1 minute readings itself mainly resulted in a time shift while the shape did not change much. Therefore that special smoothing effort was thrown overboard and the exponential smoothing is applied to the subsets of every 5th reading described above. So, the loop algorithm is fed with those smoothed BG and delta values.

For the **parabola fit** it is another story. As mentioned before the Libre readings do not vary wildly within 1 minute and using the raw readings as input for the parabola fit proved to be working fine. Keep in mind, that the fit algorithm by its nature determines a smooth parabola which best aproaches the data points without modifying them. Sometimes or for some users the Libre spectrum can show oscillations overlayed on an otherwise smooth path. Such an oscillation peak has a duration of typically 10 minutes and therefore the minimum length for the parabola fit was set to 20 minutes in order to avoid resonance situations between an oscillation half wave and a parabola.

Why not use **xDrip**? It can be used as an alternative to do smoothing or send datae only every 5 minutes. That remains an otion if users prefer it or have other reassons to include xDrip in the process chain. But beware of a trap in xDrip: when a Libre reading arrives earlier than 60 sec that value is rejected by xDrip and no loop is triggered You better have Juggluco send data to AAPS and xDrip in parallel to avoid such drop outs.

One other important aspect when using 1 minute readings is related to the **smb_delivery_ratio**. Normally we expect large SMB as soon as possible to be advantageous. Here, the opposite proved to be better. Using several small steps rather than a few large steps resulted in smoother performance. So autoISF now alloows ratios down to 0.1 aand 0.2 seems to be a good starting value. The added advantage of such lower ratios is that responses to sensor noise are much smaller.

One other aspect of using 1 minute data is the **drain on battery**. In my case it mainly impacts the Combo battery because of more frequent TBR andjustments and minor SMBs. Its battery now lasts only 2 weeks compared to 4 weeks with the 5 minute Eversense.

In summary the recommended data flow is very simple: Juggluco → AAPS → exponential smoothing. Set a delivery ratio below 0.5.