BCILAB: Building and Testing a Simple BCI Model

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Uses of BCI Technology
The BCILAB Toolbox

Q = sparse(0);
for i=1:m
    Q = Q + F(i);
end
Q_inv = inv(Q);
if nnz(Q_inv) > m
    Q_inv = full(Q_inv);
end

for k=1:param.maxit
    for i=1:m
        % primal variable
        Lz = F(i).L'*F(i).x;
        F(i).x = F(i).x + Lz;
        % dual variable
        F(i).u = F(i).u - Lz;
        % consensus variable
        zold = z;
        z = 0;
        for i=1:m
            z = z + F(i).L'*F(i).x - F(i).u;
        end
    end
end
Background

• Developed for *real-time cognitive state assessment / BCI*
  – Utilized in a large US research program (CaN CTA)
  – Focus on advanced methods development, rapid prototyping, simulation, testing, evaluation of BCIs
  – Now the largest open-source BCI toolbox by number of methods and algorithms (2012)

• Built with the user community in mind
  – Integrated with widely-used EEGLAB ecosystem
  – Open source, plugin-based, extensible toolbox

• Precursor was the PhyPA toolbox (Kothe/Zander, 2006)
Demo