**What to do:**

1. **Choose This paper: “Avoiding bad steps in Frank-Wolfe variants”**
2. **Implement these three Algorithms from the paper in Python:(Don't worry, it is easy).**
3. **Write a literature review of the paper and your results from the python for the report.**

**Algorithm 1:** First-order method

**Initialization.** x0 ∈ Ω, k := 0.

1. If xk is stationary, then STOP

2. select a descent direction dk ∈ A(xk , −∇f (xk ))

3. set xk+1 = xk +αkdk for some stepsize αk ∈ [0,αmax]

4. set k:=k+1, go to Step 1.

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**Algorithm 2:** First-order method with SSC

**Initialization.** x0 ∈ Ω, k = 0. 1. **while** xk is not stationary:

1. g = −∇f(xk)
2. xk+1 =SSC(xk,g)

5. k = k + 1

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**Algorithm 3:** SSC(x ̄,g)

**Initialization.** y0 = x ̄, j = 0. **Phase I**

1.

2.

3.

**Phase II**

4. compute βj with (4.2

1. letα=min(α(j),β) j maxj
2. yj+1=yj+αjdj
3. **if**αj=βj**then**:
4. **return** yj +1
5. j=j+1,gotoStep1.