**Introduction**

**Context**

(There are two reading which measures blood pressure. SBP is the higher number and diastolic pressure is the lower number.)

SBP measures the force of blood being pushed around the body when your heart contracts. Studies have shown that SBP is an important marker in the risk of all-cause mortality and chronic diseases. (including heart attack, stroke, diabetes and more.)

**Question/Interest**

We aim to build a model to determine the effect and estimate the magnitude of several factors (gender marital status, smoking status , age , height, BMI and condition of overweight ) on SBP of “young and middle aged adults”.

(Yes, we are all covered. You can easily use our model to predict your own SBP and increase longevity by adjusting those factors.)

**(The definitions of “model selection” and “model validation” is in Lec17, and “model diagnosis” is in Lec 19,20)**

**Procedures**

To build a proper model, we go through a three-step procedure. Model selection, model validation, and model diagnosis.

Model selection is essentially finding the simplest model (with forward/ back/forward step), by narrowing the number of variables. (Using a list of criterions including R2, R\_adj2, Cp, AIC, BIC)

Model validation is to confirm the effectiveness of our model on an independent set of data.(in our model, we use 40% of data to test the effectiveness.)(using methods of MSPR, cross validation, PRESS)

Model diagnosis is to determine the model adequacy by controlling some special data. This is because some data can be so big and so small that these data literally work like a “lever” tilting the regression line towards the points, which we call it leverage.

Reference List;

Bhyan, Poonam, et al. “ASSOCIATIONS OF SYSTOLIC BLOOD PRESSURE (SBP) <120 (VERSUS 120-139) MMHG WITH OUTCOMES IN PATIENTS WITH HEART FAILURE AND PRESERVED EJECTION FRACTION (HFPEF) WITHOUT HYPERTENSION (HTN).” *Journal of the American College of Cardiology*, vol. 71, no. 11, Elsevier Inc, 2018, pp. A919–A919, <https://doi.org/10.1016/S0735-1097(18)31460-8>.

Böhm, Michael, et al. “Heart Failure and Renal Outcomes According to Baseline and Achieved Blood Pressure in Patients with Type 2 Diabetes: Results from EMPA-REG OUTCOME.” *Journal of Hypertension*, vol. 38, no. 9, Copyright Wolters Kluwer Health, Inc. All rights reserved, 2020, pp. 1829–40, https://doi.org/10.1097/HJH.0000000000002492.